



# DEVELOPMENT AND VALIDATION OF STRATEGIC INTERVENTION MATERIALS (SIM) IN SCIENCE FOR GRADE 7 STUDENTS

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## ABSTRACT

This study was conducted to develop and validate the Strategic Intervention Materials (SIM) in science for Grade 7 students of Josephine M. Cojuangco National Technical Vocational High School. The study used a pretest/posttest pre-experimental design and development. Five science experts from State Universities and Colleges (SUCs) validated the SIM in Science 7 using the evaluation rating sheet adapted from Learning Resources Management System (LRMDS) assessment and evaluation. Sixty-five Grade 7 students were the respondents of the study who used SIM and the administered pretest and posttest to determine the effectiveness of the SIM. The Strategic Intervention Materials (SIM) covered the first quarter least mastered competencies in Science 7 which consist of five parts namely: Guide Card, Activity Card, Assessment Card, Enrichment Card, and Reference Card. The science experts validated the SIM in terms of content, format, presentation and organization, and accuracy and up-to-dateness of the information. The developed SIM was rated "Very Satisfactory" in all mentioned indicators. On the other hand, a pre-test and post-test were given to the students to test the effectiveness of the SIM. It was concluded that the SIM has a great impact on the continuity of education amidst the COVID-19 pandemic. It served as an intervention material, especially in teaching least mastered competencies in science such as the ability to recognize that substance are classified into elements and compounds. It also improved the student's level of mastery and the significant result of the pretest and post-test, which prove that the usage of SIM is effective for Grade 7 students. Therefore, it is recommended that teachers are encouraged to develop and use Strategic Intervention

Materials (SIM) as supplementary resources in teaching science. The SIM may also be used to reduce the least mastered competencies and to improve the performance of the students.

**Keywords:** *SIM, Science, Instructional Material, LRMDS, Competencies.*

## INTRODUCTION

The delivery of education in the Philippines has greatly changed because of the pandemic and in order to provide clear guidance, the Department of Education released the DepEd order N0. 012 s. 2020 which is the adoption of the Basic Education Learning Continuity Plan (BE-LCP) for school year 2020-2021 due to public health emergency brought by COVID 19 (Department of Education, 2020). It is a plan that will respond to the challenges of the basic education brought by the pandemic. This plan ensures that amidst disaster such as the pandemic that were experiencing right now, the students' learning will still continue and progress. The communication, materials, learning activities and assignments, and assessments are the four aspects of the learning continuity plan should be geared towards distance learning to keep our students safe that's why different modes of learning were created. Face to face classes is not allowed due to COVID-19 so the BE-LCP provide distance learning modalities with the use self-learning modules, internet, radio and television. The BE-LCP ensures that the learners will learn effectively, and the relevant knowledge, skills and competencies will be acquired through different learning modalities that promotes equal learning opportunities, the 4<sup>th</sup> goal of the Sustainable Development Goals (SDG).

As stated in DepEd Memorandum No. 39, series of 2021, it is the policy guideline in implementing reading and writing program and addressing learning gaps in secondary schools, DepEd recognized that secondary schools must conduct remediation programs to address learning gaps. SIM ensures that the students will master the least learned competencies which is an essential tool for the development of students' knowledge and skills.

In our current situation, contextualization and localization of materials is much needed to ensure that the students will clearly understand the lesson. DepEd Order No. 32, s. 2014 define contextualization as an educational process which aims to associate the area of application to make the competencies relevant, goal oriented, and significant to all learners. The RA 10533 or Enhanced Basic Education Act of 2013 which states that a curriculum must be contextualize, global and flexible to produce contextualize intervention materials. So, teacher made SIM can help students engage, upskill and flourish learners based on many studies conducted by different researchers because it requires less teacher supervision and extends learning through various activities provided in the material. It will also help the students achieve mastery of the competencies.

In order to ensure that the learning will progress, the DepEd shifts from face-to-face learning to distance learning modalities such as modular distance learning, television

and radio-based learning, online learning and blended learning. SIM is a material prescribed by the DepEd used to improve students' performance in science by focusing on a particular competency intended from remediation. The researchers find this study very important because it will awaken the teachers to provide a teacher made intervention material that will suit to the learning level, interest, and localization to provide an excellent and quality education, and to increase the scientific literacy of students here in the Philippines.

The Department also released the Most Essential Learning Competencies (MELCs) to be used nationwide which will be used to inform and enrich the curriculum review. The DepEd Memorandum No. 89, s. 2020 is also known as the clarifications on the use of the MELCs and other related issues. MELCS were identified according to the learning deficiencies, problems and concerns of the students in different grade level and learning areas. MELCs was created and released as a response not only in our current situation but also a long-term response to the call of SDG4. It is useful to develop quality and effective system of education most especially during emergencies.

The Philippines needs to sustain progress on the Sustainable Development Goals (SDGs) for quality education where in it promotes life-long opportunities to ensure inclusive and equal education for all (Albert, J. R. G., Basillote, L. B., et.al., 2023). The researchers developed a SIM in Science for Grade 7 students because it was observed that the students are having a hard time learning some of their lessons and they are getting low scores on their activity sheets. This SDG goal four (4) can be achieved by providing an intervention material to hone students' knowledge and skills, and to achieve quality learning for all. Learning opportunities should increase through the development of SIM and by this, problem solving skills, critical thinking, creativity and other high-level cognitive and non-cognitive skills will be emphasized.

## **Research Objectives**

This study developed and validated strategic intervention materials in Science. Specifically, the study seek to achieve the following:

1. To develop strategic intervention material (SIM) in Science along the K to 12 Least Mastered Competencies
2. To validate the strategic intervention material in terms of:
  - 2.1 Experts validation
    - 2.1.1 Content
    - 2.1.2 Format
    - 2.1.3 Presentation and Organization
    - 2.1.4 Accuracy and Up-to-Datedness of Information
  - 2.2 User's Validation
    - 2.2.1 Effectiveness
3. To draw implications of this study to science education.

## METHODOLOGY

### Research Design

The study is focused on the development and validation of Strategic Intervention Material (SIM) in Science 7. The study used research and development type of research to determine the level of validity of the developed SIM in teaching Science 7 in terms of its content, format, presentation and organization, accuracy and up-to-datedness of information as validated by the science experts.

This design was used because the validators need to validate the validity of the developed SIM in teaching Science 7. Aside from that, this study also used pre-test and post-test pre-experimental design. It was administered before the SIM is implemented and once after it is implemented to determine its effectiveness in Science 7 among the end users.

The entire concept of the SIM for Science 7 is based on the least mastered competencies to improve or enhance the skills of the students to engage them in activities that will bridge the learning gaps so, each science expert was given a test, TOS and SIM for validation (Nitko & Brookhart, 2011).

### Research Locale

The study was conducted at Josephine M. Cojuangco National Technical Vocational High School located in Barangay Poblacion Norte, Mayantoc, Tarlac and it was established in 2013. The school offers Technical -Vocational Education program (TVE) strands and it also offers Science, Technology and Engineering (STE) program.

### Validators of the Strategic Intervention Material

The validators of the Study are five [5] science experts whose area of specialization is Science related subjects. The science experts who validated the SIM are licensed professional teachers.

**Table 2**  
**Science Experts**

<b>Validators</b>	<b>Degree</b>	<b>Position</b>	<b>Number of Years in Teaching</b>
1	BS major in Chemistry with Master's Degree major in Science Education	Instructor I	6
2	BS major in Physics with Master's Degree major in Physics	Instructor I	7

3	BS major in General Science with Master's Degree in General Science	Associate Professor I	17
4	BS major in Biology with Doctoral Degree major in Science Education	Assistant Professor IV	25
5	BS major in Physics with Doctoral Degree major in Physics	Asst. Director, Quality Assurance	22

In addition, the science experts who validated the SIM, TOS, pre-test and post-test have master's degree and doctoral degrees. Moreover, a minimum of five (5) years teaching experience in the said specialization is also one of the qualifications of the five (5) science experts who validated the Strategic Intervention Material (SIM) in Science 7.

### Research Participants

The respondents of the pilot study were grade seven students of Josephine M. Cojuangco National Technical Vocational High School. There are one hundred fifty-seven (157) grade 7 students but only sixty-five (65) students were the respondents of the study. The pre-test paper was given to all grade 7 students but only eighty (80) of them submitted it on time during the distribution and retrieval of modules. The eighty (80) students were given SIM, but only sixty-five (65) of them submitted it as well as the post-test paper.

### Data Gathering Procedure

The study started by asking permission for the conduct of study to the school head of Josephine M. Cojuangco National Technical Vocational High School. The review of existing Strategic Intervention Materials (SIM), lessons, most essential learning competencies and learning objectives were made as part of the analysis before developing the SIM. Selection of activities and learning objectives for each part of the SIM particularly the guide card, activity card, assessment card, enrichment card and reference card were made to develop a SIM.

The researcher asked permission from the chosen validators by giving a letter prior to conducting the study. Experts' validation of test and SIM were done to produce a valid and reliable material for the learners. Science experts validated the SIM through the use of the adapted LRMDS rating sheet that consist of four factors namely: content, format, presentation and organization, and accuracy and Up-to-datedness of information. Each factor has four criteria with appropriate number: 4 being Very Satisfactory (VS); 3- Satisfactory (S); 2- Poor, and 1- Not Satisfactory. Different descriptors were used in accuracy and up-to-datedness of information such as 1 for Not present, 2- Present but Very Minor, 3- requires major redevelopment, and 4 for Poor. The same set of experts also validated the pre-test and posttest through face and content validity. The letter for the conduct of study was sent via Facebook messenger. Soft copy and hard copy were given to the validators following the safe and health protocols. Link for Google forms were

also sent to the science experts to validate the SIM using rating sheet and the pre-test/post-test through face and content validity. After the expert's validation, various changes were made to the developed SIM and tests based on the expert's comments and suggestions. Pilot testing of the test were made to identify the index of difficulty and index of discrimination. Some of the test questions were rejected, retained, and revised.

The development of pre-test for first quarter were made to identify the learner's least mastered competencies. All grade 7 students were given pre-test papers. The first eighty (80) students that have submitted their pre-test papers on time during the distribution of modules will be considered as the respondents of the study though, only sixty-five (65) of them returned the answered SIM and posttest that's why sixty-five (65) students were considered as the participants of the study. Pilot testing of the SIM and pre-test to the learner's became part of the implementation. The SIM and test papers were given to the parents of the students during the distribution of modules and learning activity sheets.

The validated and evaluated SIM and test in science 7 through Expert's and end user's validation will be part of evaluation. Lastly, implications of the study to science education were made. The study went on for nine weeks.

## **Research Instruments**

The researcher read various literature and studies related to the development and validation of learning modules in science. After reading the literature and studies, the researcher adopted an evaluation rating sheet from LRMDS. The researcher employed this rating sheet in validating the SIM in Science 7 to have a basis for identifying the validity of the material.

On the other hand, the researcher was the one who developed the SIM in Science 7 which consisted of five parts: Guide card, Activity card, Assessment card, Enrichment card, and Reference card. The preparation of SIM will be based on the given parts and on the least-learned competencies.

In addition, the SIM was submitted through for validation to science experts, consisting of 5 teachers of State Universities and Colleges (SUCs) whose area of specialization is Science in Tarlac. Furthermore, they are currently teaching science subjects and all of them have masters and doctoral degrees related to their area of specialization. Moreover, the validators spent at least five years teaching the learning area.

The teacher-made test was subjected to a face and content validity with the same set of science experts and pilot testing was done to get the index of difficulty and index of discrimination of each item. The following group means ratings and their corresponding interpretation were used to validate he SIM.

The following group means ratings and their corresponding interpretation were used to validate the three factors in SIM. The range of mean was adapted from M. Selga (2014).

SCALE	RANGE OF MEAN	INTERPRETATION
4	3.26 – 4.00	Very Satisfactory
3	2.51 – 3.25	Satisfactory
2	1.76 – 2.50	Poor
1	1.00 – 1.75	Not Satisfactory

The following group mean ratings and their corresponding interpretation were used to validate the accuracy and up-to-datedness of information in SIM. The range of mean was adopted from Selga, M. (2014).

Scale	Range Of Mean	Interpretation
4	3.26 – 4.00	Not present
3	2.51 – 3.25	Present but Very Minor
2	1.76 – 2.50	Requires major redevelopment
1	1.00 – 1.75	Poor

The following group are index range and their corresponding interpretation were used to validate the test.

Level Of Difficulty	
Index Range	Interpretation
0-0.2	Very Difficult
0.21- 0.4	Difficult
0.41- 0.6	Average
0.61- 0.8	Easy
0.81- 1	Very Easy

The following group are index range of discrimination and their corresponding interpretation were used to validate the test adopted to Ebel and Frisbie (1986) and Hetzel (1997).

Levels Of Discrimination	
Index Range	Interpretation
0- 0.19	Poor Item
0.2- 0.29	Fair Item
0.3- 0.39	Good Item
0.4- 1	Very Good Item

The table below shows that the least learned skills in Science 7 for the School Year 2021-2022 were identifying the composition of a compound, identifying the constituent elements present in a compound, computing the percentage of a solution, determining the physical property of a substance, analyzing the statements about compound,

comparing elements from compounds, describing unsaturated solution, describing a compound, solving problems on concentration, and differentiate substance from mixture. The development of SIM in Science 7 was based on least learned skills as a means of addressing this problem. A well-developed SIM could be a tool to elicit students' mastery on the concepts in each lesson. Also, this would result in ease of understanding on the lessons in Science 7.

**Table 3.**  
**Least Mastered Skill 2021-2022**

Item	Least Mastered Skill	Rank
12	Identifying the composition of a compound	1
19	Identifying the constituent elements present in a compound	2
49	Computing the percentage of a solution	3
23	Determining the physical property of a substance	4
16	Analyzing the statements about compound	5
8	Comparing elements from compounds	6
39	Describing unsaturated solution	7
17	Describing a compound	8
48	Solving problems on concentration	9
22	Differentiate substance from mixture	10

### Statistical Treatment

The data that will be computed and the results are analyze using the following descriptive and inferential statistical procedures and all computations were done using computer software in statistics.

To describe the Strategic Intervention Material (SIM) validated by the experts, the following statistical tools were used.

#### a. Arithmetic Mean

Arithmetic mean is often used to find a mean or average. It is calculated by taking a sum of a set of numbers and dividing it by the count of the numbers in the set. In this study, arithmetic mean can be calculated using this formula:

$$\text{Mean} = \frac{\text{Sum of all Data Points}}{\text{Number of Data Points}}$$

Furthermore, the arithmetic mean was computed to measure the validators' perceptions on the Strategic Intervention Material (SIM) in Science 7 regarding its validity in terms of content, format, presentation and organization, accuracy and up-to-datedness of information.

b. t-test

A t-test is an inferential statistic used to determine the difference between means of two sample groups using hypothesis testing (Creswell, J. W., & Creswell, J. D.,2018). The formula is shown below:

$$t = \frac{(\sum D)/N}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{N}}{(N-1)(N)}}$$

where,

$\sum D$ - is the sum of pretest and posttest

$\sum D^2$ - Sum of the squared differences

$(\sum D)^2$ - Sum of the differences

N = Sample Size

## RESULTS AND DISCUSSION

### 1. Development of Strategic Intervention Material in Science 7 along the K to 12 Least Mastered Competencies

The Strategic Intervention Material was developed to focus on a particular competency intended for remediation of the students. SIM is also use to gain mastery of the least learned skills, level of understanding, and to increase students' achievement especially during examinations.

The Strategic Intervention Material (SIM) consisted of five parts which are the following:

- (1) **Guide card** which may arouse the students' interest on the topic. It presents and gives preview about the topic, of what the students will learn.

## Guide Card

Materials in the grocery store are arranged according to their classification (whether they are dry goods or wet goods). Matter is also classified in this manner, it may classify as solid, liquid, gas, plasma or Bose Einstein condensate. Another way of classifying matter is whether it is a pure substance or a mixture.



<https://www.bing.com/images/search?view=10-budget-friendly-healthy-grocery-shopping-tips/>



What is a pure substance?

A pure substance is made up of only one type of particle. It also has a definite and constant composition.

Pure substances maybe **elements** like hydrogen, helium, gold, oxygen, platinum, or **compounds** like carbon dioxide, acetic acid, salt, sugar, etc.


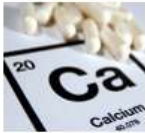




(2) **Activity card**, which provides organized activities based on the focus skills, it gives clear direction that guides and challenges students in learning.

## Activity Card

### A. Think smart

**Direction:** Classify the following examples as pure substance or mixture.

<p>1. Oil and water</p>  <p>Answer: _____</p>	<p>6. Calcium</p>  <p>Answer: _____</p>
<p>2. Sugar</p>  <p>Answer: _____</p>	<p>7. Sodium bicarbonate</p>  <p>Answer: _____</p>

3) **Assessment card** that provides exercise drill or activities which assess students understanding.

## Assessment Card

### A. You complete me

Directions: Underline the word inside the parenthesis that best complete the statement below.

1. Pure substance has a definite and \_\_\_\_\_ (**constant, varying**) composition.
2. Mixture is composed of at least different pure substances which are \_\_\_\_\_ (**chemically, physically**) combined.
3. Homogeneous mixtures are also referred to as a \_\_\_\_\_ (**compound, solution**).
4. Compounds are also pure substances but what makes them different from elements is that they are made of \_\_\_\_\_ (**one, two**) or more elements.
5. A technique used to separate out homogenous mixtures where there is one or more dissolved solids is called \_\_\_\_\_ (**evaporation, distillation**).

(4) **Enrichment card** which extends learning by providing additional activities for further application of knowledge and skills.

## Enrichment Card



### A. Let's Investigate!

Identify 5 example of mixtures found in nature, in the supermarket, grocery store, and even at your home. Write it on the table provided below.

Example: Oil and water- Heterogeneous- Components can be separated

Mixtures	Appearance (Homogeneous or Heterogeneous)	Separating Techniques (Components can be separated or inseparable)
1.		
2.		
3.		
4.		
5.		

(5) **Reference card** which provides additional content and consist list of resources that the learner may refer to for further reading.

### FOR FURTHER READING ...



Investigating Life and Beyond 7, pp. 35-36

Compendium in Science 7, pp. 15-47

Science 7 Module, pp. 8-13

<https://interestingengineering.com/real-life-use-every-element-periodic-table>

<https://studiousguy.com/compounds-we-use-in-everyday-life/>

**Pure substance** consists only of one element or one compound.

A **mixture** consists of two or more different substances, not chemically joined together

**Homogeneous mixture** is combination of two or more substances that are so intimately mixed that the mixture behaves as a single substance.

**Heterogeneous mixture** is a mixture in which the composition is not uniform throughout the mixture.

**Decantation** – the particles of the mixtures are allowed to settle down and less dense particles are poured off

Hence, from this information, SIM was developed for the four selected topics in chemistry namely: elements and compounds, substances and mixtures, saturated and unsaturated solutions and concentration of solutions.

## 2. Validation of the Strategic Intervention Material by the Experts

The Science experts were asked to validate the Strategic Intervention Material on the content, format, presentation and organization, and accuracy and up-to-datedness of information in teaching Science 7.

### a. Content

The Strategic Intervention Material was developed considering the least learned competencies. The researcher designed the activities on each card on the SIM so that the students will enhance their scientific knowledge and skills. The SIM is aligned to the

present standard in the Learning Resources Management and Development System (LRMDS) evaluation tool from the Department of Education.

**Table 4**

Validation of the Strategic Intervention Material in Terms of Content

STATEMENTS	MEAN	VERBAL DESCRIPTION
Statement 1	3.40	Very Satisfactory
Statement 2	3.80	Very Satisfactory
Statement 3	3.80	Very Satisfactory
Statement 4	4	Very Satisfactory
Statement 5	3.80	Very Satisfactory
Statement 6	3.40	Very Satisfactory
Statement 7	3.60	Very Satisfactory
<b>Overall Mean Score</b>	<b>3.69</b>	<b>Very Satisfactory</b>

Table 4 shows the result of the SIM in terms of content. The table revealed that the overall mean score of the SIM in Science in terms of content is 3.69 with a verbal description of Very Satisfactory. This implies that the validated SIM was aligned to the purpose of the intervention material. In addition, the Science experts stated that the SIM's content is easy to understand, arouse interest for the target reader and suitable for the grade level. With this, the SIM meets the needs of the students in terms of content and contributes to the achievement of specific objectives in science.

**b. Format**

The researchers designed the activities of the SIM to develop students' creativity and critical thinking skills. Relevant prints, illustrations, design and layout, paper and binding were used to make the material relevant and useful to the learners.

**Table 5**

Validation of the Strategic Intervention Material in terms of Format

STATEMENTS	MEAN	VERBAL DESCRIPTION
Prints		
Statement 1.1	3.40	Very Satisfactory
Statement 1.2	3.60	Very Satisfactory
Statement 1.3	3.40	Very Satisfactory
Statement 1.4	3.60	Very Satisfactory
Statement 2		
Statement 2.1	3.80	Very Satisfactory

Statement 2.2	3.80	Very Satisfactory
Statement 2.3	3.40	Very Satisfactory
Statement 2.4	4	Very Satisfactory
Statement 2.5	3.40	Very Satisfactory
Statement 2.6	3.60	Very Satisfactory
Statement 3		
Statement 3.1	3.40	Very Satisfactory
Statement 3.2	3.80	Very Satisfactory
Statement 3.3	3.60	Very Satisfactory
Statement 3.4	3.40	Very Satisfactory
Statement 4		
Statement 4.1	3.60	Very Satisfactory
Statement 4.2	3.20	Satisfactory
Statement 5		
Statement 5.1	3.40	Very Satisfactory
Statement 5.2	3.40	Very Satisfactory
<b>Overall Mean Score</b>	<b>3.54</b>	<b>Very Satisfactory</b>

The given data in Table 5 shows the results of the experts' validation on the format of the Strategic Intervention Material in Science 7. It was found out that the SIM in terms of format got an overall mean of 3.54 with a verbal description of Very Satisfactory. This means that the validated SIM has the appropriate prints, illustrations, design and layout, paper and binding. According to the Science experts, the design and layout of the Strategic Intervention Material is simple, attractive and has an adequate illustration. Each illustration is helpful for every activity which clarifies and supplement the text; thus, the Strategic Intervention Material (SIM) has a relevant format.

### 2.3 Presentation and Organization

The SIM was developed considering the needs of the students based on the least learned competencies. The material presents organize and clear ideas evident to the learners, used suitable and appropriate vocabulary, sentence structures and language structures were considered in making the SIM.

**Table 6**  
Validation of the Strategic Intervention Material in Terms of Presentation and Organization

<b>Statements</b>	<b>Mean</b>	<b>Verbal Description</b>
Statement 1	3.60	Very Satisfactory
Statement 2	3.60	Very Satisfactory
Statement 3	4	Very Satisfactory
Statement 4	4	Very Satisfactory

Statement 5	4	Very Satisfactory
<b>Overall Mean Score</b>	<b>3.84</b>	<b>Very Satisfactory</b>

Table 6 shows that the overall mean score of the SIM given by the Science experts under presentation and organization is 3.84 with a verbal description of Very Satisfactory. This means that the activities presented in the SIM particularly on the guide card, activity card, assessment card, enrichment card, and reference card are well presented and organized. The science experts implies that every provided suit the learner’s ability and matches the tasks objectives, engaging, interesting and understandable.

**c. Accuracy and Up-to-datedness of Information**

The researchers made sure that there are no conceptual errors, factual errors, grammatical errors, computational errors, obsolete information, typographical and minor errors through the help of science experts in validating the material.

**Table 7**

Validation of the Strategic Intervention Material in terms of Accuracy and Up-to-Datedness of Information

Statements	Mean	Verbal Description
Statement 1	4	Not Present
Statement 2	4	Not Present
Statement 3	4	Not Present
Statement 4	4	Not Present
Statement 5	4	Not Present
Statement 6	4	Not Present
<b>Overall Mean Score</b>	<b>4</b>	<b>Not Present</b>

The presentation of conceptual content and factual content made sure to be accurate and up-to-date to avoid misconceptions. It can be shown in Table 7 the result of the Strategic Intervention Material in terms of accuracy and up-to-datedness of information. The table further revealed that the accuracy and up-to-datedness of information got an overall mean of 4 with a verbal description of not present. This means that the SIM in Science is accurate and no factual errors

**Table 8**

Overall Validation of the Strategic Intervention Material in Science 7

Factor	Overall Mean
Content	3.69
Format	3.54

Presentation and Organization	3.84
Accuracy and Up-to-Datedness of Information	4
<b>Grand Mean</b>	<b>3.77</b>

Table 8 shows the grand mean given by the Science experts. The computed mean for content is 3.69 with a verbal description of Very Satisfactory. Next is the format which gains 3.54 mean with a Very Satisfactory as a verbal description. Presentation and Organization got a mean of 3.84 with a verbal description of Very Satisfactory and lastly, the accuracy and up-to-datedness of information has a mean of 4 with a verbal description of not present. The computed grand mean given by science experts is 3.77 with a verbal description of Very Satisfactory.

Based on the results, the SIM needs to be improved in content, format, and in presentation and organization. As suggested by the Science experts, if possible, activities should fit in one page to avoid learners from going back and forth, be consistent with the text formats, and include the sources of each illustration.

### 3. Validity of the SIM by the End Users

The researchers used an item analysis to test the validity and effectiveness of the test. Also, the researcher conducts an item analysis to analyze students' response on each test questions. The test was administered to number of valid samples wherein the 27% of the population is the upper limit and the lower limit (adapted from Truman Kelly, 1939). A pilot testing of test questions to the students was done by the researcher to get the index of difficulty and index of discrimination of each test questions and to know what test questions should reject, retain, and revise.

The index of difficulty interpretation of a 50 item test questions is that it has a very difficult question ranges from 0-0.2, a difficult item ranges from 0.21-0.41, an average item ranges from 0.41-0.6, an easy item is from 0.61-0.8, and a very easy item range from 0.81-1. The index of difficulty determines how difficult or how easy a test question. There are 7 very difficult questions, 8 difficult questions, 19 average questions, 15 easy questions, and 1 very easy question. Furthermore, the discriminating power interpretation of a 50-item test question has an index range of a poor item ranges from 0-0.19, a fair item ranges from 0.2-0.29, a good item is from 0.3-0.39, and a very good item ranges from 0.4-1 which was adapted from Ebel and Frisbie (1986) and Hetzel (1997).

The 9 test questions have an index of difficulty interpretation of easy and considered as a poor item and it should be eliminated or needed to be revised. There are 7 very difficult question as its index of difficulty interpretation and these are fair items which needs some revision, 2 good item which possibly needs improvement, and a 30 very good item that should be retained.

After that, science experts gave their content and face validity to the pre-test and posttest. The result of pre-test and posttest given to sixty-five (65) students were computed through the use of t-test correlation shown in the table below.

**Table 9**

t- test correlation between Pre-test and Post-test scores with the use of SIM.

Students Performance	MEAN	%	t-value	DF	Critical Value	Significance
Pre- test	23.2	46.4	-	64	1.99	Significant
Post- test	40.58	81.16	33.75			

Table 9 depict the result of the test of difference between the pretest and posttest scores of the students in using SIM. The computed t value is found to be -33.725 compared to its critical value of -1.99. Thus, the null hypothesis is rejected at 0.05 level of significance. This implies that the SIM served its purpose to elicit mastery among the grade 7 students on the subject matter and consequently improve the performance of the students. As a result, the SIM is effective for remedial instructions in Science 7 to enhance the performance of the students in the subject.

The present study revealed that there was an improvement on the performance of the students after the administration of the SIM. Hence that the SIM greatly gave a remarkable change in the achievement of the students. The study of Hernandez, et.al (2019) entitled Effectiveness Using Strategic Remarkable Intervention Material (SIM) in Teaching Mathematics for the Selected Grade Five Pupils showed a positive result on the part of the students where in, it helps improve the academic performance the students in mathematics subject after the intervention (SIM) was used based on the pre-test and post-test given. The students will do better in science if there are SIMs to be use in presenting different lessons.

#### **4. Implications of Strategic Intervention Material (SIM) to Science Education**

According to UNESCO (2003) the COVID- 19 pandemic disrupt educational opportunities not only in the Philippines but also worldwide. Despite of this, educational leaders take immediate steps to develop and implement different strategies to continue students learning. So, it is necessary to provide learning materials and activities to enhance learner’s scientific knowledge and skills. Utilizing self- learning modules as a learning modality in this time of pandemic is useful to continue students learning. But problems are evident by the result of the learner’s activities and outputs which shows that some learning competencies are not met that’s why a need for additional resources for students to extend their learning through interactive activities and evaluation. Educating the students in learning science is important to prepare them for their future (Darling-Hammond, L., Flook, L., et.al., 2020). Effective and efficient teachers not just only impart knowledge from the students, they also inspire, motivate, innovate, shape the young minds, instill values from the lesson, apply the content and find solutions to a problem. In

connection to this, the researcher made a SIM that help students improve their level of understanding.

The science experts who validated Strategic Intervention Material (SIM) stated that it is a big help for the students to cope up with the least mastered competencies in this time of pandemic. In addition, the science experts also stated that the material is easy to understand intended for the grade level. Simple yet engaging activities were included on the guide card, activity card, assessment card and enrichment card. Also, they recommend that the material can be used for strategic intervention because the activities given suits the learners ability and matches the tasks objectives.

With the positive findings of the science experts mentioned above about the implications of Strategic Intervention Material (SIM), significantly impacts science education. That is why researcher developed and designed her SIM in Science to enhance students' creativity and critical thinking skills in science.

### **Summary of Findings**

The researcher developed a SIM through the least mastered competencies from the result of teacher made test. A checklist for the science experts were used to validate the SIM in science 7. The checklist was adapted from the DepEd LRMSD.

The study used a pre-test/post-test pre-experimental design. The salient findings are as follows:

#### **1. Development of Strategic Intervention Material in Science 7 along the K to 12 Least Mastered Competencies**

The developed and validated SIM was based on the least mastered skills of the students for them to cope up with the lessons. The SIM covered first quarter least mastered competencies in Science 7 which consist of five parts namely: Guide card, Activity card, Assessment card, Enrichment card and Reference card. The guide card gives a short introduction of the lesson. The activity card provides different activities that is aligned with the learning objectives. Assessment card measures students learning about the lesson. Enrichment card provides additional activities and the reference card provides additional readings and different resources. A pre-test was given to learners to identify the least mastered competencies through an item analysis.

#### **2. Validation of Strategic Intervention Material as Validated by the Science Experts**

The Science experts validated the SIM using the material adapted from LRMSD that consists of four factors such as content, format, presentation and organization, and accuracy and up-to-datedness of information. It has a verbal description of "Very Satisfactory" with a grand mean of 3.77.

## 2.1. Experts

The Science experts rated the content with a mean of 3.69, the format with 3.54, and 3.84 for presentation and organization. All these factors have a verbal description of very satisfactory while the accuracy and up-to-datedness of information got a mean of 4 with a verbal description of Not Present.

## 2.2 Users

The students performed better using the SIM in Science with a weighted mean of 23.2 in their pre-test and 40.58 in their posttest.

## 3. Implications of the study to Science Education

The computed t value is found to be -33.725 compared to its critical value of -1.99. The null hypothesis is rejected,  $H_0$  which means there is a significant difference between the pretest and posttest. Thus, the SIM is effective. It is evident that the use of SIM improved the students' scores in posttest and it helped the students to master the least learned competencies in science even under the distance learning modality.

## Conclusions

Based on the results of study, the following conclusion was drawn:

1. This research study entitled "Development and Validation Strategic Intervention Material in Science 7" aimed to help students to cope up and to improve their level of mastery in every lesson. It also aimed to help teachers attained their objectives on their lessons. This study has a great impact on the continuity of education amidst the COVID-19 pandemic as it served as an intervention material, especially in teaching least learned competencies in science.
2. Furthermore, the developed and validated Strategic Intervention Material (SIM) has a very satisfactory content, format, presentation and organization, and accuracy and up-to-datedness of information. This means that the administration of SIM improves the performance of the students. It ensures that the students attain the objectives of every lesson to improve their level of mastery for them to be globally competitive. Also, the significant result of pretest and posttest proves that the usage of SIM is effective for Grade 7 students.
3. The use of SIM helped students master the least learned competencies for the first quarter lessons in Science 7 even in the modular distance learning approach with the teacher as facilitators of learning. Therefore, it is an effective instructional material for remedial instruction in Science 7.

## Limitations of the Study

Two (2) sections with 35 students each was used in this study. Five science experts validated the developed Strategic Intervention Material in Science for grade 7 learners.

## Recommendations

In line with the results and conclusions, the researcher recommends the following:

1. It is recommended that the Science teachers use the developed and validated Strategic Intervention Material as a supplementary material in teaching Science.
2. The validated SIM in Science 7 may serve as a model in designing SIM in other subjects in Junior High School.
3. A conduct follow-up study on the effectiveness of the Strategic Intervention Material 4. The SIM is recommended for piloting or try-out in different high schools before adoption.
5. Students are encouraged to get copies of this SIM for remedial instructions.
6. Science teachers should be encouraged to utilize materials that will enhance students' scientific ability.
7. School administrators and supervisors should organize and fund workshops, trainings and seminars in developing SIM and other localized instructional material.
8. Further research similar to this study is encourage to improve students' scientific ability.

## Compliance with Ethical Standards

The researcher secured the personal information of the experts for confidentiality. The researchers also asked permission from the science experts prior to the conduct of the study. Results, methods, and procedures were collected and conducted online and face to face with safe and health protocols for the safety of the research participants. It is done without any manipulation to provide valid and reliable results for the research. Science experts can participate and contribute to the research of their own will.

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