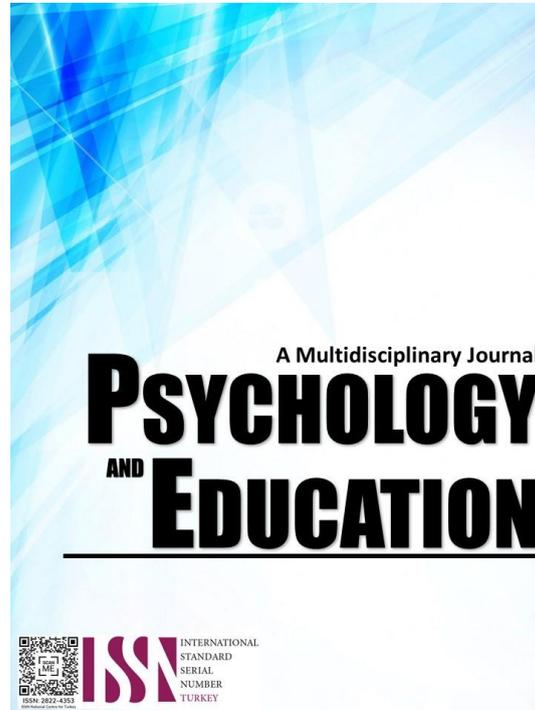


**DEVELOPMENT AND VALIDATION OF  
RESPONSIVE, EMPOWERED, AND REFLECTIVE  
INTERVENTION (RERI) MATERIAL FOR SCIENCE 9**



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## Development and Validation of Responsive, Empowered, and Reflective Intervention (RERI) Material for Science 9

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### Abstract

Numerous issues, notably the lack of instructional materials and teaching resources that are in line with the learning outcomes outlined by the Department of Education, have an impact on the state of scientific Education today. (DepEd). According to Allison Academy (2021), The poor quality of fundamental science and math Education, which is reflected in the scarcity of science education facilities, is indicated by the low achievement scores of Filipino pupils on numerous assessments. Additionally, there is a lack of teaching resources that are in line with the goal competencies. With the issue of scarcity of instructional materials that are aligned with the target competencies that are lacking, it is a challenge to develop appropriate intervention materials that may enhance student learning and may resolve this kind of dilemma using the ADDIE model. This study focused on developing and validating intervention materials in Science for Grade 9 students for the School Year 2022-2023 with the DepEd, seven (7) identified by the researcher's Least mastered competency. A descriptive developmental method research design was used in the study. It was conducted in Mulanay, Quezon and Macalelon, Quezon. The participants were Ten (10) experts from the Division of Quezon composed of (4) Science teachers, (3) English teachers, and (3) Graphic Design NCIII holders who were asked to evaluate and validate the intervention materials selected through purposive sampling techniques. The instrument used was a validated survey questionnaire. The conduct of a questionnaire through validation was used to gather data. (1) Explaining how the respiratory and circulatory systems operate together to move nutrients, gases, and other substances to and from the various regions of the body was found to be one of the least taught competencies, according to the study's findings. (2) Draw conclusions on how a person's lifestyle may impact how well their circulatory and respiratory systems work. (3) Describe where genes are located on chromosomes. (4) Describe the various non-Mendelian inheritance patterns. (5) Discuss the ways in which Rutherford's atomic model was enhanced by Bohr's atomic model. (6) Describe how the electrons' energy and locations are described by the quantum mechanical model of the atom. (7) Identify several compounds (covalent or ionic) based on their physical characteristics, such as melting point, hardness, polarity, and electrical and thermal conductivity. (8) Using models, demonstrate which constellations can be seen at various times of the year. (9) Draw the conclusion that heat transmission can be employed to perform work and that heat is released during work. (10) Describe the production, transmission, and distribution of electrical energy. In the development of the RERI materials, the study revealed that (a). The material used were bond papers, printers, binders, and staple wires with a total cost of Php. 8,720.00. (b) It took eight weeks for the development process to consume 4 hours on weekdays. (c) The people involved are the ten (10) validators. Under the validation of the RERI materials, the findings were most of the validators rated the Adequacy as valid with a grand mean of 4.50 and a descriptive equivalent of very much valid. Regarding the Coherence, most of the validators rated much valid with a mean of 4.42 and a descriptive equivalent of very much valid. When it comes to Appropriateness, most of the validators rated much valid with a mean of 4.28 and a descriptive equivalent of very much valid. Almost all of the validators rated the Usefulness of the developed intervention material as much valid, with a mean of 4.68 and a descriptive equivalent of very much valid. The output of the study was Responsive, Empowered, and Reflective Intervention (RERI) materials that may improve the student's level of progress in learning. Based on the findings and conclusions, the researcher recommended the output to use; since the study developed an intervention material for Science G9 as a remedy for the least mastered competencies, administrators and curriculum planners may allow the use of the developed intervention materials in improving Science instructions.

**Keywords:** *least learned competencies, learning competency, development, validation, adequacy, coherence, appropriateness, and usefulness*

## Introduction

The new learning modalities brought about by the epidemic generated numerous modifications in the Philippine educational system. Challenges result from these developments. The requirement for more educational materials appropriate for various learning modalities is one of the problems they confront when presenting modalities. During the first two years of the country's new modalities' implementation, this issue grew into an unavoidable problem. The Department of Education (DepEd) confirmed that activity sheets and other modules for the students' use had not yet been distributed promptly. (Boron, 2021).

The Fourth Industrial Revolution's problems and the world's rapid change have continued to alter the educational environment of today. The difficult task of educating Generation Z to keep them current with the digital world presents a challenge to educators. Globally speaking, the Philippines lags behind other nations in terms of educational quality, especially when it comes to science education. According to the World Economic Forum (2018), the Philippines was ranked 76th out of 137 nations for the quality of its math and science education and 55th out of 137 for higher education.

Many issues are affecting the state of science education today; one is the lack of teaching resources and tools that are in line with the DepEd-mandated learning outcomes. There are some science topics and principles that teachers find challenging to teach since there aren't many resources available that are pertinent, responsive, and based on research. The low accomplishment scores of Filipino children on various tests are a sign of the poor quality of basic science and math education, which is reflected in the scarcity of science education facilities, claims Allison Academy (2021). Additionally, there aren't enough instructional materials that address the target competencies.

Teachers must use their creativity to come up with the required, appealing, and engaging tools that students can use in class in order to address this issue. Since science is such an important part of the teaching-learning process, it is highly recommended that teachers use adequate and thoughtfully designed instructional materials appropriate for the type of learners. It has a significant impact on the student's academic achievement, especially in science (Study Drive, 2021).

Additionally, instructional materials (IMs) like textbooks, workbooks, modules, and intervention materials are crucial teaching tools because they let

students engage with words, images, and ideas in ways that help them improve their reading, speaking, listening, writing, and other multifaceted skills (Boukoye, 2019).

Intervention resources are thought to be the main source of comfort and confidence for science teachers in general and in teaching in general. If there are intervention materials readily available for them to use, they find it simple to impart knowledge to learners. This is essentially the justification for why intervention resources must be accessible and readily available in every classroom (National Council of Teachers of English, 2021). Obviously, the need for developing and using learning materials, such as intervention materials in teaching science, heaps up. The development of the Responsive, Empowered, and Reflective Intervention (RERI) materials in Science G9 is an intervention material designed for remediation purposes. It is considered one of the solutions to enhance the academic achievement of students performing poorly in class.

The researcher was challenged to create suitable intervention materials that would boost student learning and address this type of conundrum because there aren't many instructional materials that are in line with the target capabilities that need to be addressed.

## Research Questions

The focus of this study was to develop appropriate intervention materials in Science for Grade 9 students of Calantas National High School, which would enhance their learning in the subject. Specifically, this study aimed to answer the following questions:

1. What are the least learned competencies of students in Science 9 in the following topics:
  - 1.1. Respiratory and Circulatory Systems Working with the Other Organ Systems
  - 1.2. Heredity: Inheritance and Variation
  - 1.3. Electronic Structure of Matter
  - 1.4. Chemical Bonding
  - 1.5. Constellations
  - 1.6. Work Power and Energy
  - 1.7. Electricity and Magnetism
2. How does the researcher develop the RERI material in terms of the following:
  - 2.1. materials
  - 2.2 time/duration
  - 2.3 person involved
3. How valid are the RERI materials in terms of the following:
  - 3.1 adequacy
  - 3.2 coherence
  - 3.3 appropriateness
  - 3.4 usefulness
4. Based on the validation made, what improved RERI materials can be offered by the researcher?



## Methodology

### Research Design

The researcher used a descriptive developmental method, which focused on the development of intervention material to facilitate learning of the least-learned and least-practiced concepts and skills of Grade 9 students in science.

Harrapa (2021) highlighted how the descriptive approach looks for the facts regarding a problem. Furthermore, this method primarily describes, compares, analyzes, and interprets existing data. Meanwhile, Radcliff (2022) defined developmental technique as a corpus of the research literature directly related to instructional development, implying that this study will produce an output. In other words, a descriptive developmental method is a systematic study of putting into the design, development, and careful evaluation of instructional programs, processes, and products that must meet the standard or criteria.

### Research Locale

This study was conducted at Calantas National High School, Olongtao National High School, and Bondoc Peninsula Agricultural High School. Specifically, the Public Science teachers from the third district of Quezon will participate in the research. Since the qualified validators were mostly from the mentioned school, it was selected as a research locale. From this, the researcher will ensure the completion of the data gathering and the validating of the materials.

The validation will be participated by the experts, including four (4) Science teachers with units in master's degrees who are experts on intervention material development, three (3) English teachers for grammar and choice of words, and three (3) ICT experts for the graphics included in the materials. They will evaluate the RERI materials' appearance and content validity based on their adequacy, coherence, appropriateness, and usefulness.

### Population and Sample

The study used a purposive sampling technique in choosing the participants, involving two participant groups.

Table 1. *The First Group Respondents of the Study*

Section	School	Male	Female	Total
G9-Bonifacio	Calantas National High School	16	14	30
G9-Rizal	Calantas National High School	15	14	29
G9-Mabini	Calantas National High School	11	15	26
Total		42	43	85

The first group was the 85 Grade 9 from Calantas National High School. They were selected as study participants since they satisfied the following selection criteria: (1) a bona fide student of the Calantas National High School; and (2) enrolled as Grade 9 students during the School Year 2022-2023. These students were given a diagnostic test to determine their least learned competencies in Science G9. Before the student's involvement in the study, the researcher secured an informed consent form from them.

Table 2. *The Second Group Respondents of the Study*

Districts	School	Science Teachers			Information Communication Technology Teacher (Graphic Design NCIII Holder)	English Teacher (With Units In Ph.D. / A Ph.D. Degree Holder)	TOTAL
		With Units In Masters Degree	Masters Degree Holder	Science Master Teachers /Ph.D. Degree Holder			
Macalelon	Olongtao National High School			1		1	
Mulanay1	Bondoc Peninsula Agricultural High School	2		1	3	9	
Total		2		2	3	10	

The second group of participants was the validators. The content validators comprise one school head, 3 Science teachers with units in Master's Degree, 2 Science teachers who are Master's Degree Holders majoring in science, and 3 Science Master Teachers and Doctorate holders from selected schools in the third district of Quezon. On the other hand, the English validators are composed of 3 English teachers with units in Doctorate or a Doctorate holder. They validated the material in terms of grammar and choice of words. Lastly, the IT validators comprised 2 ICT experts with Graphic Design NCIII holders. They were responsible for validating the graphics and pictures used in the material. All the validators were asked to validate the appearance and content of the RERI material in terms of adequacy, coherence, appropriateness, and usefulness.



### Research Instrument

The researcher used a diagnostic test for Grade 9 students to measure their least-learned Competency in Science 9. Before the diagnostic test was given, it was subjected to content and construct validity. Based on the item analysis conducted, the inter-item reliability was found to be high. For the validators, the researcher used a standardized evaluation tool for the instructional materials adopted from the College of Education, Arts, and Sciences of the University.

### Data Gathering Procedure

The product development of the RERI material followed the ADDIE model. This model guided the

researcher through creating effective educational material for science subjects. The phases in the ADDIE model were followed in the study. First was the Analysis Phase, which included the diagnostic or needs assessment to determine the Grade 9 students' least-learned competencies in Science 9. The researcher reviewed selected Science G9 books published in the Philippines to determine the content of the test. Second was the Design Phase, in which the researcher selected essential learning competencies, assessments, activities, and content, based on the diagnostic test results. Third was the Development Phase, in which the researcher started crafting the activities to be included in the RERI material. The activities included were student-centered and reflective under DepEd Order no. 031 s. 2020. The fourth phase in the ADDIE model is the Implementation Phase. However, this phase was not included since the study only focused on subjecting the developed material to expert validation. The last phase was the Evaluation Phase, where the material was subjected to expert validation to gauge the RERIs' face and content validity based on adequacy, coherence, appropriateness, and usefulness. Four experts were requested to complete the expert validator's form. The group comprised Science teachers who obtained units in master's degree or a master's degree holder specializing in instructional material development. The experts' and students' verbal suggestions and comments were considered for the material's revision. The revised RERI material was then subjected to final evaluation.

## Results and Discussion

### Identifying the Least Learned Competencies

Teaching the students of today's generation has been a perennial challenge for teachers, particularly in providing these students with the core competencies to be more globally competitive and functionally literate in science and biological disciplines.

Table 3. *Identified Least Learned Competencies in Science Topics*

Content/Topic	Identified Least Learned Competencies
Respiratory and Circulatory Systems Working with the Other Organ Systems	<ul style="list-style-type: none"> <li>✚ Explain how the respiratory and circulatory systems work together to transport nutrients, gases, and other molecules to and from the different parts of the body.</li> <li>✚ Infer how one's lifestyle can affect the functioning of the respiratory and circulatory systems.</li> </ul>
Heredity: Inheritance and Variation	<ul style="list-style-type: none"> <li>✚ Describe the location of genes in chromosomes.</li> <li>✚ Explain the different patterns of non-Mendelian inheritance.</li> </ul>
Electronic Structure of Matter	<ul style="list-style-type: none"> <li>✚ Describe how Bohr's model of the atom improved Rutherford's atomic model.</li> <li>✚ Explain how the Quantum Mechanical Model of the atom describes the energies and positions of the electrons.</li> </ul>
Chemical Bonding	<ul style="list-style-type: none"> <li>✚ Recognize different types of compounds (ionic or covalent) based on their properties, such as melting point, hardness, polarity, and electrical and thermal conductivity.</li> </ul>



Constellations	✚ Show which constellations may be observed at different times of the year using models.
Work Power and Energy	✚ Infer that heat transfer can be used to do work, and that work involves the release of heat.
Electricity and Magnetism	✚ Explain how electrical energy is generated, transmitted, and distributed.

Table 3 shows that in standardized testing, Grade 9 students in Calantas National High School tend not to reach their full potential; hence they underperform. This indicates that they only had little progress in science subjects. The item analysis results of the Grade 9 students in Calantas National High School showed low performance indicating that the topics presented on the table were "not mastered" by the students. The low mean percentage scores (MPS) tell that there are learners who are being tested with low mastery of concepts.

In general, Gillies (2018) defined academic underachievement as the perceived inability of students to achieve their potential. Dorgi (2021) Under achievement is defined as failing to meet the academic requirements imposed by the educational environment. Academic underachievement is a severe problem, mainly as it affects students of all abilities and is more than just a problem for bright students. Students' performance on standardized tests, the most common means of assessing and evaluating students, is frequently linked to this underachievement. This explains that low academic achievement indicates academic underachievement. Unfortunately, it still affects classroom instructions.

**Development of RERI Materials**

With the scarcity issue of instructional materials aligned with the target competencies, the researcher was challenged to develop appropriate intervention material to enhance student learning. The researcher crafted an intervention material called Responsive, Empowered, Reflective Intervention (RERI) Materials which was developed based on the identified least learned competencies of Grade 9 students at Calantas National High School in Science 9. The RERI material was anchored to the DepEd Order No. 18 series of 2018 and No. 001 series of 2021. The development of the RERI material followed the ADDIE model.

However, the implementation phase was not included since the developed material was only subjected to validation. The format, content, submission, funding, and evaluation were also adapted.

Table 4. *Cost of Materials Used in the Developed RERI Material*

Materials	Description/Quantity	Cost
Bond paper	One (1) ream, white, 8.5 x 11 in.	Php 185.00
Printer	One (1), Eson L3150, personal	Php 8, 500.00
Staple Wires Binder (Colored Paper)	One (1) box, No. 35 One (1) pcs., Violet, 8.5 x 11 in	Php 10.00 Php 25.00
<b>Total</b>		<b>Php 8,720.00</b>

Table 4 presents the materials and their cost used in developing and printing the RERI materials. The total cost of the materials was 8,720. 00. According to Section V-A 6.8 of DepEd Memorandum No. 018, Series of 2020, the purchase of capital outlay items (e.g., equipment, gadgets, software, or any item costing Php. 15,000 and above per unit) is not allowed. Like an online article released by Science Education Resource Center at Carleton College (SERC) 2020, Resources and materials for the EDDIE Module Development Process should either permit offline module use or contain pre-packaged versions of the materials. Also, knowing this material's strengths and limitations helps teachers appropriately select and use them for effective instruction. Print media's time- and cost-effectiveness account for some of their unique appeal. (Loyola, 2018).



Table 5. Time/Duration of the Development of the RERI Materials

Weeks	Dates	Number of Hours	Activity	Task Completed
				Identified the least mastered competencies in Science G9.
1	August 22-26, 2022	20 hrs.	Conducting a Pretest to identify the least mastered competencies in Science G9.	Gathered the pretest and conducted an item analysis. The least learned skills were used as bases for the construction of the intervention materials.
2	September 5-9, 2022	20 hrs.	Selecting the topics and learning objectives.	Selected learning objectives, assessment instruments, and content.
3-4	September 12-23, 2022	40 hrs.	Drafting the activities that were included in each part of the intervention material.	Drafted and finalized the activities that were included in the intervention material.
5-6	September 26-October 7, 2022	20 hrs.	Making a design and developing the RERI materials	Finalized the worksheets and edited the appropriate activities.
7	October 10-14, 2022	20 hrs.	Revision and Finalization of the RERI Material for Validation	Finalized and edited the RERI material in preparation for validation.
8	October 17-21, 2022	20 hrs.	Printing of the Intervention Material	Listed the needed materials for the printing of the RERI material.

Table 5 depicts the timeline of the development of RERI materials in Science 9 for the School Year 2022-2023. The table shows the activity and the actual task completed per week. It took three weeks to do each card and eight weeks for the development of the whole RERI materials. Approximately 4 hours were consumed every day of the week for the drafting and development of the activities, topics, and assessments for each topic since the researcher was also performing her duties as a teacher. Weekends were not included due to checking and other personal tasks.

According to McGuire (2021), The research proposal timeline should include the following in their online sample for timelines: (1) clearly state the start and finish dates; (2) provide an expected amount of project work hours each week; and (3) include a week-by-week breakdown of planned project milestones. In this way, the level of detail shows the reviewers that the project was carefully structured. Just like DepEd Order No. 001, Series of 2021, which set guidelines on the submission and evaluation of intervention materials.

Table 6. Persons Involved in the Development and Validation of the RERI Materials

Districts	School	Science Teachers			Information Communication Technology Teacher (Graphic Design NCIII Holder)	English Teacher (with units in Ph.D. / a Ph.D. Degree Holder)	TOTAL
		With units in Master's Degree	Master's Degree Holder	Science Master Teacher s /Ph.D. Degree Holder			
Macalelon	Olongtao National High School Bondoc Peninsula			1			1
Mulanay1	Agricultura 1 High School	2		1	3	3	9
Total		2		2	3	3	10

Table 6 shows the people involved in the development and evaluation of the RERI materials. They were composed of four (4) Science Junior/Senior High School teachers, three (3) English teachers with units in Master's degree, and three (3) Graphic Design NCIII Holder. They are all from the second district in the division of Quezon.

**Validation of the Intervention Material**

The RERI materials were evaluated and validated in terms of adequacy, coherence, appropriateness, and usefulness. Similarly, DepEd Order no. 001 series of 2021 has issued an evaluation rating sheet for content and was used by the Learning Resource Evaluators (LRFs) composed of classroom teachers, master teachers, and learning area experts.



Table 7. *Adequacy Validity of the Intervention Materials by Teachers*

<i>Adequacy</i>	<i>Sd</i>	<i>Mean</i>
1.1. Instruction corresponds with activities	0.70	4.60
1.2. Learning activities satisfy the stated objectives	0.52	4.60
1.3. Provides independent activities	0.85	4.50
1.4. Evident graphical and pictorial images	0.53	4.50
1.5. Concepts presented logically	0.67	4.30
Over-all Rating	0.65	4.50

Table 7 shows the validation results for the RERI materials in terms of adequacy. With an average mean of 4.50, interpreted as *very much valid*, the material can be implemented in the learning process of the Grade 9 students. The indicators for adequacy of the RERI materials were met as they were all rated valid. This implies that the teacher experts or validators believe that the adequacy of the intervention materials was much valid. In an article by Adephi University (2019), It was claimed that the appropriateness of creating intervention materials aids the writer in planning and defining what the writer wants the students to learn about the topic.

Table 8 *Coherence Validity of the Intervention Materials by Students*

<i>Coherence</i>	<i>Sd</i>	<i>Mean</i>
2.1. Contains relevant activities	0.82	4.30
2.2. Activities provide practical application	0.57	4.10
2.3. Activities develop creativity and resourcefulness	0.42	4.80
2.4. Provides relevant information for better understanding	0.53	4.50
2.5. Activities conform with the concepts	0.52	4.40
Over-all Rating	0.57	4.42

Table 8 shows the validation results for the RERI materials in terms of coherence. The developed RERI got a favorable rating of 4.42, interpreted as *very valid*. This means that the validators strongly agreed with all the indicators.

Although the indicator on the provision of practical work had the lowest mean, still the developed intervention was coherent with the skills to be developed. This finding supports the study of Windschitl (2019), who made it clear that considering teachers' deeply ingrained notions about "good" teaching and learning is the same as being coherent with current knowledge rather than customizing training to what teachers already know.

Table 9. *Appropriateness Validity of the Intervention Materials by Teachers*

<i>Appropriateness</i>	<i>Sd</i>	<i>Mean</i>
3.1. Adapted to intended learners	0.85	4.50
3.2. Based on the Science curriculum guide learning competencies	0.63	4.20
3.3. Provides immediate needs	0.57	4.10
3.4. Develops both Science process skills	0.42	3.80
3.5. Provides varied activities to sustain interest	0.63	4.80
Over-all Rating	0.62	4.28

Table 9 revealed that the validators strongly agreed on the appropriateness (M = 4.28; SD = 0.62) of the RERI materials. All indicators received strongly agree with the remarks. It was suggested, however, that the developed RERI materials should provide more differentiated activities, provide immediate needs, and encourage development of both Science process skills among the students. The importance of content knowledge and its connection to student learning (National Council on Teacher Quality, 2021). Strong content understanding increases a teacher's propensity to instruct in ways that support students in building knowledge, provide pertinent questions, offer other interpretations, and encourage further research. (Park, 2022).

Table 10. *Usefulness Validity of the Intervention Materials by Teachers*

<i>Usefulness</i>	<i>Sd</i>	<i>Mean</i>
4.1. Easy to understand	0.70	4.60
4.2. Provides knowledge, skills, and abilities	0.70	4.60
4.3. Encourages creative and critical thinking	0.84	4.60
4.4. Serves as an instructional tool for Grade 9	0.63	4.80
4.5. Helps facilitate learning concepts	0.63	4.80
Over-all Rating	0.70	4.68



Table 10 shows the validation results for the RERI materials in terms of usefulness. As shown, the developed RERI material got a very favorable rating of 4.68, interpreted as *very much valid*. This means that the validators strongly agreed with all the indicators. This finding supports the study of Lazo and De Guzman (2021) that the value of intervention materials enhances the advantages of various learning tasks, activities, instructional philosophies, strategies, and methods. It ought to improve interdisciplinary teaching, social skills development, experimentation in the classroom, and experiential learning strategies.

Table 11. Summary of the Validity for the RERI Material by Teachers

	<i>Sd</i>	<i>Mean</i>
3.1 Adequacy	0.65	4.50
3.2 Coherence	0.57	4.42
3.3 Appropriateness	0.62	4.28
3.4 Usefulness	0.70	4.68
<b>Over-all Rating</b>	<b>0.64</b>	<b>4.47</b>

Table 11 presents the summary of the validation results for the developed RERI material. Overall, the validators rated 4.50 for its adequacy, 4.42 for coherence, 4.28 for appropriateness, and a mean of 4.68 for usefulness. Most of the validators rated the developed RERI materials *very much valid*; thus, it implies that the level of validity is high, and its contents can be implemented in the learning process of the students.

According to an online article published by Middleton (2019), How precisely a method measures what it is supposed to measure is referred to as validity. High- validity research yields findings that are consistent with actual traits, characteristics, and changes in the physical and social environment. Additionally, an effective intervention tool will have specified learning outcomes or objectives that are in line with teaching activities and assessments. (What has been called constructive alignment) (Burge, 2020).

Table 12 shows the validation results for the RERI materials in terms of adequacy. With an average mean of 4.51, interpreted as *very much valid*, the material is evidently able to be used in the learning process of the Grade 9 students. The indicators for adequacy of the RERI materials were met as they were all rated valid. This implies that the students believe that the adequacy of the intervention material was *much valid*.

Table 12. Adequacy Validity of the Intervention Materials by Students

<i>I.O ADEQUACY INDICATOR</i>	<i>Sd</i>	<i>Mean</i>
1.1. Instruction corresponds with activities	0.65	4.63
1.2. Learning activities satisfy the stated objectives	0.55	4.66
1.3. Provides independent activities	0.76	4.52
1.4. Evident graphical and pictorial images	0.53	4.33
1.5. Concepts presented logically	0.58	4.39
<b>Over-all Rating</b>	<b>0.62</b>	<b>4.51</b>

This was in line with a study by Okoli (2015) titled "Adequacy of Material Resources Required for Effective Implementation of Upper Basic Education Business Studies Curriculum in Nigeria" which held that the quality of the learning materials was a requirement for the successful implementation of the curriculum under consideration. It was important that the resources were arranged to meet the needs of the student.

Table 13. Coherence Validity of the Intervention Materials by Student

<i>2.0. Coherence Indicator</i>	<i>Sd</i>	<i>Mean</i>
2.1. Contains relevant activities	0.72	4.36
2.2. Activities provide practical application	0.51	4.28
2.3. Activities develop creativity and resourcefulness	0.44	4.75
2.4. Provides relevant information for better understanding	0.50	4.45
2.5. Activities conform with the concepts	0.56	4.45
<b>Over-all Rating</b>	<b>0.54</b>	<b>4.46</b>

Table 13 shows the validation results for the RERI materials in terms of coherence. The developed RERI got a very favorable rating 4.46, interpreted as *very much valid*. This means that the student validators strongly agreed with all the indicators. The developed intervention was coherent with the skills to be developed.



When he notes that one of the national education aims was the development of mental, physical, and social talents and competencies as a tool to live in and contribute to one's society, Nweze (2018) confirms this conclusion with coherence. It was crucial that the student's validator recognized the value of the learning materials' coherence in relation to their required learning competencies.

Table 14. *Appropriate Validity of the Intervention Materials by Student*

<i>3.0 Appropriateness</i>	<i>Sd</i>	<i>Mean</i>
3.1. Adapted to intended learners	0.73	4.52
3.2. Based on the Science curriculum guide learning competencies	0.53	4.24
3.3. Provides immediate needs	0.53	4.17
3.4. Develops both Science process skills	0.63	4.14
3.5. Provides varied activities to sustain interest	0.48	4.85
<b>Over-all Rating</b>	<b>0.58</b>	<b>4.38</b>

Table 14 shows the validation results for the RERI materials in terms of appropriateness. The RERI material got an overall rating of 4.38, interpreted as *very much valid*. This means that the developed material was very much appropriate.

The assertion that the student's success contributed significantly to their thorough comprehension of the subject matter was supported by UNESCO (2022). Students get more information by using content that was created with their needs in mind. The pupils' behavior showed that the content was intended for them, which was regarded as being extremely valid. The products that are suitable for them aid in raising their accomplishments.

Table 15. *Usefulness Validity of the Intervention Materials by Student*

<i>4.0 Usefulness</i>	<i>Sd</i>	<i>Mean</i>
4.1. Easy to understand	0.58	4.70
4.2. Provides knowledge, skills and abilities	0.61	4.70
4.3. Encourages creative and critical thinking	0.72	4.70
4.4. Serves as an instructional tool for Grade 9	0.52	4.82
4.5. Helps facilitate learning concepts	0.51	4.83
<b>Over-all Rating</b>	<b>0.59</b>	<b>4.75</b>

Table 15 shows the validation results for the RERI materials in terms of usefulness. As shown, the developed RERI material got a very favorable rating of 4.75, interpreted as *very much valid*. This means that the student validators strongly agreed with all the indicators. According to these studies, this will improve students' science performance (Sinco, 2020) and have a beneficial influence on their attitudes about science (De Roxas, 2019). These intervention materials were given to learners to serve its usefulness which was to help the learners master a competency-based skill that they were not able to develop during regular classroom teaching (Cordova, et.al., 2019).

Table 16. *Summary of the Validity for the RERI Material as a Whole by Students*

	<i>Sd</i>	<i>Mean</i>
3.1 Adequacy	0.62	4.51
3.2 Coherence	0.54	4.46
3.3 Appropriateness	0.58	4.38
3.4 Usefulness	0.58	4.75
<b>Overall Rating</b>	<b>0.58</b>	<b>4.52</b>

Table 16 presents the summary of the validation results for the developed RERI material. Overall, the validators rated 4.51 for its adequacy, 4.46 for coherence, 4.38 for the appropriateness, and a mean of 4.75 for usefulness. Even the student validators rated the developed RERI materials very much valid, thus, it implies that the level of validity was high, and it is evident that the intervention materials are suited to the needs of the students and its contents can be implemented in the learning process of the students.

In his research "Good Measurement in Research: Validity and Reliability", Mohajan (2018) states that validity refers to how well the data gathered covers the topic under inquiry. Conclusions drawn from research with strong internal consistency properly represent real traits and alterations in the physical and social environment. This result also agreed with the findings of a study by Dahar (2018), which asserts that making intervention resources available to students will unquestionably.

## Conclusion

Based on the summary of findings, it can be concluded that the RERI material was developed on time for the School Year 2022-2023. It can also be concluded that the adequacy, coherence, appropriateness, and usefulness of the intervention materials were very much valid. Furthermore, the intervention material was ready for implementation based on the comments and suggestions of the validators.

Based on the results of the study, the researcher recommends the following:

1. Since the study developed an intervention material for Science G9 as a remedy for the least mastered competencies, administrators, and curriculum planners may allow the use of the developed intervention materials in improving Science instructions.

Based on the findings, the validity of the developed learning package was very much valid; thus, educators and teachers may use This learning material in teaching Science G9 subject.

2. The RERI materials were designed so that it was easy to understand and could also develop the higher-order thinking skills needed for lifelong learning for students. Thus, the students may use the intervention to improve their learning in Science 9.

3. The findings of This study may be used by future researchers in conducting similar research and may be used as a reference in crafting and developing intervention material in other subject areas.

## References

Abanto, Y. (2019). *Strategic Intervention Material (SIM)*. [https://www.academia.edu/40663045/Strategic\\_Intervention\\_Material\\_SIM](https://www.academia.edu/40663045/Strategic_Intervention_Material_SIM)

Abouchacra, Z. (2021). *Learning: Competencies, Objectives, or Outcomes?*. <https://www.d2l.com/blog/learning-competencies-objectives-outcomes/>

Andaya, R., Aquino, C., Perez, M., Pizarra, M., & Valencia, N. (2019). *Increasing the Performance Level in Mathematics of Grade III Pupils of Bukal Sur Elementary School through the Utilization of Intervention Material "ASMD4X4"*. <https://ojs.aaresearchindex.com/index.php/AAJMRA/article/view/6511>

Andres, R. (2020). *PH lags behind other countries in college student population*. <https://www.pna.gov.ph/articles/1071884>

British Columbia (2021). *Program for International Student Assessment (PISA)*. <https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/assessment/national-and-international/pisa>

Brouse, K., (2020). *Competency-Based Assessment: What It Is and Its Benefits*. <https://www.graduateprogram.org/2020/04/competency-based-assessment-what-it-is-and-its-benefits/>

Boron, G. (2021). Manila Bulletin News: *Shortage of learning materials, lack of teachers' benefits manifestations of 'failed' education system — students' group*. Retrieved: September 24, 2022, from <https://mb.com.ph/2021/09/13/shortage-of-learning-materials-lack-of-teachers-benefits-manifestations-of-failed-education-system-students-group/>

Cerdan, M. (2017) Why Motivation is in the First Part, <http://www.learningmotivation/teaching/alignment.pdf> January 2018

Competency Curriculum Guide (2016) k-12 Basic Education, Curriculum Guide <http://k12philippines.com/>

Curriculum Guide (2016). k-12 Basic Education, Curriculum Guide. <http://k12philippines.com/>

Dabbay, M. (2018). *Alignment of Curriculum Guide and Teaching Guide in Oral Communication in Context for Senior High School*. Unpublished Thesis. Sacred Heart College, Lucena City. Dela Cruz, M. (2022). *effects of lack on instructional materials*. [https://www.academia.edu/13158439/effects\\_of\\_lack\\_on\\_instructional\\_materials](https://www.academia.edu/13158439/effects_of_lack_on_instructional_materials)

DepEd (2017), The K-12 Curriculum Development of Senior High School, <http://k12philippines.com/> January 2017

Educational Resource Acquisition Consortium (ERAC) (2019). *The Recommendation on OER*. <https://www.unesco.org/en/open-solutions/open-educational-resources>

Filgona, J. (2020). *Motivation in Learning*. [https://www.researchgate.net/publication/344199983\\_Motivation\\_in\\_Learning](https://www.researchgate.net/publication/344199983_Motivation_in_Learning)

Florida Department of Education (2022). *STATEWIDE SCIENCE ASSESSMENT*. <https://www.fldoe.org/accountability/assessments/k-12-student-assessment/science.stml>

Gosselin D. (2020). *Competencies and Learning Outcomes*. [https://serc.carleton.edu/integrate/programs/workforceprep/competencies\\_and\\_LO.html](https://serc.carleton.edu/integrate/programs/workforceprep/competencies_and_LO.html)

Instructional Design. (2018). *The ADDIE Model*. <http://www.instructionaldesign.org/models/addie.html>.

International Bureau of Education (2022). *Learning resources*. <http://www.ibe.unesco.org/en/glossary-curriculum-terminology/l/learning-resources>

Jalmasco, N.M. (2017). *Science Education Realities. The Manila Times*. <http://www.manilatimes.net/science-education-realities/100096>.

Jet Propulsion Laboratory (2018). *Modeling the Structure of the Solar System*.

<https://www.jpl.nasa.gov/edu/teach/activity/modeling-the-structure-of-the-solar-system/>

Juandi, D. (2018). *Learning difficulties of senior high school students based on probability understanding levels*. Journal of Physics: Conference Series. 1013. 012116. 10.1088/1742-6596/1013/1/012116. [https://www.researchgate.net/publication/325183029\\_Learning\\_difficulties\\_of\\_senior\\_high\\_school\\_students\\_based\\_on\\_probability\\_understanding\\_levels](https://www.researchgate.net/publication/325183029_Learning_difficulties_of_senior_high_school_students_based_on_probability_understanding_levels)

Kapur, R. (2019). *Development of Teaching-Learning Materials*. [https://www.researchgate.net/publication/334083571\\_Development\\_of\\_Teaching-Learning\\_Materials](https://www.researchgate.net/publication/334083571_Development_of_Teaching-Learning_Materials)

K to 12 Junior High School Curriculum Science Grade 9. (2016). *K to 12 Basic Education Curriculum Senior High School Core Subject*.

[https://www.drive.google.com/file/d/0BwSTMpKEx\\_4a0RHOGZ6dEZqbUU/view](https://www.drive.google.com/file/d/0BwSTMpKEx_4a0RHOGZ6dEZqbUU/view)

Mississippi Department of Education (2020). *Curriculum*. <https://www.mdek12.org/CTE/Cirriculum>

Otico, L. (2019). *7e Learning Resource Material for Enhancing Least Learned Competencies In Science Among Grade 10 Students*. Unpublished Dissertation. Southern Luzon State University, Lucban, Quezon.

Rana, N. (2019). *Teaching Competency of Secondary School Teachers In Relation To Selected Variables*. [https://www.researchgate.net/publication/339230519\\_TEACHING\\_COMPETENCY\\_OF\\_SECONDARY\\_SCHOOL\\_TEACHERS\\_IN\\_RELATION\\_TO\\_SELECTED\\_VARIABLES](https://www.researchgate.net/publication/339230519_TEACHING_COMPETENCY_OF_SECONDARY_SCHOOL_TEACHERS_IN_RELATION_TO_SELECTED_VARIABLES)

Rogayan, D. (2019). *Development and Validation of Physical Science Workbook for Senior High School*. [https://www.academia.edu/44433491/Development\\_and\\_Validation\\_of\\_Physical\\_Science\\_Workbook\\_for\\_Senior\\_High\\_School](https://www.academia.edu/44433491/Development_and_Validation_of_Physical_Science_Workbook_for_Senior_High_School)

Salvejo, E. (2020). *Strategic Intervention Material-Based Instruction, Learning Approach and Students' Performance in Chemistry*. <https://www.ijlter.org>

Student Achievement and Supports Branch Saskatchewan Ministry of Education (2022). *Education*. <https://www.saskatchewan.ca/government/government-structure/ministries/education>

Strachota, E. (2007) "The Development and Validation of an Instrument to Evaluate Online Training Materials. Concordia University Wisconsin." Retrieved from: <http://www.sil.org/new/2012>

Suarez, M. & Casinillo, L. (2020). *Effect of Strategic Intervention Material (SIM) on Academic Performance: Evidence from Students Of Science VI*. [https://www.researchgate.net/publication/346311944\\_Effect\\_of\\_Strategic\\_Intervention\\_Material\\_SIM\\_on\\_Academic\\_Performance\\_Evidence\\_from\\_Students\\_Of\\_Science\\_VI](https://www.researchgate.net/publication/346311944_Effect_of_Strategic_Intervention_Material_SIM_on_Academic_Performance_Evidence_from_Students_Of_Science_VI)

Supatmi, S. (2019). *Students' misconceptions of acid-base titration assessments using a two - tier multiple-choice diagnostic test*. <https://www.semanticscholar.org/paper/Students%E2%80%99-misconceptions-of-acid-base-titration-a-Supatmi-Setiawan/5656a5ef5159a6f6b8e6e885d8b04876a6c99d9f>

Study Drive (2021). *The effect of modern technology in the academic performance*. Retrieved December 18, 2022, from <https://studydriver.com/the-effect-of-modern-technology-in-the-academic-performance/>

Valamis, (2021). *SKILLS MANAGEMENT Competency Model*. <https://www.valamis.com/hub/competency-model>

World Economic Forum (WEF). (2018). *Global Competitiveness Report (2017-2018)*. <http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf>

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