Original Research Article

ACADEMIC PERFORMANCE OF HIGH SCHOOL STUDENTS USING STRATEGIC INTERVENTION MATERIAL IN SCIENCE

Abstract:

Teachers in Science are challenged to use Strategic intervention material to improve students' academic performance. This study aimed to improve the academic performance of students through SIM (Strategic Intervention Material) in Science. The research instruments implemented were experimental research design and employed the administration of pre-test and post-test assessment to sixty-six (66) Grade V pupils. It assessed effectiveness of the Strategic Intervention Material (SIM) in terms of Validity, Content, Structure design, and Organizational presentation. The pre-test results indicates that majority obtained scores ranges from 2-11 with 63 or equivalent to 95.50%. The computed mean of the assessment in the pre-test was 6.75 interpreted as "Did not meet the expectation". On the post-test assessment, majority with 54 or equivalent to 81.80% obtain scores ranges from 17-20. The computed mean of the assessment was 17.62 interpreted as "Outstanding". The result showed that the student was rated poor and "Did not meet the expectation" in the pre-test, while "Outstanding "in the post-test. The teacher-respondents were "Strongly Agreed" on the contents, interventional design, organizational presentation, and assessment as dimensions of Test Validity for Strategic Interventional Materials. There was significant difference on the performance of the students based on the results of the pre-test and post-test. There was no significant difference on the assessment towards dimensions of Assessment of Test Validity for Strategic Interventional Materials (SIM) as to contents, interventional design, organizational presentation, and assessment, respectively.

Key words: Strategic intervention material, Academic performance, Science

Introduction

Science is included as a core subject in elementary and secondary levels despite conceptual complexity and high cost of implementation. (Batomalaque, 2009). Another justification for the inclusion of science in school curricula is that all citizen needs to achieve a degree of "scientific literacy" to enable them to participate effectively as a citizen in modern societies.

Studies indicate however, that many of our Filipino learners are not attaining functional literacy, without which they find it too difficult to meet the challenges post by our rapidly changing world.

The implementation of K to 12 programs using the spiral progression approach in teaching Science is on hardcore and problems are always predicted. Based on the studies of

Javier (2013) after one year the Status of the Implementation of spiral approach in teaching Science, it was found out that the four areas such as Teaching Competency, Learners Competency, Assessment Tools, and Interventional Materials, the least managed of them all is the Learners' Competency. Students lack deeper understanding of the topics. Although the learning material area are cleared and easy to understand, students are having a hard time in the topic and it was found out in study of Javier (2013), that the science skills and competencies that were expected to the students are not on the highest level, in line with this researcher would like to make an intervention material.

Results of Suarez and Casinillo (2020) and (Sinco, 2020) studies 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. According to Lange (2012) confer this scaffolding is a particularly the effective method to use with children in failing school. This study will be conducted as what is recommended in Javier (2013) Master Thesis entitled Management on the implementation of Spiral Approach in Science classroom.

In teaching Science, greater emphasis should be placed on Science as a process and the development of higher cognitive skills through Science process skills, and the relevance of the concepts and principles in daily life. Moreover, concept learning is inevitably involved in any science investigations. Real Science is both a process and product inseparably joined. Some factors why students choose to ignore or reject science are related to what goes on in school and in the Science lessons, thus can be controlled to some extent by the individual teachers. Most pupils perceive that the subject as very difficult, heavy content, very dull and demanding passive reception rather than active involvement with the learning process.

In its continuing effort to raise the quality of education in the country, the Department of education (DepEd) continuously implements innovations particularly in Science. The focus of Science Education program is to make learning a meaningful to the students. In fact, most of the seminars, trainings and scholarship sponsored by the DepEd and DOST for teaching science subject have the objectives of furthering the enhancement of their knowledge and skills in delivering goods to the students. An example of this is the National training on Strategic Interventions Materials (SIM). The training workshop enhance teacher's skill in test analysis and interpretation and capacitate them in developing various intervention materials for remediation and enrichment of learning (DepEd Memorandum No.117 s. 2005.)

For this research, the researcher embarks on developing the strategic intervention materials in science for grade 5 students that will enhance learning and remedy in the least mastered skills of the students, thus attain growth in their academic performance.

2. Research Methodology

2.1 Research Design

This study used the Quasi-Experimental Technique. Quasi-experimental research involves the manipulation of an independent variable without the random assignment of participants to conditions or orders of conditions. Among the important types are nonequivalent groups designs, pretest-posttest, and interrupted time-series designs.

The Quasi-experimental studies encompass a broad range of nonrandomized intervention studies. These designs are frequently used when it is not logistically feasible or not

ethical to conduct a randomized, controlled trial—the "gold standard" of causal research design.
(https://academic.oup.com/cid/article/38/11/1586/285372).

The initial test scores of the pupils were determined before using the Strategic Intervention Material (SIM) and the final test scores were determine after employing the Strategic Intervention Material (SIM) in Science.

2.2 Respondents and Sampling Technique

This study composed of respondents from pupils who are currently enrolled at Cabangan District. In this manner, the respondents have diverse qualities in terms of intellect and scientific ability.

The sample respondents of this study covered the 66 randomly selected pupils of the two (2) schools in Cabangan District enrolled during the school year 2019-2020, sixteen (16) classroom teachers.

These studies make use of the Experimental Technique which is the pre-test and post-test design to analyze the academic performance of the pupils. The pre-test is given to identify the level of performance of the pupils before they exposed to the strategy, and post-test is given to the pupils to measure the result the SIM affecting the academic performance of the pupils. The respondents will be given treatment as the result of the SIM.

2.3 Location of Study

The location of the study are the 2 schools of Cabangan. Namely Camiing Elementary School and Laoag Elementary School. Figure 1 on the next page shows the map of Cabangan, Zambales and the location of the selected Elementary Schools.

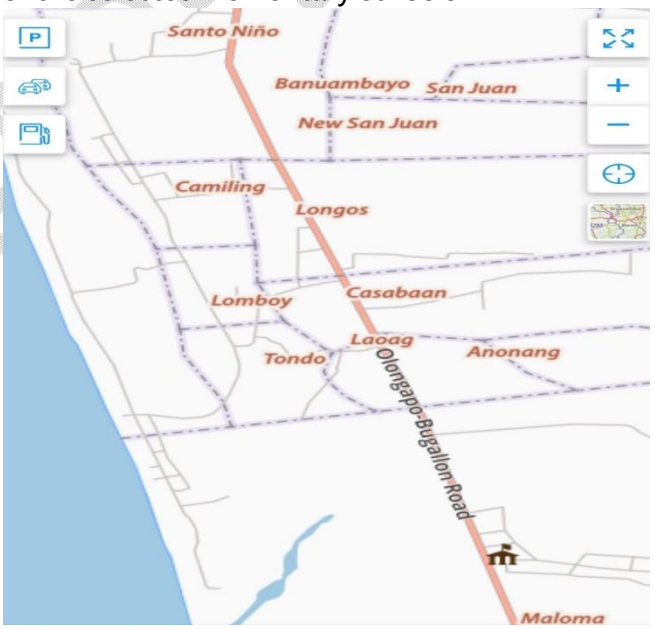

Figure 1
Map of Cabangan, Zambaes showing the location of Camiing and Laoag Elementary School

2.4 Instruments

The following were the research instruments used in the study.

1. Strategic Intervention Materials

These are the intervention materials which designed to help teachers provide the students a needed support to make progress. They tried to increase and deepen their skills, knowledge and understanding from the concrete science to what is more abstract. They gave the students opportunity to explore their understanding and make sense of these new scientific ideas. They helped the students what they know and understand from the teachers to formalize their thinking. Furthermore, they were Interventional materials meant to reteach the concept(s) and skill(s) to help the learner master a competency-based skills which they were not able to develop during classroom teaching.

The SIM has five parts such as the guide card, activity card, assessment card, enrichment card and reference card.

2.5 Data Collection

All the data will serve as the basis to find the improvement of the academic performance of pupils in Science through the Strategic Intervention Material. Data will be tabulated, tallied, organized, statistically treated, and analyzed. With the use of questionnaires, the researcher was to classify the approach using the pre-test and post-test, the implementation of the Strategic Intervention Material as the approach in improving the academic performance of the pupils. The mean score of the respondents in SIM was the basis for identifying the learning approach.

The performance of the respondents was measure using the pre-test and post-test. Pre-test and Post-test scores of the learner's and surface learners was compared in terms of the highest and lowest scores, mean scores, and standard deviation.

Teachers' perception about the use of SIM was tabulated. The survey utilized scales from 1 – 5 with equivalent remarks or descriptions. Frequency of the responses of the respondents was tallied and will be presented. Weighted mean for each statement and overall weighted mean was computed. Qualitative interpretation was based on the weighted mean computed using the ranges 1-1.99 (Not Valid (NV), 2-2.99 (Moderately Valid (MV), 3-3.99 Valid (V), 4-4.99 (Highly Valid (HV), 5 Extremely (Valid (EV) All the data was processed using SPSS version 11.0 statistical software.

2.6 Data Analysis

The statistical treatment of this study used descriptive statistical tools such as percentage, rank, and mean distribution. The ANOVA was used as inferential statistics.

3. RESULTS AND DISCUSSION

3.1 Assessment on the Pre-Test and Post-Test in Science

Table 1 shows the students' Academic Performance in the Pre-Test and Post Assessment in Science.

Table 1
Student Academic Performance in the Pre-Test and Post

Assessment in Science

Transmuted Grade	Pre-test			Post-test		
	Raw Score	F	%	Raw Score	f	%
Below 75 Did not meet Expectation	2-11	63	95.50	10	1	1.50
75-79 Fairly Satisfactory	12	3	4.50	12	5	7.60
80-84 Satisfactory	-	0	0.00	15	2	4.50
85-89 Very Satisfactory	-	0	0.00	16	4	4.50
90-100 Outstanding	-	0	0.00	17-20	54	81.80
Total		66	100.00		66	100.00
Mean	**6.75**			**17.62**		
Interpretation	**Did not meet Expectation**			**Outstanding**		

Table 1 shows the pre-test results indicating that majority had obtain scores ranges from 2-11 with 63 or equivalent to 95.50%. The computed mean of the assessment in the pre-test was 6.75 interpreted as "Did not meet the expectation". Pre-test results indicated that the students have poor academic achievement scores. The results suggest for interventions that will aid the improvement of the students' academic achievement. It can be implied that when teachers may not incorporate effective interventions in the remediation class, students' academic achievement would be on the same level, which is very low. The results indicate that the student's encounters struggle with their understanding; prerequisite and fundamental knowledge and/or skills have not been acquired or developed adequately to aid understanding. A similar finding in the pre-test scores was revealed in a study conducted by Barredo (2013) that both groups of research subjects had the same level of mastery before an intervention was introduced to the experimental group and traditional Interventional material to the control group.

On the post-test assessment, majority with 54 or equivalent to 81.80% obtained scores ranged from 17-20. The computed mean of the assessment was 17.62 interpreted as "Outstanding". The result from the analysis points out that the results in the post-assessment obtained a greater mean gain score than during the pre-test administration. Thus, students performed better in the post-test. Students learned best in the topic because the material given through SIM was simplified and easy to understand. The students were able to understand the definition of constellation, determine the different forms of star patterns, identify the constellations and zodiac constellation, and understand the use of starts in the lives of man. Hence, information is retained longer, and mastery was achieved. The effectiveness of SIM as a strategy needs to be explored to measure its relevance in teaching workplace. As

shown in the table, it contributes greater gain on the part of the students. Thus, it can be used as intervention strategy in making the lesson easy to understand and mastery was achieved on the part of the students. This idea was supported by the findings of Ceballos (2000) which says that collaboration is a shared act by each member of the group and allows each member to collectively gain knowledge and learn on their own. This statement is in line when SIM was employed in the teaching process. Since SIM entails collaboration on the part of the students. Thus, students learned best if there is collaboration among the members of the group.

With this, it can be inferred that there is a concrete manifestation of the Gestalt Theory wherein students learn best when they can build on experience, relate what they are learning to things that are relevant to them, have direct "hands-on" experience, construct their own knowledge in collaboration with other students and communicate their result effectively (Lewin, 1951). The same is true as the researcher's findings agreed with the findings of Gultiano (2012), who found out that intervention materials contributed to better learning of the concepts among students wherein students manifested better retention of concepts learned and that students who used the SIM are more superior in applying the knowledge in problem solving exercises.

This result agrees with the findings of Soriano (2012) and Tabago (2012), who found out that intervention materials contributed to better learning of the concepts among students resulting to better academic performance.

3.2 Assessment on Test Validity on Strategic Interventional Materials (SIM)

Table 2
Assessment of Test Validity for Strategic Interventional Materials (SIM)

Dimension on Test Validity on Strategic Interventional Materials (SIM)		Overall Weighted Mean	Qualitative Interpretation	Rank
1	Content	4.99	Strongly Agree	1
2	Interventional Design	4.74	Strongly Agree	4
3	Organizational Presentation	4.86	Strongly Agree	3
4	Assessment	4.96	Strongly Agree	2
	Grand Mean	4.89	Strongly Agree	

Table 2 shows the Summary Table on the Assessment of Test Validity for Strategic Interventional Materials (SIM).

The teacher-respondents assessed "Strongly Agreed" on the content manifested on the high mean value of 4.99 and ranked 1st followed by assessment, 4.96 and ranked 2nd; organizational presentation, 4.86 and ranked 3rd while Interventional design with mean of 4.74 and ranked 4th. The computed grand mean was 4.89 with qualitative interpretation of "Strongly Agree".

Strategic intervention material is believed to be an effective **strategic** teaching aid for teachers in carrying out objectives on least learned lessons. It is a module that contains puzzles, games, vivid illustrations, concept map used to motivate and stir up the attention and interest of the pupils.

Strategic intervention materials are instructional materials meant to teach the concept and skills. Materials are given to students to help them master a competency-based skill which they were not able to develop during the regular classroom teaching. The aim of SIM is to make students master the least learned concepts in science. In doing so, once they mastered the concept, they can easily comprehend questions and answer it correctly, thus, better academic gain is achieved.

3.6 Test of Differences between Pre-Test and Post-Test

Table 3 shows the t-Test: paired two samples for means to determine differences between the Pre-Test and Post-test assessment.

Table 3
t-Test: Paired Two Sample for Means to determine differences between the Pre-Test and Post-test assessment

	Pre-Test	*Post-Test*
Mean	28.1	55.7
Variance	34.83157895	7.484210526
Observations	20	20
Pearson Correlation	0.285555761	
Hypothesized Mean Difference	0	
Df	19	
t Stat	21.45579514	
t Critical one-tail	1.729132812	
t Critical two-tail	2.093024054	

There is significant difference on the results of the assessment between pre-test and post-test manifested on the computed t-test value of 21.45579514 which is greater than t-critical (One-tail test) value of 1.729132812 or t-critical (two-tail test) of 2.093024054, therefore the Null Hypothesis is Rejected, hence, there is significant difference.

Table 3 shows that there is a statistically significant difference in the academic achievement between the pre-test and post-test in favor of the post-test group. The difference must have resulted from the use of SIM as a remediation tool. The use of SIM gave a significant improvement in students' academic achievement.

This implies that using SIM as remediation tool brings large effect on students' performance in Science. Further, these point out that those students who are exposed to this intervention material have a greater chance of increasing or improving their academic performance in Science . The same approves the claim of Blalock GC (2010) and Soberano (2009) in their studies using Interventional materials that resulted to a significant increase in the post-test mean scores as compared from the pre-test mean scores of the experimental group after employing an intervening Interventional material as remediation tool. Helping students understand better in the classroom is one of the primary concerns of every teacher

(Gerard, Mary Johnson (2010). Teachers need to motivate students how to learn. Students who understand the lesson tend to be more engaged and show different characteristics such as they are attracted to do work, persist in the work despite challenges and obstacles, and take visible delight in accomplishing their work.

According to Bretz (2001), Novak's Theory of Human Constructivism states that "a meaningful learning underlies the constructive integration of thinking. Feeling and acting, leading to human empowerment for commitment and responsibility". Meaningful learning will only occur when education provides experience that requires the students to connect knowledge across the three domains either the cognitive, affective, or psychomotor domain.

3.7 Analysis of Variance to test differences on the dimensions towards Assessment of Test Validity for Strategic Intervention Materials

Table 4 shows the Analysis of Variance to test differences on the dimensions towards Assessment of Test Validity for Strategic Intervention Materials.

Table 4
Analysis of Variance to test differences on the dimensions towards Assessment of Test Validity for Strategic Interventional Materials

Groups	*Count*	*Sum*	*Average*	*Variance*
Content	5	24.94	4.988	0.00072
Interventional Design	5	23.7	4.74	0.13985
Organizational Presentation	5	24.31	4.862	0.03452
Assessment	5	24.82	4.964	0.00108

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.191775	3	0.06392	1.45143	0.26514	3.238872
Within Groups	0.70468	16	0.04404			
Total	0.896455	19				

There is no significant difference on the assessment towards dimensions of Assessment of Test Validity for Strategic Interventional Materials (SIM) manifested on the computed F value equivalent to 1.45143 which is lower than (<) the F critical value of 3.238872, therefore the Null Hypothesis is Accepted, hence there is no significant difference.

The data simply suggest on the similarity and likeness in determining the degree of validity and differences. The dimension of contents, interventional design, organizational presentation, and assessment was considered with equal perspective.

In the study of Bransford, Brown & Cocking (2000) confer that the more capable other provides the scaffolds so that the learner can accomplish (with assistance) the tasks that he or she could otherwise not complete, thus helping the learner through the ZPD. On the other hand, Hartman (2002) expound that in the educational setting scaffolds may include models, cues, prompts,

hints, partial solutions, think-aloud, modelling, and direct instruction. And the behavioural theory of Watson is found to be applicable is on the change in the behaviour of an organism as product of the learning.

Collette and Chiapatte (1994) said that "there is a good match between student's developmental stage and the cognitive complexity of the instructional materials. Students have a greater chance to achieve the desire of learning outcomes". However, they continue when the materials are too abstract and complex, many students may fail to comprehend the subject matter. If science teachers and curriculum writers which to identify learning outcomes that students can attain, they must be aware of the cognitive operations, scheme, or reasoning patterns required to learn a given number of materials.

Since the Strategic Intervention Materials (SIM) used by the students involved several parts wherein the students worked on, it is in this context that learner-teacher dialogue will be observed. The learners need to empower and to have control over the learning process. So, the teacher relinquishes a great deal of authority and becomes a facilitator.

4. CONCLUSION AND RECOMMENDATION

The student was rated poor and "Did not meet the expectation" in the pre-test assessment while assessed "Outstanding "in the post-test assessment. The teacher-respondents were "Strongly Agreed" on the contents, interventional design, organizational presentation, and assessment as dimensions of Test Validity for Strategic Interventional Materials. There is significant difference on the performance of the students based on the results of the assessment between pre-test and post-test There is no significant difference on the assessment towards dimensions of Assessment of Test Validity for Strategic Interventional Materials (SIM) as to contents, interventional design, organizational presentation, and assessment, respectively.

Based on the conclusion, the researcher recommends that the use of Strategic Intervention Material (SIM) by the teachers to improve the performance of students. A replication of the study is encouraged with in-depth and wider in scope to validate and confirms the findings obtained in the study.

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