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TEACHER-MADE STRATEGIC INTERVENTION MATERIALS FOR STUDENTS WITH LEARNING DIFFICULTIES IN MATHEMATICS 8 IN THE PHILIPPINES

Author's Name: [1]May Bundang, [2]Katherine B. Parangat Edd

Affiliation: Deped-Zambales National High School, Philippines

E-Mail: may.bundang@deped.gov.ph

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Abstract

The purpose of this study is to examine the effectiveness of teacher-made strategic intervention materials through instructional task performance and instructional supervision of the teacher in charge and to assess students' performance in Mathematics 8 in Zambales National High School, Philippines. Strategic Intervention Material (SIM) is used in remedial sessions to focus on developing the learners' least mastered skills. It is a learning tool that assists students in mastering competency-based abilities that they may not have been able to develop in a traditional classroom setting. A quasi-experimental study design was used. Purposive sampling was used to select one hundred twenty-five student-respondents. For data analysis and interpretation, descriptive (frequency, percentage, and mean) and inferential statistics (t-test) were used. There was a highly significant difference for illustrating theorem on triangle inequalities, applying theories on triangle inequalities, proving inequalities, and proving properties of parallel lines cut by a transversal on the result of pre-test and a post-test score of the students in Mathematics when the competencies were taught. In light of the findings, it is recommended that Mathematics teachers must be innovative, imaginative, and creative in creating strategic intervention material to enhance the Mathematical skills of the students. DepEd officials may encourage teachers to utilize strategic intervention material as valid instructional material for teaching Mathematics, especially those difficult competencies or least mastered skills.

***Keywords**: Strategic Intervention Material, Mathematics, Academic Performance*

INTRODUCTION

Mathematical ideas should be explored in ways that stimulate curiosity, create appreciation and enjoyment of mathematics, and develop critical and analytical thinking and depth of understanding. Therefore, students cannot expect to learn by simply watching their teacher solve problems on the board. In fact, students must bear the responsibility of being actively engaged to maximize their learning potential (SEI-DOST & MATHTED, 2011).

Nowadays, 21st-century teachers used the Strategic Intervention Material (SIM) and combined it with technology, creativity, and resourcefulness of teachers. It is one of the instructional materials for remediation or reteaching least mastered competencies suited for 21st-century learners (Sun Star, 2017).

Instructional approaches may succeed or fail, they are dependent on the learning needs of the students. Teachers must consider the students' emotional needs and their approaches to learning. Developing instructional materials play an integral role in the teaching-learning process. The use of instructional materials has a strong relationship with academic performance among secondary students (Dahar, 2011).

In this assessment, the Philippines was among the bottom five poor performers in Math and Science. Dela Cruz (2012), cited by Dacumos (2016) reported that the Philippines placed 36th in science out of the 38 countries that participated in the said assessment. Similarly, results in the 2003 TIMSS showed that the country ranked 23rd of the 25 countries in Grade 4 Science and 42nd out of the 45 participating countries in Second year Science.

Learning gaps are referred to as being the difference between where students currently are in their education level and where they should be; to determine a child's learning gap, teachers and students should both perform and assess a variety of ongoing tasks. Furthermore, learning gaps are the difference between what we know about effective learning and what is currently happening in the classroom. Addressing learning gaps is done by identifying the learning gap first and implementation is important in developing the quality of teaching to close the gap (Holmes, 2012, cited by Lumogdang, 2015).

Olawale (2013) claimed, "The importance of Instructional Materials in any teaching-learning process cannot be overemphasized." If properly prepared, these materials will be effective in terms of enhancing, facilitating, and making teaching-learning easy, lively, and concrete.

Learners with an insufficient level of understanding of the concept will overcome such problems through SIM which is a well-structured and carefully planned material. The appropriate utilization and planning of SIM by teachers enable the students to develop an understanding of the science concepts, develop functional knowledge and manipulative skill (Dacumos, 2016).

Thus, the purpose of this study is to examine the effectiveness of teacher made strategic intervention materials through instructional task performance and instructional supervision of the teacher in charge and to assess students' performance in Mathematics 8 in secondary school in Zambales National High School, during the school year 2018-2019.

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METHODOLOGY

The quasi-experimental design was used to measure and compare the effect of teacher-made strategic intervention materials with learning difficulties in Mathematics 8 in Zambales National High School. The study was conducted in selected Grade 8 level in Zambales National High School. It consisted of the entire population of one hundred twenty-five (125) student-respondents. The Grade 8 sections include (1) Grade 8 - Cashew, (2) Grade 8 - SPA, and (3) Grade 8 – SPFL.

Table 1 shows the frequency and percentage distribution of the respondents in terms of section.

Table 1: Frequency and Percentage Distribution of the Respondents as to Section

Section	Frequency	Percent
8 - SPA	48	38.40
8 – CASHEW	48	38.40
8 - SPFL	29	23.20
Total	125	100.00

The questionnaire was the main instrument used to provide data for the respondents' section. The researcher administered a pre-test and a post-test. The student-respondents were selected using purposive-quota sampling. This technique was used because it was the purpose of the researcher to select 125 grade 8 students in Zambales National High School. The grade 8 students were chosen as respondents because they receive direct instruction from the researcher.

The researcher prepared several letters and requested permission from the respective school principal of Zambales National High School and Schools Division Superintendent, Division of Zambales to survey students in Zambales National High School.

The pre-test/post-test made by the researcher was forwarded to Master Teachers and Department Head of Mathematics Department for checking especially if the competencies are aligned to the objectives of the lessons.

After the questionnaires have been validated and found to have a high-reliability coefficient, the researcher incorporated all the suggestions and corrections ready for administering to the respondent-students. After all, questionnaires were retrieved, the data gathered were analyzed using appropriate statistical tools frequency count and percentage, weighted arithmetic mean, and t-test.

RESULTS AND DISCUSSION

Level of Difficulties

Table 2 showed the frequency and percentage of correct answers and the level of difficulty of the respondents in Mathematics in the four competencies on triangle inequalities in the pre-test and post-test.

Table 2: Level of Difficulty of the Respondents in Mathematics during Pretest and Posttest on Triangle Inequalities

Item No.	Pre-test				Post-test			
	Frequency and Percentage of Students with correct Answers		***Difficulty Index***		***Frequency and Percentage of Students with correct Answers***		***Difficulty Index***	
	F	***%***	***Range***	***Interpretation***	***F***	***%***	***Range***	***Interpretation***

Illustrating theorem on triangle inequalities								
1	67	53.60	0.5360	Average	123	98.40	0.9840	Very easy
2	42	33.60	0.3360	Difficult	113	90.40	0.9040	Very easy
3	32	25.60	0.2560	Difficult	112	89.60	0.8960	Very easy
4	30	24.00	0.2400	Difficult	104	83.20	0.8320	Very easy
5	38	30.40	0.3040	Difficult	100	80.00	0.8000	Very easy
Applying theories on triangle inequalities								
6	73	58.40	0.5840	Average	117	93.60	0.9360	Very easy
7	35	28.00	0.2800	Difficult	95	76.00	0.7600	Easy
8	24	19.20	0.1920	Difficult	89	71.20	0.7120	Easy
9	32	25.60	0.2560	Difficult	104	83.20	0.8320	Very easy
10	37	29.60	0.2960	Difficult	98	78.40	0.7840	Easy
Proving Triangle Inequalities								
11	51	40.80	0.4080	Average	111	88.80	0.8880	Very easy
12	55	44.00	0.4400	Average	108	86.60	0.8640	Very easy
13	32	25.60	0.2560	Difficult	99	79.20	0.7920	Easy
14	58	46.40	0.4640	Average	101	80.80	0.8080	Very easy
Proving properties of parallel lines cut by a transversal								
15	53	42.40	0.4240	Average	104	83.20	0.8320	Very easy
16	50	40.00	0.4000	Difficult	114	91.20	0.9120	Very easy
17	73	58.40	0.5840	Average	110	88.00	0.8800	Very easy
18	73	58.40	0.5840	Average	111	88.80	0.8880	Very easy
19	54	43.20	0.4320	Average	108	86.40	0.8640	Very easy
20	22	17.60	0.1760	Very Difficult	93	74.40	0.7440	Easy

Table 3: Summary of Level of Difficulty of the Respondents in Mathematics Using Strategic Intervention Material

Competencies	**Pretest Difficulty Index**		**PostTest Difficulty Index**	
	Range	**Interpretation**	**Range**	**Interpretation**
Illustrating Theorem on Triangle Inequalities	0.3344	Difficult	0.8832	Very easy
Applying Theories on Triangle Inequalities	0.3216	Difficult	0.8368	Very easy
Proving Inequalities in Triangle	0.3920	Difficult	0.8380	Very easy
Proving Properties of Parallel Lines Cut by a Transversal	0.4337	Average	0.8534	Very easy
Mean	**0.0886**	**Very Difficult**	**0.8452**	**Very easy**

The level of difficulty for illustrating theorem on triangle inequalities in the pre-test was 0.3344 and interpreted as Difficult while the level of difficulty during the post-test was 0.8832 interpreted as Very Easy.

The level of difficulty for applying theories on triangle inequalities in the pre-test was 0.3216 interpreted as Difficult while in the pot-test it was 0.8368 interpreted as Very Easy.

The level of difficulty for proving triangle inequalities in the pre-test is 0.3920 interpreted as Difficult and during the post-test, the level of difficulty was 0.8380 interpreted as Very Easy.

The difficulty index for proving properties of parallel lines cut by a transversal in the pre-test was 0.4337 interpreted as Average and the difficulty index in the post-test was 0.8534 interpreted as Very Easy.

Overall, the level of difficulty of the strategic intervention material during the pre-test was 0.0886 interpreted as Very Difficult, and after using the strategic intervention material the level of difficulty improved to 0.8452 and interpreted as Very Easy.

Performance of the Respondents during Pre – Test and After Using Strategic Intervention Material (Post – Test)

The computed mean grade in the pre-test for illustrating theorem on triangle inequalities was 69 interpreted as did not meet expectation. The level of performance of students in Mathematics after pre-test using teacher made strategic intervention material as method of teaching did not meet expectation. The computed mean grade was 93 interpreted as Very Satisfactory. The level of performance of students in Mathematics after post-test using teacher-made strategic intervention material as a method of teaching was Very Satisfactory.

Table 4: Performance of the Respondents During Pre-test and After Using Strategic Intervention Material (Post-test)

Descriptive Equivalent	Score	Initial Grade	Transmuted Grade	Pre - Test		Post - Test	
				Frequency	Percentage	Frequency	Percentage
Illustrating theorem on triangle inequalities							
Outstanding	5	100.00	100	2	1.60	82	65.60
Very Satisfactory	4	80.00	87	9	7.20	20	16.00
Satisfactory	3	60.00	75	15	12.00	16	12.80
Fairly Satisfactory	2	40.00	70	35	28.00	7	5.60
Did not meet expectation	1	20.00	64	48	38.40	0	0.00
Did not meet expectation	0	0.00	60	16	12.80	0	0.00
Applying Theories on Triangle Inequalities							
Outstanding	5	100.00	100	1	0. 8	64	51.20
Very Satisfactory	4	80.00	87	1	0. 8	18	14.40
Satisfactory	3	60.00	75	20	16.00	29	23.20
Fairly Satisfactory	2	40.00	70	45	36.00	10	8.00
Did not meet expectation	1	20.00	64	42	33.60	4	3.20

Did not meet expectation	0	0.00	60	16	12.80	0	0.00
Proving Triangle Inequalities							
Outstanding	4	100.00	100	6	4.80	71	56.80
Very Satisfactory	3	75.00	87	9	7.20	29	23.20
Satisfactory	2	50.00	75	40	32.00	18	14.40
Fairly Satisfactory	1	25.00	70	49	39.20	7	5.60
Did not meet expectation	0	0.00	64	21	16.80	0	0.00
Proving properties of parallel lines cut by a transversal							
Outstanding	6	100.00	100	1	0.8	59	47.20
Very Satisfactory	5	83.33	89	10	8.00	31	24.80
Satisfactory	4	66.67	79	18	14.40	24	19.20
Fairly Satisfactory	3	50.00	72	29	23.20	8	6.40
Did not meet expectation	2	33.33	68	39	31.20	3	2.40
Did not meet expectation	1	16.67	64	11	8.8	0	0.00
Did not meet expectation	0	0.00	60	17	13.60	0	0.00

Table 5: Summary Performance of the Respondents During Pre-test and After Using Strategic Intervention Material (Post-test)

Competencies	Pre - Test		Post - Test	
	Mean Grade	Descriptive Equivalent	Mean Grade	Descriptive Equivalent
Illustrating Theorem on Triangle Inequalities	69	Did not meet expectation	93	Very Satisfactory
Applying Theories on Triangle Inequalities	68	Did not meet expectation	89	Very Satisfactory
Proving Triangle Inequalities	70	Fairly Satisfactory	90	Very Satisfactory
Proving Properties of Parallel Lines Cut by a Transversal	71	Fairly Satisfactory	91	Very Satisfactory
Overall Mean Grade	**70** Fairly Satisfactory		**91** Very Satisfactory	

The computed mean score in the pre-test for applying theories on triangle inequalities was 68 interpreted as did not meet expectation. The level of performance of students in Mathematics after pre-test using teacher-made strategic intervention material as a method of teaching did not meet the expectation. The computed mean grade in the post-test was 89 interpreted as Very Satisfactory. The level of performance of students in Mathematics after post-test using teacher-made strategic intervention material as a method of teaching was Very Satisfactory.

The computed mean score in the pre-test for proving triangle inequalities was 70 interpreted as Fairly Satisfactory. The level of performance of students in Mathematics after pre-test using

teacher-made strategic intervention material as a method of teaching was Fairly Satisfactory. The computed mean grade in the post-test was 90 interpreted as Very Satisfactory. The level of performance of students in Mathematics after the post-test using teacher made strategic intervention material as a method of teaching was Very Satisfactory

The computed mean grade in the pre-test for proving properties of parallel lines cut by a transversal was 71 interpreted as Fairly Satisfactory. The level of performance of students in Mathematics after pre-test using teacher-made strategic intervention material as a method of teaching was Fairly Satisfactory. The computed mean grade in the post-test was 91 interpreted as Very Satisfactory. The level of performance of students in Mathematics after post-test using teacher-made strategic intervention material as a method of teaching was Very Satisfactory.

For strategic intervention material as a 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 12 that there was an improvement in the scores of the students from did not meet expectation in the pre-test to very satisfactory in the post-test when teacher-made strategic intervention material was used in learning Mathematics competencies by Grade 8 students from 8-SPA, 8- SPFL, and 8-Cashew.

From the above results, it is obvious that teacher-made strategic intervention material as a 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 outstanding scholastic progress of learners.

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

t-test of Difference in the Student's Pre-test and Post-Test Performance: When Strategic Intervention Material Method of Teaching Used

Table 6 showed the difference in the students' pre-test and post-test performance in Mathematics using Strategic Intervention Material.

Table 6: Difference on the Pre-Test and Post-Test Performance of the Respondents in Mathematics 8

COMPETENCY	t-computed	Sig. (2-tailed)	df	Decision/ Interpretation
Illustrating theorem on triangle inequalities	-38.674	.000	124	Reject Ho Significant
Applying theories on triangle inequalities	-35.038	.000	124	Reject Ho Significant

Proving inequalities	-45.873	.000	124	Reject Ho Significant
Proving properties of parallel lines cut by a transversal	-30.333	.000	124	Reject Ho Significant

The significant value for illustrating theorem on triangle inequalities, applying theories on triangle inequalities, proving inequalities, and proving properties of parallel lines cut by a transversal was 0.00 which is less than 0.05 alpha level of significance. The null hypothesis was rejected. There was highly significant difference on the result of pre-test and post-test score of the students in Mathematics when the competencies were taught. The significant difference of the result was attributed to the method utilized by the researcher.

The results implied that there was empirical evidence that the performance of the students differ from pre-test to post-test.

Soberano (2010), mentioned that strategic intervention materials were effective in mastering the competency-based skills based on the mean gain scores in the post-test of the experimental and control group. He found out that there was observed from the experimental group after the presentation of the intervention materials. The post-test result of the content group was likewise significant. There were significant differences between their mean scores in the post-test in favour of the experimental group. Togonon (2011), the students exposed to strategic intervention material performed better in the post-test than in the pre-test.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Based on the findings obtained in the study, the researcher concluded that majority of the respondents were from Grade 8- SPA and Grade -8, the student-respondents were rated difficult during the pre-test and very satisfactory during the post-test, the student-respondents were rated fairly satisfactory in their pre-test and very satisfactory after using the strategic intervention material when strategic intervention material was used, the performance fairly satisfactory in pre-test improved very satisfactory in post-test, and there is a highly significant difference between students' pre-test and post-test performance when strategic intervention material used as instructional material.

Mathematics teachers must be innovative, imaginative, and creative in creating strategic intervention material to enhance the mathematical skills of the students. They must be sensitive in identifying the needs and learning difficulties of diverse learners prior to the lesson. Seminar and in-service training should be conducted for the development and implementation of strategic intervention material as instructional material in the classroom. DepEd officials should encourage teachers to utilize strategic intervention material as valid instructional material for teaching Mathematics, especially those difficult competencies or least mastered skills. 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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