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Effectiveness of Strategic Intervention Material (SIM) Teaching Grade 11 Mathematics in Senior High School West Bay College

Dr. Susana C. Bautista
Email address: eddie.garcia@wbc.edu.ph/Bautista.susana@uphsl.edu.ph

Abstract*—Education is a vital tool for attaining success and enhancing an individual's quality of life. It helps to mitigate daily challenges and builds confidence through the gain of knowledge and skills. The role of teachers is essential in shaping students' educational experiences and outcomes. The Strategic Intervention Material (SIM), a creative approach to teaching mathematics, seeks to help students master difficult topics and raise their academic performance. The objective of this study was to evaluate the effectiveness of Strategic Intervention Material (SIM) in teaching Grade 11 Mathematics at Senior High School West Bay College. Specifically, it sought to (1) assess the pre-test scores of students prior to the implementation of SIM and the traditional method, (2) compare the post-test scores of students after applying both methods, (3) explore the differences in pre-test scores between students taught via SIM and the conventional method, and (4) analyze the differences in post-test scores of students instructed using SIM versus those taught using the traditional method. The study employed a descriptive method, integrating quantitative analyses to effectively describe and interpret the collected data. The results indicated that, during the pre-test, most students in both the control and experimental groups scored at average levels or below. In contrast, the post-test results showed that the experimental group that utilized SIM experienced notable improvement, with many students achieving above-average or superior performance levels. The calculated t-value of 0.917 and p-value of 0.363 suggested no significant differences in pre-test scores, whereas the t-value of -3.771 and p-value of 0.00 indicated significant differences in the post-test scores.In conclusion, the study determined that the implementation of Strategic Intervention Material (SIM) is more effective than traditional teaching methods. It significantly boosts students' understanding, performance, and overall success in Mathematics*.

***Keywords*—** *Strategic Intervention Material (SIM), Mathematics Instruction, Teaching Effectiveness, Descriptive Method, Academic Performance*.

I. INTRODUCTION

Teaching Mathematics in the 21st century demands innovative approaches that accommodate students' diverse backgrounds, learning styles, and academic needs. At its core, effective mathematics instruction is grounded in student-centered, experiential, and inquiry-based learning strategies that encourage active engagement and critical thinking. Alberta (2012)(1) and Wurdinger (2005)(2) emphasized that students learn more effectively when they are involved in hands-on, real-world activities that connect abstract concepts to practical experiences.

Similarly, Beilock (2015)(3) and McCrann (2016)(4) supported the idea that "learning by doing" fosters a deeper understanding of mathematical concepts by promoting participation and reflection.

Vaughn (2012)(5) and Weselby (2014)(6) argued that instruction must be systematic and responsive to learners' individual needs, integrating differentiated techniques to ensure that all students achieve mastery. Teachers play a vital role in structuring instructional time effectively, creating supportive environments, and adjusting pedagogical approaches to improve student outcomes.

In this context, the use of Strategic Intervention Material (SIM) has emerged as a crucial innovation in addressing learning gaps in Mathematics and Science. As defined by the Department of Education (DepEd Memo No. 117, s. 2005)(7), SIM serves as a remediation tool designed to help learners master competencies that were not fully understood during regular instruction. It consists of guide, activity, assessment, enrichment, reference, and answer key cards, all tailored to enhance comprehension and retention. Teichert and Stacy (2002)(8) and Rosenshine et al. (2009)(9) demonstrated that students who used SIM performed significantly better than those taught through traditional lecture-based methods, underscoring its effectiveness in reinforcing difficult concepts.

According to Bretz (2001)(10), meaningful learning occurs when cognitive, affective, and psychomotor domains are interconnected—an approach reflected in SIM's design. Dahar (2011)(11) and Nicholls (2000)(12) further noted that instructional materials—both printed and digital—enhance memory retention and student engagement.

Unlike conventional modules, SIM specifically targets least-mastered skills and focuses on immediate remediation rather than extensive testing (Bunagan, 2012)(13). To maintain student motivation, it integrates enjoyable and creative activities such as puzzles, games, and concept mapping (Garcia, 2015)(14; Rodrigo, 2015)(15).

Complementary teaching frameworks also support SIM's approach. Felder and Brent (2007)(16) highlighted the value of cooperative learning in fostering teamwork and communication, while Gardner (2001)(17) and Miller (2011)(18) emphasized the role of multiple intelligences in shaping differentiated instruction. Dewey (2015)(19) advocated for experiential learning, emphasizing the connection between experience and reflection as key to long-term understanding.

Barberos (2003)(20) stressed that teachers must possess strong pedagogical competence, adaptability, and motivation

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to maximize the impact of such instructional materials. Similarly, Espinosa (2014)(21), citing Dermirci, found that while traditional teaching alone may not lead to significant gains, integrating technology and interactive tools like SIM produces substantial improvements in student achievement and engagement.

For these reasons, the researcher found it essential to evaluate the effectiveness of Strategic Intervention Material (SIM) in enhancing students' mathematical performance. The study aims to determine how SIM contributes to student learning outcomes, motivation, and conceptual mastery. Ultimately, findings from this research are expected to guide educators and policymakers in developing strategies that integrate SIM into classroom instruction, ensuring that every learner receives equitable and meaningful opportunities to succeed.

1.1 Objective of the Study

The overall objective of this study was to determine the effectiveness of the Strategic Intervention Material (SIM) in teaching Grade 11 Mathematics in Senior High School at West Bay College. Specifically, this study had the following aims: (1) determine the pre-test scores of students in Mathematics before the utilization of the Strategic Intervention Material (SIM) and the Conventional Method; (2) determine the post-test scores of students in Mathematics after the utilization of the Strategic Intervention Material (SIM) and the Conventional Method; (3) assess whether there is a significant difference between the pre-test scores of students taught using the Strategic Intervention Material (SIM) and those taught using the Conventional Method; (4) assess whether there is a significant difference between the post-test scores of students taught using the Strategic Intervention Material (SIM) and those taught using the Conventional Method; and (5) propose recommendations based on the findings of the study to enhance the effectiveness of Mathematics instruction through the integration of the Strategic Intervention Material (SIM) in the Senior High School curriculum.

II. Methods

To obtain the necessary data needed for the study, quantitative research was utilized. Vaidya (2020) [15] defined it as a method of research that relies on measuring variables using a numerical system, analyzing these measurements using any of a variety of statistical models, and reporting relationships and associations among the studied variables.

Likewise, The researcher utilized the descriptive research method, which integrates both qualitative and quantitative data to provide a comprehensive interpretation of the study's variables—specifically, the effects of using Strategic Intervention Material (SIM) versus the conventional teaching method on the academic performance of Grade 11 mathematics students at West Bay College. Descriptive research aims to observe and describe prevailing conditions, trends, practices, and differences, offering an insightful understanding of the data gathered. This method was particularly suited for analysing whether significant differences existed in student performance before and after instruction utilizing SIM and conventional techniques.

The study drew information from two main data sources: primary and secondary. The primary data were collected directly from the Grade 11 students who participated in the testing process, while the secondary data were gathered from educational materials such as textbooks, the Strategic Intervention Materials themselves, and other related references necessary to support the study's framework.

The population consisted of 60 Grade 11 students enrolled during the 2017–2018 academic year, distributed across heterogeneous sections at Senior High School West Bay College. Sampling involved administering pre-tests and post-tests to two groups—control (conventional method) and experimental (SIM)—to evaluate and compare their performance effectively.

Instrumentation involved researcher-developed problem-solving tests, each containing 40 multiple-choice questions designed to assess students' skills in understanding, analyzing, and interpreting mathematical concepts. Test validity was ensured through expert review by mathematics educators and statisticians, guaranteeing that the instruments accurately measured what they intended to assess.

For data collection, the researcher secured permission from school authorities to conduct tests. Data gathering followed a structured sequence: pre-tests were administered first, then the teaching intervention (conventional method or SIM) was conducted, followed by post-tests, all to ensure accurate measurement and analysis of instructional effectiveness. Tests were treated as part of the formative assessment to provide instant feedback to learners.

Statistical analysis involved calculating frequencies and percentages to describe respondents' test scores and employing independent samples t-tests to determine statistically significant differences between pre-test and post-test scores within and between the control and experimental groups. This allowed for a rigorous evaluation of SIM's impact compared to conventional teaching methods, providing reliable evidence on its effectiveness in enhancing students' mathematical performance.

III. Results and Discussion

1. Scores in the Mathematics Pre-test of the Control Group and Experimental Group

TABLE 1. The Pre-test Score in Mathematics of Grade 11 Student before using Conventional Method and Strategic Intervention Material (SIM)

Score	Controlled Group (Convectional Method)		Experimental Group (SIM)	
33 - 40 (Superior)	F	%	F	%
25 - 32 (Above Average)	1	3.33	-	
17 - 24 (Average)	12	40.00	8	26.67
9 - 16 (Below Average)	9	30.00	14	46.67
0 - 8 Poor	8	26.67	8	26.67
Total	30	100.00	30	100.00

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For the control group, one [1] or 3.33% fell between 25 to 32 [Above Average Level], twelve [12] or 40% fell between 17 to 24 [Average], nine [9] or 30% got the score 9 to 16 [Below Average], and [8] or 26.67% are between 0 to 8 [Poor Level of Performance]. It was noted that none among the group were able to reach Superior level. One of them fell under Above Average while half of the group fell under Average and Below Average level. It was not surprising that some of them were under Poor performance level since the topic was not yet discuss. Those students who fell in Superior and Above performance level might be good in mathematics at the same time doing advance reading about the topic.

For the experimental group, eight [8] or 26.67% got the score between 17 to 24 which interpreted as Average, fourteen [14] or 46.67% are between to 9 or 16 which is Below Average and eight [8] or 26.67% score 0 to 8 under Poor Level of Performance. Just like in control group nobody fell under Superior level of performance while many of the students were under Below average. It seems that students find difficulty in the topic.

TABLE 2. The Post-test Score in Mathematics of Grade 11 Students after using Conventional Method and Strategic Intervention Material (SIM)

Performance Level	Controlled Group (Convetional Method)		Experimental Group (SIM)	
	F	%	F	%
33-40 Superior	7	23.33	20	66.67
25-32 (Above Average)	19	63.33	8	26.67
17-24 (Average)	4	13.33	2	6.67
9-16 (Below Average)	-	-	-	-
0-8 (Poor)	-	-	-	-
Total	30	100.00	30	100.00

For the control group seven [7] or 23.33% of the students got the scores between 33 to 40 [Superior level], nineteen [19] or 63.33% of them got the scores 24 to 32 [Above Average] and four [4] or 13.33% fell between the scores 17 to 24 [Average]. Nobody got Below Average and Poor level of performance after the using the Conventional Method of Teaching math.

For the Experimental group, twenty [20] or 66.67% of the students fell between the scores 33 to 40 [superior], eight [8] or 26.67% got the scores of 25 to 32 [Above Average], and two [2] or 6.67% scores 17 to 24 [Average] performance level. Same with the control group, nobody got the score below 16 or Below Average and Poor Performance level after conducting the lesson with the used of Strategic Intervention Materials.

3. Significant difference between the scores of the Control Group and Experimental Group in the Pre-test.

The computed p- value is 0.363 which was greater than the 0.05 level of significance. Thus, the null hypothesis that there was no significant difference between the performance of students using Conventional method of teaching I math and using Strategic Intervention Materials in the pre-test was accepted

TABLE 3. Difference in the Pre-Test Score in Mathematics of Grade 11 Students before using Conventional Method and Strategic Intervention Material (SIM)

Pre-test	Mean	T-test	P-value	Interpretation
Conventional Method	13.90	0.917	0.363	Not Significant
SIM	12.60			
Significance level @ 0.05				

4. Significant difference between the scores of the Control Group and Experimental Group in the Post-test.

TABLE 4. Difference in the Post-test Score in Mathematics of Grade 11 Students after using Conventional Method and Strategic Intervention Material (SIM)

Post-test	Mean	T-test	P-value	Interpretation
Conventional Method	29.17	-3.771	0.000	Significance
SIM	33.93			
Significant @ 0.05				

The computed p- value 0.00 was less than the 0.05 level of significance. The result showed that the null hypothesis that there was no significant difference between the performance of students using Conventional method of teaching in math and using Strategic Intervention Materials in the post-test was rejected.

IV. Conclusion and Recommendation

The results showed that in control group almost half of the respondents had

The score between 17 to 24 which correspond to the average level, while in experimental group nobody fell under Superior level of performance and most of the students are Below Average.

The result of control group showed that more than half of the students got score between 25 to 32 points which indicated that their performance is Above average, while the result of experimental group showed that nobody got the score below 16 or Below Average and Poor performance level.

There is no significant difference in the Pre-test Score in Mathematics of Grade 11 Students before conducting Conventional method and using Strategic Intervention Material [SIM].

Using Strategic Intervention Material [SIM] in teaching Mathematics in Grade 11 students in Senior High School of West Bay College was proven more effective than Conventional method of teaching.

Based on the conclusions drawn, the following recommendations were made:

There are some students who are good in Mathematics as it was revealed in their scores in the pre-test. The study recommends that Mathematics teachers can assign students who can help their classmates who still need assistance to guide them through “Peer Tutoring”.

Teaching using Strategic Intervention Material [SIM] and Conventional Methods of teaching were both effective, so the study recommends to continue using both strategies.

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Teaching using Strategic Intervention Material [SIM] was proven to be effective, the study suggests to use this strategy and improve the quality of intervention materials in teaching Mathematics.

Teachers must know the mastered and unmastered skills of the students and focus on the least mastered skills.

Other researchers similar to this one can conducted as strategies on effective teaching of mathematics among High School students and effectiveness of motivation in other subjects.

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