

## STRATEGIC INTERVENTION MATERIAL: PERFORMANCE LEVEL OF GRADE 7 STUDENTS OF ZAMBALES NATIONAL HIGH SCHOOL SCHOOLS DIVISION OF ZAMBALES, PHILIPPINES

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### **Abstract**

*The main purpose of the study was to determine the effectiveness of teacher made Mathematics Strategic Intervention Material (SIM) to the performance level of the Grade 7 students of Zambales National High School Schools Division of Zambales, Philippines. There were a total of 116 students who served as respondents in this study who were enrolled during the school year 2018-2019. Quasi-experimental research design was used using pre-test and post-test to find the effect of strategic intervention material to the academic performance of the student-respondents in Mathematics. Descriptive (frequency, percentage and mean) and inferential statistics (t-test and Analysis of Variance) were utilized for the analysis and interpretation of the data.*

*The results on students' performance in Mathematics using the teacher made strategic intervention material was fairly satisfactory in pre-test to outstanding in post-test. For competencies, the scores of more than half of the respondents in the competency test on translate verbal expressions into algebraic or mathematical phrases and vice versa were greater than the mean score of 53.57 interpreted to be outstanding. The scores of more than half of the respondents in the competency test on translate English sentence to inequalities and vice versa were greater than the mean score of 35.60 interpreted to be outstanding. The perception of the student-respondents toward the effectiveness of teacher made strategic intervention material on knowledge, process, and transfer/ application was very much effective while motivation resulted to be very effective.*

*There is no significant difference in the perception of the student-respondents on the knowledge, motivation, process and transfer/ application in the test scores of mathematics competencies.*

*There is highly significant relationship between students' pre-test and post-test performance when the teacher made strategic intervention material used as method of teaching in teaching and learning mathematics competencies.*

**Keywords:** Strategic Intervention Material, Performance, Learning Gap, Intervention, Competency

### **INTRODUCTION**

Mathematics is one of the most vital and tough subjects in today's generation. No matter to which field or profession you belong to, its use is everywhere. However, many students would say that this subject is also one of the most difficult to learn. They seldom master some basic concepts that leads to their low performance in terms of phasing of lessons and the improvement is clearly affected. Specifically, some of the necessary skills in problem solving are Translating English Phrases to Mathematical or Algebraic phrases, Translating English Sentences into Equations and Inequalities. The students sometimes get confused on what operation are they going to use. That is why it is necessary to have a good understanding of the

lesson. Furthermore, the teacher makes adjustments by inserting such concepts and even recapping the different words that can be associated with the basic operations, thus in order to lessen confusion and boost mastery, a strategic intervention material should be utilized.

Strategic Intervention Materials (SIM) are conceptualized and designed to aid the teacher provide the students the needed support to make progress in studies. These will increase and deepen the skills, knowledge and understanding of the student in various subject areas not only in Mathematics but also in including various learning areas in the curriculum. SIM can give the opportunity to explore various ideas and concepts that would enrich their understanding of varied subject matters that sharpen their competencies. Furthermore, the strategic instructional materials tend to reteach the lessons, which are not so much clear to the learners, and to help them gain mastery of the skills.

### STATEMENT OF THE PROBLEM

This study aimed to determine the effectiveness of the teacher – made Mathematics Strategic Intervention Material in increasing the performance level of the selected Grade 7 students of Zambales National High School Division of Zambales, Philippines.

Specifically, these are the questions to be investigated:

1. How is the performance of the students using the Teacher Made Strategic Intervention Material (SIM) be describes in terms of:
  - 1.1 Pre – test; and
  - 1.2 Post – test?
2. How do the student respondents perceive the effectiveness of the Teacher Made Strategic Intervention Material in terms of:
  - 2.1 Knowledge;
  - 2.2 Motivation;
  - 2.3 Process; and
  - 2.4 Transfer/ Application?
3. Is there a significant difference between the perceive effectiveness of Teacher Made Strategic Intervention Material and level of competencies in Grade 7 Mathematics?
4. Is there a significant relationship between the academic performance and level of competencies using the Teacher Made Strategic Intervention Material during the pre – test and post – test?

### REVIEW OF RELATED LITERATURE

Mathematics, as a highly sophisticated yet practical discipline, provides a person with opportunities to develop life and practical skills. Learning its concepts becomes easier with the aid of various instructional materials (IMs) which are necessary for the teaching-learning process since they address the diverse needs of learners. Strategic Intervention Material (SIM) is a user-friendly IM that can be answered solely by a student or by a group of students inside or outside the classroom. (Diaz and Dio, 2017)

Nowadays, aside from using technology, 21st century teachers are using Strategic Intervention Material (SIM). SIM refers to teaching aid introduced into the teaching methods to stimulate the activity of the students and thereby increasing their level of understanding. It is also use for remediation or teaching least mastered competencies suited for 21st century learners (Sun.Star Pampanga, 2017).

In the Philippines, Strategic Intervention Material best known as SIM is an instructional material meant to reteach concepts or topics, which are considered least mastered by the students. The basic parts of which are: Guide Card, Activity Card, Assessment Card, Enrichment Card and Reference Card (Plenos, Josephine, 2014). It is one of the solutions employed by the Department of Education to enhance academic achievements of students performing low in the field of Mathematics. DepEd Memo No. 117, series of 2005 entitled “Training Workshop on Strategic Intervention Materials (SIMs) for Successful Learning” provided math secondary teachers the training in the preparation of SIMs. As part of intensifying and developing strategic intervention materials as a tool for remediating poor performance in Math. The Department of Education included the SIM making as one of the contests during math competition in school, division, regional, and national level competitions. As stipulated in the DepEd Order No. 39, s. 2012, interventions have to be made in order to address learning gaps. The use of Strategic Intervention Material (SIM), is identified as one of the suggested various intervention forms that can bridge learning gaps. SIM is a remediation aid for the students at the level of their understanding and thereby increasing their academic achievement.

Strategic Intervention Material as meant to re-teach the concepts and skills (least mastered). It is a material given to students to help those master competency-based skills, which they were not able to develop during a regular classroom teaching. It consists of both learning strategies (for students) and content enhancement (for teachers). It is a multifaceted approach to help students to become independent and successful learners. This intervention material focuses on the skill not mastered by the students during regular class. It does not involve pretest and posttest and includes fun activities. (Bunagan, 2012)

SIM refers to teaching aid introduced into the teaching methods to stimulate students' interest in the activity to increase their level of understanding. It is a learning package composed of guide card, several hands-on and minds-on activities, assessments, enrichments, and answer keys which the students can bring home as supplementary learning material that will help them work and learn independently or with their peers.

At present, in the Philippine education system, intervention materials are highly regarded as tools for remediating poor achievements of the learners. SIM or Strategic Intervention Material refers to a teaching aid introduced into the teaching methods to stimulate the activity of the students and thereby increase their level of understanding. It is strategically prepared and designed for teaching remediation for low achievers in the subject. It is given after the regular classroom instruction to students who were not able to grasp the concepts of the subject matter. (Dy, 2011)

Instructional material plays a very important role in the teaching learning process. It enhances the memory level of the students and makes the teaching – learning process interesting (Nicholls, 2000; Raw, 2003).

Instructional materials are school resource inputs (SRI), they include print and non – print items that are designed to impart information to students in the educational process. Instructional materials also include items such as kits, textbooks, magazines, newspapers, pictures, recordings, slides, transparencies, videos, video discs, workbooks and electronic media including music, movie, radio, software, CD – ROMs, and online services (Dahar, 2011).

Further, Dahar (2011) investigated the effect of availability of instructional materials on the academic performance of students in Punjab (Pakistan). He mentioned that instructional materials play a very important role in the teaching - learning process.

SIM increases and deepens students' skills in manipulation, knowledge or thinking, understanding and observing the microscopic into macroscopic representation of matter like atoms, molecules and ions which students believe as a discrete representation of the existing matter and other related components of science (Togonon, 2011).

The study made by Edwin I. Salviejo, Science Department, Makati High School, 1214 Makati City, Philippines; Fidela Q. Aranes, Chemistry Department, College of Science, Technological University of the Philippines, 1000 Manila, Philippines; and Allen A. Espinosa, Faculty of Science, Technology and Mathematics, College of Teacher Development, Philippine Normal University, 1000 Manila, Philippines that was published in the International Journal of Learning, Teaching and Educational Research, Vol 2, No. 1, pp. 91-123, February, 2014 showed the effectiveness of SIM in enhancing the teaching-learning process.

The study entitled, "Strategic Intervention Material-Based Instruction, Learning Approach and Students' Performance in Chemistry," gave the following conclusions: (1) Most of the students adopted the deep learners' approach after the exposure to the SIM – BI. Some of the surface learners adopted the deep learners' approach while a few deep learners adopted the surface learners' approach. The SIM – BI has capability of influencing the learning approach of the students in Chemistry; (2) The use of the Strategic Intervention Material-Based Instruction (SIM-BI) enhanced the performance of students in Chemistry regardless of learning approach adopted; (3) The deep and surface learners performed equally well after exposure to Strategic Intervention Material – Based Instruction (SIM – BI); and (4) Deep and surface learners have a positive perception on the use of Strategic Intervention Material (SIM). Students find it enjoyable, interesting and contributing positive attitude towards Chemistry. (Aranes, Espinosa, Salviejo, 2014)

Based on the abovementioned information, the utilization of an intervention material can significantly increase the performance of the students in the least mastered skills in Mathematics. These studies revealed that the use of SIMs plays a pivotal role in elevating the memory level of the students, in grasping the different concepts in Mathematics, and with the integration of various strategies in the implementation of the material, the teaching-learning process becomes interesting.

## RESEARCH METHODOLOGY

### Research Design

The researcher used quasi - experimental research design, using two sections in Grade 7 students of Zambales National High School, Iba, Zambales as respondents. Experimental method of research is a method or procedure involving the control or manipulation of conditions for the purpose of studying the relative effects of various treatments applied to members of a sample, or of the same treatment applied to members of different samples (Calmorin, 1995). It is a problem-solving approach that embraces studies of an experimental nature in which the systematic study of social life is carried out under conditions of control and experiment.

According to Aquino (1993), this is a design to investigate possible cause-and- effect relationship by exposing one or more experimental groups to one or more treatment conditions and comparing the results to one or more control groups not receiving the treatment, random assignment being essential.

## RESPONDENTS AND SAMPLING TECHNIQUE

The study involved two sections of Grade 7 students of Zambales National High School, Iba, Zambales namely: 7 – Agoho and 7 – Apitong. Both sections consist of 58 students and was taught using the Teacher Made Strategic Intervention Material. The Table 1 below shows frequency and percentage distribution of respondents

**Table 1: Frequency and Percentage Distribution of the Respondents**

Section	Frequency	Percentage
Agoho	58	50.00
Apitong	58	50.00
Total	116	100.00

Out of one hundred sixteen (116) respondents, there are fifty (50) percent belong to section Agoho and the other fifty (50) percent belong to section Apitong. All of the respondents are divided equally to see the effectiveness of the Teacher Made Strategic Intervention Materials.

## Location of the Study

This study was conducted in Zambales National High School located at Zone VI, Iba Zambales, Philippines. Zambales National High School is a secondary school in the Schools Division of Zambales, Region III, Philippines.

## Instruments

The study was conducted using these instruments: Strategic Intervention Material, Pre-Test and Post Test and Perspective Survey Questionnaire.

The Strategic Intervention Material consists of the Title Card, Guide Card, Activity Cards, Assessment Card, Enrichment Card, Reference Card and Answer Card.

The Pre-Test and Post Test was consisting of 30 multiple-choice item to measure the degree of change in the sample group's understanding of the mathematics competency because of intervention.

The Perception Survey Questionnaire (PSQ) was developed by the researcher to determine the perceptions of the respondents regarding the use of the strategic intervention material. This survey was consisting of 20 questions categorized as knowledge, motivation, process and application validated by the adviser/ mentor.

## Data Collection

The researcher secured a letter to the principal requesting for the approval of the conduct of the study as well as to the Schools Division Superintendent. After the approval of the request, the researcher personally conducted the study. The researcher administered a pre – test to both groups. Both groups used the same kind of teacher made test. After administration of the pre – test, results were gathered for the interpretation of data. The researcher taught the groups using strategic intervention material then post – test was administered. The researcher gathered the results for the interpretation of data. After the administration of Post Test, The Perception Survey Questionnaire (PSQ) was also administered to determine the perceptions of the respondents regarding the use of the strategic intervention material. The researcher gathered the results for the interpretation of data

### Data Analysis

The statistical tools used in the study are the following:

**Mean.** It is also called arithmetic mean and represented by  $\bar{x}$  (or “x – bar”). This is computed by adding all the values of the variable x, (The sum of the x values is symbolized by  $\sum x$  or summation of x) and dividing the sum by the total number of samples, represented by n. This will be used to determine the average of the pre-test and post-test results. The formula for this is expressed as  $\bar{x} = \frac{\sum x}{n}$

**Weighted Mean.** This will be used to determine the perception of the students with regards to the knowledge, motivation, process, and transfer/ application. It is a mean calculated by giving values in a data set more influence according to some attribute of the data. It is an average in which each quantity to be averaged is assigned a weight, and these weightings determine the relative importance of each quantity on the average. Weightings are the equivalent of having that many like items with the same value involved in the average.

**Likert Scale.** It was used as guide in determining the effectiveness of teaching motivation through quality education delivery. The point value, weighted value, and qualitative description are as follows:

Point Value	Weighted Value	Qualitative Description
5	4.20 – 5.00	Very Much Effective
4	3.40 – 4.19	Very Effective
3	2.60 – 3.39	Effective
2	1.80 – 2.59	Less Effective
1	1.00 – 1.79	Not Effective

**t-test.** The t test is one type of inferential statistics. This will be used to determine whether there is a significant relationship between the academic performance and Mathematics competencies cited in Problem 3. The following rules are used as guide in rejecting and accepting the null hypothesis (Reyes, 1996).

#### Decision Rule:

If the computed t-value is less than the critical t-value at 0.05 alpha level, the null hypothesis is accepted. There is no significant relationship.

If the computed t-value is greater than the critical t-value at 0.05 alpha level, the null hypothesis is rejected. There is a significant relationship.

**ANOVA (Analysis of Variance).** This will be used to determine the significant difference in the perception of effectiveness between the K-12 curriculum teaching method ad Teacher Made Strategic Intervention Material.

#### Decision rule:

If the computed F-value is less than the critical F-value at 0.05 alpha level, the null hypothesis is accepted. There is no significant relationship.

If the computed F-value is greater than the critical F-value at 0.05 alpha level, the null hypothesis is rejected. There is a significant relationship.

## RESULTS AND DISCUSSION

### 1. Performance of the Students in Mathematics after Pre-Test and Post- Test using

**the Teacher Made Strategic Intervention Material (SIM)**

Table 2 presents the summary of that academic performance of the Grade 7 Students in Mathematics.

**Table 2**  
**Summary of Performance of the Students in Mathematics after Pre-Test and Post- Test using the Teacher Made Strategic Intervention Material (SIM)**

Academic Performance	Mean Score	DE
1. Pre-test	9.8017	Fairly Satisfactory
2. Post-test	25.0087	Outstanding

For strategic intervention material as method of teaching, the student-respondents after the pre-test in Mathematics obtained a mean score of 9.8017 or 10 described as fairly satisfactory and after post-test, the student-respondents scored 25.0087 or 25 described as outstanding. The results revealed in Table 4 that there was improvement in the scores of the students from fairly satisfactory in the pre-test to outstanding in the post-test when teacher made strategic intervention material used in learning Mathematics competencies by Grade 7 students from 7 – Apitong and 7 – Agoho.

From the above results, it is obvious that teacher made strategic intervention material as method of teaching is more effective than the traditional method. The present result is consistent with that of Diaz and Dio (2017) finding even if the use of textbooks, can improve the performance of students, still the use of strategic interventional material with two-dimensional manipulative produces an outstanding scholastic progress of learners.

According to the study conducted by Feliciano (2017) concluded that the exposure of learners to Strategic Intervention Material (SIM) improved the knowledge, skills and performance of the learners. Quality instructional materials and genuine tasks are necessary to facilitate the development of knowledge, skills and value standard.

**2. Effectiveness of the Teacher made Strategic Intervention Material.**

Table 3 presents the summary of assessment towards the effectiveness of Teacher made Strategic Intervention Materials on the aspects of knowledge, motivation, process and transfer, application.

**Table 3**  
**Perception on the Effectiveness of the SIM on the Aspects of Knowledge, Motivation, Process, and Transfer/ Application**

No.	Indicators	Mean	DE	RANK
	Knowledge	4. 3902	Very Much Effective	2 2
	Motivation	1466	Very Effective	4 4
	Process	4638	Very Much Effective	1 1
	Transfer / Application	3017	Very Much Effective	3 3
	<b>Grand Mean</b>	3256	Very Much Effective	

The assessment on the effectiveness of Teacher-Made Strategic Intervention Materials was perceived to be very much effective (VME) in all learning aspects, the process which ranked first with overall weighted mean of 4.4638, the aspect of learning knowledge was second in rank. Transfer/ application was third in rank with overall weighted mean of 4.3017. Motivation ranked 4th with overall weighted mean of 4.1466 interpreted as very effective. The performance of the student-respondents was perceived to be very much effective with grand mean of 4.3256.

**3. Analysis on the difference in Perception of Effectiveness between Teacher Made Strategic Intervention Material (SIM) and the Level of Competencies on Knowledge, Motivation, Process and Transfer/ Application.**

Table 4 shows the Analysis of Variance to test the significant difference on the perception of the students on the effectiveness of teacher made strategic intervention material towards knowledge, motivation, process, and transfer/ application as learning aspects

**Table 4**  
**Analysis on the Difference in Perception of Effectiveness between Teacher Made Strategic Intervention Material (SIM) and the Level of Competencies on Knowledge, Motivation, Process and Transfer/ Application**

Source of Variation	SS	df	MS	F computed	p-value	F critical	Decision	Interpretation
Knowledge	7.184 377.443	3 112	3.592 3.340	1.075	0.345	2.69	Accept Null Hypothesis	Not Significant
Motivation	5.705 378.922	3 112	2.853 3.353	0.851	0.430	2.69	Accept Null Hypothesis	Not Significant
Process	2.672 381.955	3 112	1.336 3.380	0.395	0.674	2.69	Accept Null Hypothesis	Not Significant
Transfer/ Application	6.451 378.176	3 112	3.226 3.347	0.964	0.345	2.69	Accept Null Hypothesis	Not Significant
<b>Total</b>	<b>384.627</b>	<b>115</b>						

It was revealed in the data that there is no significant difference on the effectiveness of the SIM and the level of competencies towards knowledge, motivation, process, and transfer/application as learning aspects. This means that learning aspects are not predictor variables in determining the effects of teacher made strategic intervention material on students 'performance in Mathematics.

It was reported in the study conducted by Boumova (2008) as cited by Salviejo et.al (2014) claimed the teaching is deeply teacher - centered. The traditional methodology puts the responsibility for teaching and learning mainly on the teacher and it is believed that students will be able to use the knowledge if they are present in the class discussions and listen to the teacher's explanations and examples.

**4. Relationship between the Academic Performance and Level of Competencies using Teacher Made Strategic Intervention Material**

**4.1 Pre-Test**

Computer-generated Pearson r values (Table 5) using Microsoft Excel 2007 software show that the scores in the pre-test and the scores in the mathematics competencies on translating verbal expressions into algebraic or mathematical phrases and vice versa, and translating English sentence to inequalities and vice versa have a very low positive correlation indicated by r values of 0.110 and 0.066 respectively.



**Table 5 - t-test for Significance of Relationship of Scores in the Pre-test and Level of Competencies**

Competencies		Academic	Interpretation
Translate English Phrases into Algebraic or Mathematical phrases and Vice Versa	Pearson Correlation	0.110	Very Low Positive Correlation Not Significant
	Sig. (2-tailed)	0.241	
	N	116	
Translate English sentence into Mathematical Sentence and Vice Versa	Pearson Correlation	0.066	Very Low Positive Correlation Not Significant
	Sig. (2-tailed)	0.481	
	N	116	
<b>Correlation is significant at the 0.05 level (2-tailed)</b>			

The data in Table 5 presents the result of the t-test for significance of Pearson r values for the relationship of score in the pre-test and the respective competencies at 0.05 level of significance, two-tailed test. The null hypothesis of no significance is accepted. The findings that at the 5% level of significance, Pre-test scores and scores in mathematics competencies are not significantly correlated could be attributed to the difference in the time and conditions as well as the difference in the physical and emotional state of well-being of the student- respondents during the administration of the test. This finding is similar to the study conducted by Salviejo, Aranes, and Espinosa (2014) found that difference in the mean pre-test scores of the two groups of learners is not significant. The result implied that at the start of the study, the prior knowledge of surface learners and deep learners are more or less comparable. Moreover, the findings were supported by Sahin (2010) which asserts that the effect of any strategy or material on the academic achievement of student in any written course found to be non-significant in the pre-test scores of the experimental and control group in the Written Expression Achievement test.

**4.2 Post Test**

Computer-generated Pearson r values (Table 6) using Microsoft Excel 2007 software show that the scores in the post-test and the scores in the Mathematics competencies on translating verbal expressions into algebraic or mathematical phrases and vice versa has a very low positive correlation indicated by r value of 0.955 and translating English sentence to inequalities and vice versa has a very low negative correlation indicated by r value of 0.128.

**Table 6  
t-test for Significance of Relationship of Scores in the Post-test and Level of Competencies**

Competencies		Academic	Interpretation
Translate English Phrases into Algebraic or Mathematical phrases and vice versa	Pearson Correlation	0.005	Very Low Positive Correlation Not Significant
	Sig. (2-tailed)	0.955	
	N	116	
Translate English sentence into Mathematical Sentence and Vice Versa	Pearson Correlation	-.142	Very Low Negative Correlation Not Significant
	Sig. (2-tailed)	0.128	
	N	116	
<b>Correlation is significant at the 0.05 level (2-tailed)</b>			

The data in Table 6 presents the result of the t-test for significance of Pearson r values for the relationship of score in the pre-test and the respective competencies at 0.05 level of significance, two-tailed test.

The null hypothesis of no significance is accepted. The findings that at the 5% level of significance, post-test scores and scores in mathematics competencies are not significantly correlated could be attributed to the difference in the time and conditions as well as the difference in the physical and emotional state of well-being of the student- respondents during the administration of the test.

According to the study of Saclao (2016) found upon using the SIM-MOD, a posttest was given to

the participants. The p-value of 0.000 with a t value of -11.019 is an indication of the significant differences between the scores of the participants from the control and experimental groups. This implies that the participants who used the SIM- MOD have significant higher scores than those who did not use the learning materials. Also, there is a significant difference (p-value of 0.000 and t-value of 7.727) present in the mean gain scores of the participants with regards to their pretest and posttest scores. This is an indication that the use of SIM-MOD is an effective way of improving the achievement of the students in their Mathematics subject.

According to the study conducted by Dahar (2011) explained that the use of appropriate instructional materials has a strong relationship to the academic performance of secondary students. Barlis (2015) also added that instructional materials play an important role in improving students' Mathematics achievement.

### CONCLUSION

Based on the summary of the investigations, the researcher concluded that:

1. The performance of the students in Mathematics using the teacher made strategic intervention material was fairly satisfactory in pre-test to outstanding in post-test.
2. The perception of the student-respondents toward the effectiveness of teacher made strategic intervention material on knowledge, process, and transfer/ application was very much effective while motivation resulted to be very effective.
3. There is no significant difference in the perception of the student-respondents on the knowledge, motivation, process and transfer/ application in the test scores of mathematics competencies.
4. There is highly significant relationship between students' pre-test and post-test performance when the teacher made strategic intervention material used as method of teaching in teaching and learning mathematics competencies.

### RECOMMENDATIONS

Based on the findings and conclusions, the researcher offers the following recommendations:

1. For students' better academic performance teacher made strategic intervention materials shall be used in teaching Mathematics to enhance and develop students' mathematical skills, concepts, and competencies.
2. Mathematics teachers should create and produce teacher made strategic intervention materials to address the least mastered skills and competencies.
3. Mathematics teachers should give more drill exercises and activities on Mathematics competencies which are difficult to comprehend and less interesting topic to enhance student interest and encourage the students to work independently.
4. Mathematics teachers shall be provided with more seminars, workshops, and in- service training on the principles of strategic intervention material construction for effective teaching and learning Mathematics competencies.
5. Implement continuous professional development programs for Mathematics teachers to keep abreast with development in education with the use of teacher made strategic intervention materials.
6. It is suggested that similar studies be made in order to widen the scope of the study and validate the result obtained by the researcher.

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