Novelty Journals

ISSN 2394-9694

International Journal of Novel Research in Humanity and Social Sciences
Vol. 9, Issue 1, pp: (13-20), Month: January - February 2022, Available at: www.noveltyjournals.com

EFFECTS OF THE EXTENDED CORE LESSONS INTERVENTION AS UTILIZED IN TEACHING MATHEMATICS

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Abstract: **The study aimed to determine the effects of the extended core lessons intervention on students' academic performance in Mathematics 10. It utilized the one experimental group design with one hundred ten (110) Grade 10 Junior High School student respondents. The results show a significant difference in the respondents' test scores before and after the extended core lessons intervention was implemented in Permutation and Combination and Probability of Compound Events topics. The difference is evidenced by the significant increase in the respondents' means scores in both topics after the intervention was implemented. Additionally, the data also revealed that the higher mean gain was obtained in the Permutation and Combination lesson, indicating that the students showed better performance in the first topic than the second.**

The data implies that the intervention's introduction or use enhanced the students' performance in both lessons, which is consistent with the intervention's purpose to re-teach fundamental mathematical concepts and procedure, and provide extended time learning the material presented in the core curriculum. However, since the study was not designed to determine for whom each intervention was most effective, further research can be conducted in this regard.

Keywords: **extended core lessons, intervention on students' academic performance, mathematics.**

1. INTRODUCTION

Rationale

As we see it, mathematics has the following roles in Philippine Education: facilitating participation in productive life activities, providing a way of making sense of the world, serving as a means of communication, and operating as a gateway to national progress. Despite several curriculum revisions, the basic education objectives of mathematics education have remained relatively unchanged: "to provide opportunities for individuals to learn skills and attitudes necessary for successful involvement in daily life, as well as to prepare them for further education and the workplace so that they can make valuable contributions to society." However, it is eminent to students as one of the most challenging subjects in school due to the lessons' complexity. Students show poor academic performance in Mathematics 10 of Almeria National High School. Students struggling with mathematics may benefit from early interventions to improve their mathematics ability and ultimately prevent subsequent failure.

Marzano, Lerman & Zevenbergen (2004), promising features of the Interventions results from this study suggest that mathematics interventions designed to re-teach fundamental mathematical concepts and procedures and provide extended time learning the material presented in the core curriculum may improve students' achievement in mathematics (Hiebert & Wearne, 2003). This study, however, is not designed to determine for whom each intervention is most effective because of the nature of the tested intervention programs; it is possible that only students with specific learning needs would benefit from either of the programs. For example, students who have some risk for not meeting the benchmark but have a basic understanding of the core concepts might benefit most from the Extended Core intervention.

Hill and Lubienksi, in press; Loeb and Reininger, (2004) suggest that a portion of the achievement gap on the National Assessment of Educational Progress and other standardized assessments might result from teachers with less mathematical knowledge teaching more disadvantaged students. One strategy toward narrowing this gap could be investing in the quality of mathematics content knowledge among teachers working in disadvantaged schools. This suggestion is underscored by the comparable effect sizes of teachers' knowledge and students' socioeconomic status on achievement gains.

It recognizes the important role teachers play in providing students with learning opportunities, and it is based on empirical evidence that mathematics teachers are hesitant to address problems in a variety of ways in the classroom. The inconsistency is discussed in this article. The importance of establishing a common language among members of the mathematics education community, including teacher educators and researchers, is discussed, as is the dynamic relationship between different types of teacher knowledge.

With this scenario, the call for the conduct of this study with a high sense of urgency is very much needed. Not only will this help students perform better in Mathematics subject but for them to become productive individuals with potentials and gives meaning in nation-building. Finally, the result of this study will supplement the next academic performance of students, especially in higher Mathematics, enhance the teaching-learning process and help improve student learning outcomes using the identified supplemental intervention.

Objective of the Study

The main objective of this study was to determine the effect of extended core lessons intervention in the academic performance of students in Mathematics 10 during the school year 2016 – 2017.

Specifically, it sought to:

1. Describe the process of employing the extended core lesson intervention;

2. Find out the pre-test scores of respondents;

3. Find out the post-test scores of respondents;

4. Ascertain the significant difference of the pretest-posttest scores of respondents; and

5. Design a feedback plan based on extended core lessons intervention.

Hypothesis

Ho_1**:** There is no significant difference between pre-posttest scores of respondents on Extended Core Lessons Intervention.

Theoretical Framework

The study anchored on Jean Piaget's theory of intellectual development and considered a leading theory on cognitive development. According to Piaget's theory, intellectual growth is a natural extension of inborn biological development. That is, the child is born with the ability to make a range of motor responses, which serve as the basis for subsequent thought processes. That is to say, the capacity to think stems from a physiological basis. Piaget suggests that intelligence is founded on two biological characteristics shared by all living things: organization and adaptation.

Adaptation is a child's inherent ability to connect with his surroundings. This relationship facilitates the growth of a more dynamic mental organization. Each stage in this development sequence lays the groundwork for the next, allowing for increasingly complex and successful adaptations to the climate. Assimilation and accommodation are two complementary mechanisms that make up adaptation. When a child meets new interactions that he cannot fit into the current framework, he assimilates them and incorporates them into the evolving structure of his intellect through accommodation or a changed way of reacting.

Conceptual Framework

The main concern of this study was to determine the effect of extended core lessons intervention in the academic performance of students in Mathematics 10 during the school year 2016 – 2017. The experimental activity in teaching

mathematics through an intervention serves as the independent variable. The academic performance of the respondents was considered as the dependent variable. The concept of the study included the giving of the pre-test to one group of experimental respondents. Post-test materials were administered after the exposure of respondents to the intervention. The difference between the pre and post-test were to indicate whether there was an improvement in their achievement in said areas and which would further indicate the effect of extended core lessons intervention in teaching mathematics.

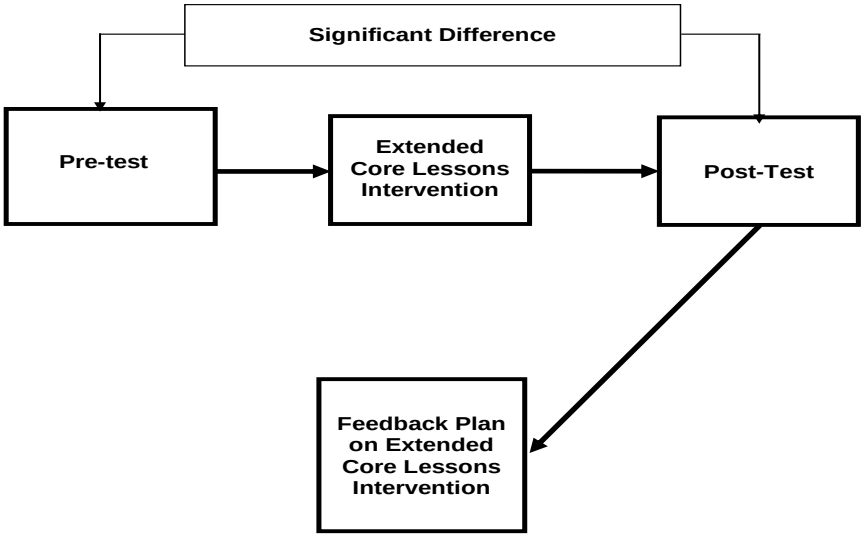

Figure 1. **The Conceptual Framework of the Study**

2. RESEARCH DESIGN AND SAMPLING

This study made use of a one group experimental design. This method was appropriate on this study because it attempted to determine the effect of extended core lessons intervention to academic performance of Grade 10 students in Mathematics of Almeria National High School. The main respondents for this study were the 110 Grade 10 Junior High School students of Almeria National High School S.Y. 2016-2017 from three (3) identified sections. All the students from the three (3) sections underwent the identified intervention.

Data Gathering Procedure

Before gathering the data, the researcher submitted a letter of endorsement from the OIC-University President to the Dean of the Graduate Education to the Schools Division Superintendent and administrators of the research locale. Upon approval of the request, the researcher distributed the pre-test with accurate instructions to the respondents. The questionnaires were distributed to the respondents personally by the researcher. Instructions and personal interview were conducted during the distribution. The respondents were instructed to be given intervention like extended core lessons intervention integrated in the daily classroom setting to their permutations & combinations and probability of compound events topics. Pre-test and post-test were administered to students before and after the implementation of the identified intervention. It was set during the third grading period which started from December 2016 and up to the third week of February 2017 as the extension of the intervention.

Statistical Treatment of the Data

This study utilized the descriptive statistics such as frequency, percentage, mean and standard deviation to determine the pre-test and post-test scores. T-test is used in determining the significant difference between the pre-posttest scores of the respondents after the intervention.

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3. RESULTS AND DISCUSSION

This chapter presents the analysis and findings. Results of the study are presented based on the objectives. The data are presented in tabular format, and the analysis, interpretation, and implication of the results follow after the data presentation.

Process of Employing the Extended Core Lessons Intervention

Interventions are specific programs or set of steps to help a child improve in an area of need. The following were the process used patterned on the extended core lessons intervention method.

The researcher provides students with extra time and support for the specific content being taught in the school district's curriculum. After the duration set for quarter three topics, days were extended, and interventions were employed. The teacher used systematic and explicit instructional practices. The teacher utilized explicit teaching to meet the students' needs and engage them in unambiguous, clearly articulated teaching. The intervention sessions began by the teacher stating the lesson's central focus and recapping the lesson covered in the core curriculum and how that information would be extended or reviewed in the current lesson. Next, the teacher engaged students by demonstrating a strategy using concrete examples, explaining a procedure, reviewing recently taught problem types using multiple representations, or leading a discussion by asking questions. In the third component of the extended core lessons, students were given guided practice opportunities that allowed the teacher to provide feedback on students' thinking.

Finally, students were encouraged to complete their regularly assigned homework as independent practice or re-teaching pages provided in the K to 12 curriculum materials. After the intervention, an increase in the academic performance of students was expected to come out.

Figure 2 represents the process of employing the extended core lessons intervention.

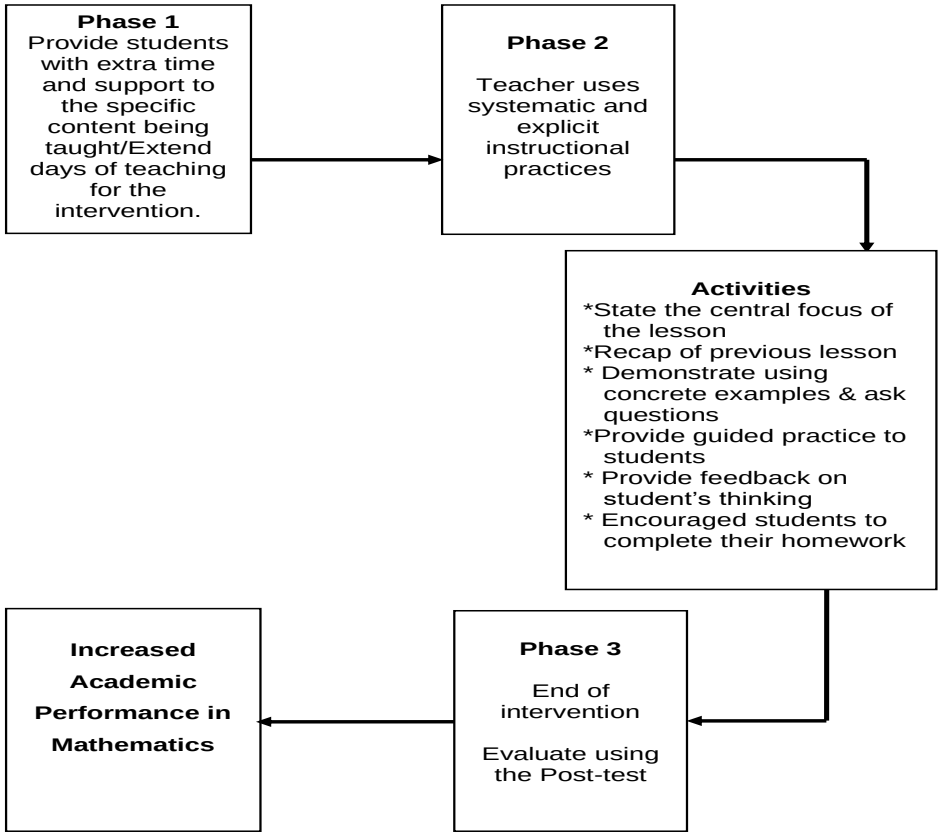

Figure 2. **The Nature Process of Extended Core Lessons Intervention**

Novelty Journals

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Pre-Test Scores of Respondents

Before the experimental treatment was applied, a 50 item test was given to the one experimental group to determine their learning level competencies. Table 1 shows the performance of the experimental group in permutation and combination and probability of compound events.

Table 1: Pre-Test Scores of Respondents

RANGE OF SCORES	Permutation & Combination			Probability of Compound Events		
	f	%	Interpretation	f	%	Interpretation
21-22	0	-	-	0	-	-
18-20	0	-	-	0	-	-
15-17	103	93.6	Fairly Satisfactory	0	-	-
14 below	7	6.4	Did Not Meet Expectations	110	100	Did Not Meet Expectations
Total	**110**	**100.0**		**110**	**100.0**	

Based on the table, respondents' pre-test scores before the extended core lessons intervention were introduced on the topic, permutation and combination did not meet expectations. The same could be said on the topic, probability of compound events, which also illustrates that most of the respondents got the scores with an interpretation of did not meet expectations for permutation and combination lessons. A total of 7 students reached the fairly satisfactory description of scores or a percentage of 6.4.

For the probability of compound events, all of the respondents did not meet the expectations. This implies that most of the topics on permutations and combinations and the probability of compound events are difficult for students to understand right away though they have probability discussion already during their previous grade level of study as revealed during the researcher's interview respondents of the study.

Post-Test Scores of Respondents

Table 2 shows the one experimental group's post-test scores in permutation and combination and probability of compound events lessons.

Table 2: Post-Test Scores of Respondents

RANGE OF SCORES	Permutation & Combination			Probability of Compound Events		
	f	%	Interpretation	f	%	Interpretation
21-22	8	7.3	Very Satisfactory	-	-	-
18-20	22	20	Satisfactory	1	.9	Satisfactory
15-17	43	39.1	Fairly Satisfactory	16	14.6	Fairly Satisfactory
14 below	37	33.6	Did Not Meet Expectations	93	84.5	Did Not Meet Expectations
Total	**110**	**100.0**		**110**	**100.0**	

The post-test scores of respondents on permutation and the combination and probability of compound events lessons after the extended core lessons intervention have been introduced to the students show the two different lessons leveled up results. A total of 43 respondents got a description of fairly satisfactory or a percentage of 39.1. Twenty-two (22) respondents got satisfactory remarks or a percentage of 20. Eight (8) respondents got a very satisfactory record or a percentage of 7.3.

For the probability of compound events lesson, there have also positive findings with the post-test results of scores compared to the results before the intervention was introduced. This time, sixteen (16) respondents have remarked fairly satisfactory, or a percentage of 14.6, and one got a satisfactory record of post-test scores or a 0.9 percent.

The interview was also conducted after implementing the intervention. According to the respondents interviewed, lessons still need to be discussed further though intervention has already been informed. They still find it challenging to understand the process or skills, especially on the probability of compound events. Others said that they were not paying attention to the demonstrated examples, for they were also attending to other agendas of their seatmates while math discussions are on-going. Those who were attentive in the demonstration said that due to explicit teaching, the skill in

permutation and combination maybe learned right away for one hour and not for several meetings but opposite remarks from them for the probability of compound events. This was observed based on the data found in table 3.

Significant Difference of Pretest-Posttest Scores of Respondents in Permutation and Combination and Probability of Compound Events

Table 3: Significant Difference of Pretest-Posttest Scores of Respondents in Permutation and Combination and Probability of Compound Events

Subject Matter	Pre-test		Post-test		Mean	Computed t	t-value
	Mean	SD	Mean	SD	difference		
Permutation & Combination	**9.91**	**3.286**	**15.3**	**3.855**	5.218	13.814	.378
Probability of Compound Events	**7.70**	**2.344**	**10.19**	**3.175**	2.491	6.525	.382
Overall							

To determine the effect of extended core lessons intervention, the t-test for dependent samples was used to ascertain a significant difference in the mean gain of the one experimental group in the two lessons. The results are found in Table 3.

n = 110

Based on the primary data presented in Table 3, the null hypothesis that there was no significant difference between the mean gains obtained by the one experimental group was, therefore, rejected. This means that there was a significant difference in the mean gains of the two groups.

Further, the data also revealed that the higher mean gain was obtained by the students in the permutation and combination lesson, which would mean that they showed better performance in the first lesson than the second lesson. This implies that the intervention's introduction or use had enhanced the students' performance in both lessons. This study's result is consistent with the interventions designed to re-teach fundamental mathematical concepts and procedures and provide extended time learning the material presented in the core curriculum that may improve students' achievement in mathematics (Hiebert & Wearne, 2003). This study, however, is not designed to determine for whom each intervention is most effective because of the nature of the tested intervention programs. This intervention may be true to permutation and combination, and probability of compound events. This was maybe because of some of the students' revelations during the interview that others were not attentive to the demonstration activity while others were doing their responsibility of becoming productive citizens of society.

Feedback Plan Based on Extended Core Lessons Intervention

Using the replica of the extended core lessons intervention, interested teachers/researchers may utilize the process below. It may apply it to their daily teaching activity in school for students' better academic performance in Mathematics regardless of what subject matter it will be utilized. This may serve as a model to other educators or teachers who want to adequately relate their teaching to the youth's educational needs by keeping open minds and using them intelligently. According to Rivera (2012), the teacher who becomes complacent about his relation to students and their needs begins to fail in his job. The teacher should be experimental in his thinking and teaching. This is the experimental method of teaching, which is always rewarding to pupils and teachers alike.

4. CONCLUSION

The study explored the influence of a video-based intervention on PSTs' knowledge-based reasoning. In previous research, it was established that this particular intervention led to changes in the pattern of attention that were markedly similar to changes seen in the literature. This versatile program incorporates effective, research-based intervention strategies while emphasizing critical areas of mathematical focus at each grade level. Students struggling with common math concepts will learn how to use their own mathematical thinking through extended core lessons intervention as utilized in teaching instruction of mathematics strategies using a strategic progression of math topics across the series scope and sequence. Math intervention resources like this series can be used in a variety of instructional frameworks, settings, and schedules including summer school and after-school programs, or as part of a larger math intervention curriculum.

5. RECOMMENDATIONS

As expressed in the implications of the study, the following recommendations are promoted:

1. School administrators should encourage teachers to continue with the interventions to attain students' increased performance in mathematics.

2. Put into practice the applications of classroom interventions more often to improve and enhance students' academic skills in math and, if possible, make it a routine activity.

3. The administration may also provide incentives, rewards, or recognition to teachers implementing interventions to enlighten them that good deeds are rewarded.

4. The teachers should intensify the utilization of interventions and reward students for their full participation, which is beyond the normal call of duty and responsibility.

5. Further research of the same nature, settings, and its utilization in other subject areas aside from Mathematics is recommended.

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