EFFECT OF STRATEGIC INTERVENTION MATERIAL (SIM) ON ACADEMIC PERFORMANCE: EVIDENCE FROM STUDENTS OF SCIENCE VI

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This study was conducted in Doos Sur Elementary School, Hindang, Leyte, Philippines within the school year 2017-2018 to assess the effectiveness of Strategic Intervention Material (SIM) on academic performance in science among grade VI students. It utilized the pretest-posttest quasi-experimental design. The SIM used as a treatment of the study covered one of the least mastered skills in the Science VI, that is, describing the appearance and uses of homogeneous and heterogeneous mixtures. The study employed 20 students for control group and 20 students for experimental group enrolled in Science VI during the first quarter. Control group was taught with conventional teaching method and the experimental group was taught with SIM. Through hypothesis testing, this study determined the significant effect of SIM to students' academic performance. Results of the study showed that the use of SIM is effective in terms of improving students' performance particularly on the topic pertaining to the least mastered skills in Science VI. This implies that SIM can be utilized as instructional materials during learning process as effective teaching tool.

Keywords: Strategic Intervention Materials, quasi-experimental design, Academic Performance, Science VI

1. INTRODUCTION

Teaching at any level requires that the students be exposed to some form of stimulation or intervention to improve learners' academic achievement (Abad, 2005; Abdo & Semela, 2010; Adewale, 2014; Ogbondah, 2008). Okobia (2011) noted

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that teaching resources means anything that can assist the teacher in promoting teaching and learning. When the students are given the chance to learn through more senses than one, they can learn faster and easier. This was in contrast with current setting in Doos Sur Elementary School (DSES), Hindang Leyte, Philippines wherein students had difficulty in understanding the concepts and low performance was visualized and least mastered competencies were visible. According to Casinillo (2019) and Casinillo et al. (2020), there are some factors affecting their learning experiences that leads to low academic performance. In the study of Govindaraju and Venkatesan (2010), poor teaching strategy, difficulties in learning and low performance results to school drop-outs. Hence, strategic intervention must be implemented to develop students' interest and progress their level of achievement.

This study was conducted in DSES, an elementary public school of Department of Education (DepEd), Leyte Division. In DSES, intermediate science teachers found it demanding to understand pupils not to grasp the lesson and incapable to master the competency being taught. As related by some Science teachers in this institution, they would no longer provide further activities since many students had failed to absorb the lesson all the time even if they prepared ample of drills and activities to elevate its academic success yet it was far from reality. Dr. Frank Yui as cited by Barredo and Joan (2014) in a speech once said "Rich countries are science-rich and poor countries are science-poor." This statement posed a challenge to all educators to improve the teaching-learning process especially in science. Furthermore, science is the backbone of the development of a country and a country with a majority of science illiterates is a poor country (Abdo & Semela, 2010).

Arisi (1998) and Bunagan (2012) defined Strategic Intervention Material as meant to re-teach the concepts and skills (least mastered). It is a material given to students to help them 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 (Jotia & Matlale, 2011; Okobia, 2011). This intervention material focuses on the skill not mastered by the students during regular class. It does not involve pretest and posttest, however it includes fun activities. Module, on the other hand, contained different topics included in a given chapter and intended for regular classroom teaching and distance learning. Module requires pretest and posttest, and also includes fun activities.

Seeing that these students faced a much more different learning activities in primary grades and yet achieved below from what was expected of them, they should be given proper intervention and strategy to address these perennial problems. Subsequently it is the teachers' accountability to give enhancement to such insufficiency, they should find means to recuperate the least mastered skills committed by pupils so that they can become adequately prepared for national-building (Okobia, 2011). Hence, SIM is intended as intervention in a regular class to facilitate the least mastered topics in Science class.

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 increased their level of understanding (Dy, 2011). 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.

The Trends in Mathematics and Science Study (TIMSS) revealed unsatisfactory results, the Philippines ranked 41st in Math and 42nd in Science out of 47 countries that were tested for grade 8 students (Gonzales et al., 2003). This proved that vast majority of Filipino students have performed way below par in all national achievement tests, and below the levels of most students from other countries in the international tests. Thus, education managers must focus on reforming and delivering quality instruction so that the Basic Education Curriculum will not be overwhelmed by the crisis. Students must be provided with maximum opportunities to become functionally literate in science through strategic intervention. The Department of Education as noted by Luz (2017) data showed that for every 100 children who enter Grade 1, close or about 15 do not make it into Grade 2, and roughly one-quarter (24 percent) have dropped out before Grade 6. It is for these reasons that the researcher embarks on developing strategic intervention materials in Science for Grade 6 students that enhanced learning and remedy the least mastered skills of the students, thus attain growth in their academic performance.

Strategic Intervention Material, an instructional material for remediation purposes is one of the solutions employed by the Department of Education (DepEd) to enhance academic achievements of students performing low in the field of science and technology. DepEd Memorandum No. 117 section 2005 stated that the National Training on Strategic Intervention Materials (SIM) Development in summer 2005 was implemented (Abad, 2005). The training workshop aimed to

enhance teachers' skill in test analysis and interpretation and capacitate them in developing various intervention materials for remediation and enrichment of learning. As part of intensifying and developing strategic intervention materials as tool for remediating poor performance in Science. The Department of Education included the SIM making as one of the contests during science fairs in school, division, regional, and national level competitions. This is supported in a studies of Jotia and Matlale (2011) and Popoola (1990) who investigated the effect of instructional resources on the academic achievements of students. It is found out that inadequate material resources have negative effect on the academic performance of the students on how well a student is accomplishing his or her task and studies, it also determines the level and quality of students.

Innumerable strategies had been developed in the past to solve problem in academic performance in Science, however the problems still exist at present. This study, therefore hoped to contribute knowledge in relation to students' poor academic status by trying the effect of Strategic Intervention Materials to enhance and give remedy on the least mastered skills. Being the center on the teaching-learning process, science teachers must equip every pupil with the necessary scientific skills that helped them perform in the different learning areas in the curriculum. Effective and efficient instruction benefited all pupils but it's imperative for teachers to use sound strategies that enhanced the scientific competence of learners. These were the very reasons why the researcher ventured in this study. The researcher chose grade 6 students among the other grade levels because they were supposed to be armed with the necessary skills to become successful in school and in preparation for their academic and scientific activities in higher grades. Grade 6 students were viewed to be in a better position as participants considering the range of experience they have taken and their level of maturity compared to lower years. Furthermore, these students were also expected to participate more seriously.

Research Questions

This study aimed to evaluate the effectiveness of Strategic Intervention Material (SIM) in improving the academic performance of students in Science VI. Specifically, the study attempted to answer the following questions:

1. What is the level of students' academic performance on the topic describing the appearance and uses of homogeneous and heterogeneous mixtures on the control and experimental groups before and after the utilization of SIM?

2. Is there a significant mean difference between the students' academic performance on the topic describing the appearance and uses of homogeneous and heterogeneous mixtures on the control and experimental groups before and after the utilization of SIM?

Statement of Hypothesis

H_o: There is no significant mean difference between the class without and with SIM.

H_a: There is a significant mean difference between the class without and with SIM.

2. METHODOLOGY

The Respondents and Ethical Procedure

Prior to the conduct of the study, the permission of the school principal of Doos Sur Elementary School (DSES) was asked through a formal letter. Next, the permission of the two science teacher was also asked to cooperate in the said study. This study was conducted after the first grading period of school year 2017-2018. Currently, there are only two sections of grade six students in DSES. Hence, by complete enumeration, this study utilized 40 grade six students who enrolled in DSES in order to gather richer information. In this manner, Grade Six under of Science Teacher A would be the experimental group composed of 20 students taught with SIM while Grade Six under the Science Teacher B would be the control group composed of 20 students taught in traditional instruction. Table 1 shows the distribution of participants and its gender.

Table 1. Distribution of Participants

Sections	No. of Males	No. of Females	Total	Teaching Method Used
Experimental Group	13	7	20	With SIM
Control group	11	9	20	Without SIM

This research study was purely academic in nature and no sensitive information was gathered from the students, hence, parents' consent was not needed. However, the participation of this study was voluntary. Furthermore, before the conduct of the study, teachers and students were assured that all information gathered were treated with confidentiality and solely used for this study only.

Data Collection Procedure

The pretest-posttest quasi-experimental design was employed to carry out this study. Classes were grouped into two such as the experimental and control group. After the conduct of first quarterly test and identification of least mastered competencies, pre-test was administered. Subsequently, item analysis was done in order to determine what competencies were the least mastered. The least mastered competencies were used as bases for constructing the SIM as an intervention material, that is, the topic "describing the appearance and uses of homogeneous and heterogeneous mixtures." The construction of SIM is grounded on the study of Abad (2005) and Luz (2017). In ensuring the appropriateness of SIM, there were three kinds of content validity executed: the Guide on Reviewing or Judging the SIM, the Learning Resources Management and Development System (LRMDS) educational soundness general evaluation checklists and LRMDS specification and guidelines for intellectual property rights management. Master Teachers in DSES validated the content if it anchored on the DepEd's guidelines on reviewing the SIM. The LRMDS district coordinators which comprised of principals with the help of LRMDS division coordinator and its technical working group gave content validity of the SIM. Thereafter was the conduct of SIM for two weeks in a 50-minute intensive intervention for experimental group. The students were properly guided on how to use the said materials during lectures. On the other hand, 50-minute conventional or traditional way of teaching was implemented for control group daily. After the treatment, both sections were given posttest. This was the basis in determining the academic performance of the students.

Data Analysis

The data gathered in this study were tabulated, treated, analyzed and used as bases for interpretation. Standard statistical procedures and formula were used to arrive at a reliable conclusion. The researcher used Mean, Standard deviation, Minimum, Maximum value, Mean Percentage Score (MPS) as statistical treatment to process the data and to arrive at descriptive interpretation of each item in the instrument. Paired t-test and Independent t-test was employed to compare the two mean scores after the implementation of SIM. Table 2 summarizes the research questions and data analysis of this research study.

Table 2. Research Questions and Data Analysis

Research Questions	Data Analysis
1. What is the level of students' academic performance on the topic describing the appearance and uses of homogeneous and heterogeneous mixtures on the control and experimental groups before and after the utilization of SIM?	Mean, Standard deviation, Minimum, Maximum value, Mean Percentage Score (MPS)
2. Is there a significant mean difference between the students' academic performance on the topic "describing the appearance and uses of homogeneous and heterogeneous mixtures" experimental groups before and after the utilization of SIM?	Paired t-test
3. Is there a significant mean difference between the students' academic performance on the topic "describing the appearance and uses of homogeneous and heterogeneous mixtures" on the control and experimental groups after the utilization of SIM?	Independent t-test

3. RESULTS AND DISCUSSION

This presents, analyzes and interprets the data gathered by the researcher from the responses of the questionnaires distributed to the research subjects and from the result of examinations conducted. These include the following:

1. The level of pupils' academic performance on the topic describing the appearance and uses of homogeneous and heterogeneous mixtures on the control and experimental groups before and after the utilization of SIM.
2. The significant mean difference between the pupils' academic performance on the topic describing the appearance and uses of homogeneous and heterogeneous mixtures on the control and experimental groups before and after the utilization of SIM.

The data gathered were organized and statistically treated to answer the specific questions of this study. These were presented in series of tables sequenced according to specific questions raised in this research. Discussion include the description, analysis and interpretation of data.

Descriptive Analysis of Academic Performance

Table 3 presents the statistical data on the level of achievement before the integration of SIM. These data provide the mean score and MPS of the learners in the class who had individually undertaken the pretest intended to measure their academic achievements in Science. From the above data, respondents in Grade Six-

Teacher A registered an MPS of 32% while Grade Six- Teacher B had an MPS of 23.25% which did not meet the national standard of 75% proficiency level attributed to any of the subject areas. On the average, Grade Six-Teacher A scored better compared to Grade Six-Teacher B hence Teacher A had a mean score of 6.40 compared to Teacher B which registered to 4.65. Section Teacher A recorded a standard deviation at 2.26 while section Teacher B posted 1.98 which implies that Teacher B had more consistent scores compared to Teacher A. Generally, both sections got alarming results thus, intervention was needed to uplift its academic performance. The findings were supported in a studies of Jotia and Matlale (2011) and Popoola (1990) who found out that inadequate material resources have negative effect on the academic performance of the pupils on how well a student is accomplishing his or her task and studies, it also determines the level and quality of students.

Table 3. The level of students' academic performance on the control and experimental groups before the utilization of SIM.

Section	Pre-test	N	Mean	Standard Deviation	Minimum Score	Maximum Score	MPS (%)
Teacher A	Experimental	20	6.40	2.26	2	9	32%
Teacher B	Control	20	4.65	1.98	1	8	23.25%

Note: Total item score is 20.

From the presented data, respondents in Section Teacher A had the highest score of 20 while Section Teacher B is 12 (Table 4). Standard deviation shows that the scores in the posttest are more scattered around its respective mean from the posttest in both sections of (Teacher A: 2.26; Teacher B: 1.66). Respondents in Section Teacher A got an MPS of 92.25% (mean: 18.45) compared to Section Teacher B posted an MPS of 51.50 (mean: 10.30). This infers that Section Teacher A which used strategic intervention materials had a higher MPS compared to Section Teacher B which did not use strategic intervention materials. With the implementation of SIM, the MPS of the respondents exposed to it had greatly improved while those who were not had a slight increase in their MPS. This means that students taught with SIM performed better and scored higher than those taught without SIM. Findings of this study confirm in the studies conducted by Inyang-Abia (1992), Özdem Yilmaz et al., (2017) and Dy (2011) that strategic 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 increased their level of understanding. Bunagan (2012) also supported the findings which defined SIM as meant to re-teach the concepts and skills (least mastered). It is a material given to students to help them master competency-based skills which they were not able to develop during a regular classroom teaching.

Table 4. The level of pupils' academic performance on the control and experimental groups after the utilization of SIM.

Section	Posttest	N	Mean	Standard Deviation	Minimum Score	Maximum Score	MPS (%)
Teacher A	Experimental	20	18.45	2.26	16	20	92.25%
Teacher B	Control	20	10.30	1.66	6	12	51.50%

Note: Total item score is 20.

Effectiveness of Strategic Intervention Material (SIM)

The statistical computation of data as presented in Table 5 exposed the significance of results of the pretest and posttest undertaken by the grade 6 classes with the implementation of SIM. Also, it presents the significant difference between the control and experimental group. The computation result indicated the t-test for paired samples results to a t-value of Section Teacher A posted 21.18 and a p-value of <0.001 (Table 5). This means that the difference between the posttest and pretest is significant and implies that SIM is effective tool in teaching. In the same table, it is also shown that the computed t-value and p-value of experimental and control group after implementation of SIM are 11.98 and 0.001, respectively, using independent T-test (Table 5). The p-value is less than the level of significance ($p < 0.01$), therefore, the difference between the mean scores in the experimental post-test and control post-test is highly significant (Table 5). It follows that the mean score in the experimental group is significantly larger compared to the control group. The result is parallel to the existing studies in literature (Arisi, 1998; Barredo & Joan, 2014; Bunagan, 2012; Jotia & Matlale, 2011; Popoola, 1990). It implies that the implementation of SIM is effective at 1% level of significance. This further means that the performance of the students positively responds to the utilization of SIM. This is supported to the study of Bete (2020) that using SIM can elevate the science instruction and students' academic performances

Table 5: T-test for pretest and posttest score of students in the utilization of SIM under the experimental and control group.

Variables	T-test (Computed Value)	df	p-value
Experimental Group (Pretest vs Posttest)	21.18**	19	<0.001
Control vs Experimental Group (Posttest vs Posttest)	11.98**	19	<0.001

Note: ** - highly significant at 1% level.

4. CONCLUSION

This study was conducted to evaluate the effect of Strategic Intervention Material (SIM) to pupil's academic performance in Doos Sur Elementary School, Hindang, Leyte, Philippines within the school year 2017-2018. Results showed that experimental group performs better than control group based on their post-test results. Hence, it is concluded that SIM is effective teaching strategy to improve the level of achievement of students on the least mastered topics in Science. Conclusively, SIM should be used in teaching Science subject to increase the academic performance and address the students' difficult topics to be mastered. Apparently, SIM assists students to develop the fundamental knowledge, skills and understanding in least mastered topics in science and effective aid in imparting information to students. It is also concluded that by the implementation of SIM, the school administration and teachers should able to maintain and enrich the provision of activities so that the students will have the chance to learn new ideas in harnessing their scientific skills. Thus, teachers should be given room for improvement and further elevate to a higher level of SIM implementation to further meet the desired instructional objectives.

It is highly recommended that science teachers can use strategic intervention materials made by the researcher to re-teach the concepts and skills and help the pupils master the competency-based skill. Generally, the Department of Education should include the Strategic Intervention Material (SIM) in the teaching of Science concepts and principles as part of the Science curriculum in all levels of basic education and same innovative teaching strategy should be adopted in all subjects. Curriculum planners should develop SIM based on the sequence of competencies of the curriculum and ensure that these are provided to all schools in all subjects. While implementing the SIM, the teachers should conduct item analysis in every quarterly test so that the teachers can identify the most-learned and the least-learned skills of the students. One of the limitation of this study is

the small sample size which leads to the possibility that T-test result will be insignificant. Hence, further studies on the use of SIM as aids in teaching should be conducted with a large sample size of students. Furthermore, seminars and in-service trainings should be conducted in the division level regarding development and implementation of the SIMs which were not included in the researchers' SIM.

5.   ACKNOWLEDGEMENT

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