International Journal of Education Humanities and Social Science

ISSN: 2582-0745
Vol. 7, No. 03; 2024

USING TRADITIONAL AND BLOCK MODEL APPROACHES IN TEACHING MATHEMATICS: A COMPARATIVE ANALYSIS

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https://doi.org/10.54922/IJEHSS.2024.0736

ABSTRACT

This study described the differences between using traditional and block model approaches in teaching mathematics to 85 Grade 5 learners in San Felipe Elementary School (West), San Felipe, Zambales, during the School Year 2018-2019 geared towards the improvement of mathematics performance. The researcher made use of descriptive-correlational and experimental methods. Different perceptions were noted between the use of traditional and block model approaches. The traditional approach recorded an increment of 1.81, while the block model approach recorded an increment of 1.90. Significant correlations were noted in the profile of the respondents and the usage of traditional and block model approaches. There was a significant difference between the pretest and posttest of the traditional and block model approaches. Hence, the enhancement of the understanding of mathematics lessons was crafted to improve the mathematics performance of the learners.

Keywords: Traditional, Block Model, Approaches, Performance, Mathematics.

1. INTRODUCTION

Approaches in teaching vary from one teacher to another. This is a fact because of the individual differences of everyone. In a classroom, teachers are obliged to deliver their daily lessons with various approaches. It is a fact that tenure in the service has a great factor in the selection of the approach to be used in the class. Most of the time, senior teachers prefer to use traditional approaches. However, some teachers prefer to try the new approaches they learned from their schooling, reading, or experiences. There is no guarantee that new approaches in teaching are more effective compared to the traditional ones. Most of the time, depending on the situation, the best approach depends on the learners. As long as they are learning the lesson, that particular approach is considered the best one. Only the learners can determine what is suited to them because they learn fast if the approach being used fits them.

Whether you are a first-year teacher eager to put into practice all the pedagogical techniques you learned in college or a classroom veteran examining differentiated instruction and new learning methodologies, consider that not all learners respond well to one particular style. Although teaching styles have been categorized into five (5) groups, the ideal teaching style is not an either-or proposition but more of a hybrid approach that blends the best of everything a teacher has to offer. The traditional advice that teachers do not overreach with a cluster of all-encompassing teaching styles might seem to conflict with the emphasis on learner-centered classrooms. Theoretically, the more teachers emphasize learner-centric learning, the harder it is to develop a well-focused style based on their personal attributes, strengths, and goals. In short, modern methods of teaching require different types of teachers – from the analyst or organizer to the negotiator or consultant (Gill, 2018).

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The ultimate goals of mathematics instruction are learners understanding the material presented, applying the skills, and recalling the concepts in the future. There is little benefit in learners recalling a formula or procedure for an assessment tomorrow only to forget the core concept by next week. It is imperative for teachers to focus on making sure that the learners understand the material and not just memorize the procedures. Here are six ways to teach for understanding in the mathematics classroom: create an effective class opener; introduce topics using multiple representations; solve the problems many ways; show the application; have learners communicate their reasoning; and finish class with a summary (Beyranevand, 2016).

Teaching mathematics can only be described as truly effective when it positively impacts learner learning. We know that teaching practices can make a major difference to learner outcomes, as well as what makes a difference in the classroom. Research and evidence from the field of mathematics let us know, with a fair degree of certitude, how effective teachers of mathematics skillfully integrate a range of instructional approaches and resources to meet the diverse learning needs of their learners. Effective teachers know the pedagogy that determines how their learners successfully learn, know and understand the content and practices that learners need to comprehend, as described in the standard framework, know the learners they teach as learners, challenge all learners at their own level, encourage risk-taking, and create purposeful learning experiences for learners through the use of relevant and meaningful contexts (Coombes, 2017).

The block model approach is a mathematical technique that uses bars or rectangular regions to make the learners visualize concepts or manipulate problem situations. This approach is used in Singapore wherein the learners came up with the correct solution. With the frequent use of this approach, the learners show progress in their performance. With the progressive results presented in various write-ups, research studies, and accomplishment reports, the researcher is inspired and motivated to apply this in his mathematics classes, particularly the Grade 5 classes.

With the information gathered, it is proper to look for the difference between the block model approach in teaching mathematics with the traditional one. This is very significant in order to determine the suited approach in teaching the learners. Likewise, this can serve as a means of validating the applicability of the approach used by other countries to the mathematics classes in the Philippines.

In considering the difference between the traditional and block model approaches in teaching mathematics lessons, the following contributory factors were considered such as attitudes toward the lesson, level of understanding in using the approach, and frequency of applying the approach to real-life situations.

The researcher's observations and dialogue with the learners served as proof that there was really a need to conduct a study on the differences of using traditional and block model approaches in teaching mathematics to the mathematics performance of Grade 5 learners in San Felipe Elementary School (West), San Felipe, Zambales for the purpose of improving their mathematics performance. It was a fact that in the hands of the teachers depend on the future of the learners (Costin, 2017). If at the beginning, teachers found ways to help the learners improve their class performance, especially mathematics performance, there was a great chance that the learners gradually showed progress in the lesson until such time that their performance was totally enhanced.

2. STATEMENT OF THE PROBLEM

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This study described the differences in using traditional and block model approaches in teaching mathematics to the Grade 5 learners in San Felipe Elementary School (West), San Felipe, Zambales during the School Year 2018-2019.

It aimed to answer the following specific questions:

1. How may the profile of the Grade 5 learners be described in terms of the following:
    1.1. age;
    1.2. sex;
    1.3. number of siblings;
    1.4. monthly income of the family; and
    1.5. average grade in mathematics?
2. How may the usage of the traditional approach be described in terms of:
    2.1. attitudes toward the lesson;
    2.2. levels of understanding in using the approach; and
    2.3. applying the approach to real-life situations?
3. How may the usage of the block model approach be described in terms of:
    3.1. attitudes toward the lesson;
    3.2. levels of understanding in using the approach; and
    3.3. applying the approach to real-life situations?
4. How may the mathematics performance of the Grade 5 learners be described in terms of the following:
    4.1. using the traditional approach; and
    4.2. using the block model approach?
5. Is there a significant difference between the usage of the traditional approach of the respondents and their profile?
6. Is there a significant difference between the usage of the block model approach of the respondents and their profile?
7. Is there a significant difference between the mathematics performance of the respondents and their profile?
8. Is there a significant correlation between the usage of the traditional approach and the mathematics performance of the respondents?
9. Is there a significant correlation between the usage of the block model approach and the mathematics performance of the respondents?
10. Is there a significant difference between the mathematics performance of the respondents in terms of pre-test and post-test results?
11. How may the findings of this study be used to formulate an action plan to improve the mathematics performance of the learners?

3. METHODS AND MATERIALS

This study described the differences in using traditional and block model approaches in teaching mathematics to the Grade 5 learners at San Felipe Elementary School (West), San Felipe, Zambales during the School Year 2018-2019. Utilizing a combination of descriptive-correlational and quasi-experimental methods of research, data were collected, classified, summarized, and presented using percentages and means. The respondents comprised 85 Grade 5 learners, employing total population sampling to ensure unbiased representation and validity. A researcher-designed questionnaire served as the primary data collection instrument, consisting of the profile

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of the respondents, use of traditional and block model approaches, and mathematics performance. Internal consistency was confirmed through Cronbach's Alpha scores, indicating excellent reliability across dimensions. Chi-square and T-tests were employed to test the hypotheses.

4. RESULTS AND DISCUSSIONS

4.1. Profile of the Respondents

Table 1 shows the frequency and percentage distribution of respondents' profiles in terms of age. The table shows that of the observed number of respondents, the majority or 51% were 10 years old, 35 or 41% were 11 years old, three (3) or four (4)% were 12 years old, and two (2) or two (2)% were 9 and 13 years old, respectively. The general mean age was 10.53 or 11 years old.

Table 1. Frequency and Percentage Distribution of Respondents' Profile in terms of Age

Age	Frequency	Percentage
9 years old	2	2.35
10 years old	43	50.59
11 years old	35	41.18
12 years old	3	3.53
13 years old	2	2.35
Total	**85**	**100.00**
Mean Age	**10.53**	

Perez (2018) emphasized that the age requirement for incoming kindergarten learners is five (5) years old as of August 31 of the present year. This was the mandated age requirement of the Department of Education. It only meant that a learner in Grade 5 must be 10 to 11 years old.

Table 2 shows the frequency and percentage distribution of respondents' profiles in terms of sex. The table shows that of the observed number of respondents, the majority or 51% were males and 42 or 49% were females.

Table 2. Frequency and Percentage Distribution of Respondents' Profile in terms of Sex

Sex	Frequency	Percentage
Male	43	50.59
Female	42	49.11
Total	**85**	**100.00**

DepEd San Felipe District enrolment data for 2018 showed that there were a greater number of males enrolled rather than females. This data was generated through the online enrolment data of all schools in the district and only school heads or the School ICT Coordinators had access.

Table 3 shows the frequency and percentage distribution of respondents' profiles in terms of the number of siblings. The table shows that of the observed number of respondents, 32 or 38% had three (3) to four (4) siblings, 31 or 36% had one (1) to two (2) siblings, and 11 or 13% had none and five (5) siblings or more, respectively.

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Table 3. Frequency and Percentage Distribution of Respondents' Profile in terms of Number of Siblings

Number of Siblings	Frequency	Percentage
None	11	12.94
1 to 2 siblings	31	36.47
3 to 4 siblings	32	37.65
5 siblings and above	11	12.94
Total	**85**	**100.00**

No one chooses their siblings. Brothers and sisters are just sort of there. But, when it comes to the total development of growing adults, siblings are more influential than parents. Having three (3) to four (4) siblings signifies that the relationship is more self-sacrificing. There are instances that one needs to give up what is intended for him or her for the benefit of the younger ones (Healy, 2018).

Table 4 shows the frequency and percentage distribution of respondents' profiles in terms of monthly family income. The table shows that of the observed number of respondents, 38 or 45% belonged to families with P20,000 to P29,000 monthly income; 27 or 32% belonged to families with P10,000 to P19,999 monthly income; 12 or 14% belonged to families with P30,000 to P39,999 monthly income; four (4) or five (5)% belonged to families with P9,999 and below monthly income; three (3) or four (4)% belonged to families with P50,000 and above monthly income; and one (1) or one (1)% belonged to families with P40,000 to P49,999 monthly income.

Table 4. Frequency and Percentage Distribution of Respondents' Profile in terms of Monthly Family Income

Monthly Family Income	Frequency	Percentage
P9,999 and below	4	4.71
P10,000 to P19,999	27	31.76
P20,000 to P29,999	38	44.71
P30,000 to P39,999	12	14.12
P40,000 to P49,999	1	1.18
P50,000 and above	3	3.53
Total	**85**	**100.00**

The living wage affirmed by the National Economic Development Authority (NEDA) was P20,000 monthly. It clearly showed that the learners belonged to families with middle marginal economic status (Sy, Macairan, & Tupas, 2018).

Table 5 shows the frequency and percentage distribution of respondents' profiles in terms of average grade in mathematics. The table shows that of the observed number of respondents, 33 or 39% attained an 85 to 89 average grade; 31 or 36% attained an 80 to 84 average grade; 19 or 22% attained a 90 and above average grade; and two (2) or two (2)% attained a 75 to 79 average grade.

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Table 5. Frequency and Percentage Distribution of Respondents' Profile in terms of Average Grade in Mathematics

Average Grade in Mathematics	Frequency	Percentage
90 and above	19	22.35
85 to 89	33	38.82
80 to 84	31	36.47
75 to 79	2	2.35
Total	**85**	**100.00**

Education is considered imperative for not only the progress of individuals but also for the development of community and nation. To bring about improvements in all aspects and utilize modern and innovative techniques and methods, individuals need to generate awareness and enhance their educational skills. The main areas that have been considered include factors influencing the academic performance of learners, academic performance, large numbers of learners in class, parental and associated factors relating to academic achievement, the contribution of school factors towards the academic performance of learners, the influence of poverty on the academic achievement of learners, and other causes of low academic achievement (Kapur, 2018).

4.2. Usage of Traditional Approach

Table 6 shows the mean rating and interpretation of respondents' usage of the traditional approach in terms of attitudes toward the lesson. "I am listening attentively to the teacher" (Item 1) had a 3.64 mean rating, which was interpreted as highly helpful; "I follow what the teacher has instructed" (Item 2) had a 3.95 mean rating, which was interpreted as highly helpful; "I focus my attention on the lesson" (Item 3) had a 3.50 mean rating, which was interpreted as highly helpful; "I avoid making noise" (Item 4) had a 3.45 mean rating, which was interpreted as highly helpful; "I ask questions to clarify gray details" (Item 5) had a 3.83 mean rating, which was interpreted as highly helpful; "I am answering the given seatwork" (Item 6) had a 3.98 mean rating, which was interpreted as highly helpful; and "I review my lesson at home" (Item 7) had a 3.67 mean rating, which was interpreted as highly helpful. In terms of attitudes toward the lesson, the general mean rating of respondents' usage of the traditional approach was 3.72, and it was interpreted as highly helpful.

Table 6. Mean Rating and Interpretation of Respondents' Usage of Traditional Approach in terms of Attitudes toward the Lesson

Item	Indicator	Mean Rating	Interpretation

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1	I am listening attentively to the teacher.	3.64	Highly Helpful
2	I follow what the teacher instructed.	3.95	Highly Helpful
3	I focus my attention in the lesson.	3.50	Highly Helpful
4	I avoid making noise.	3.45	Highly Helpful
5	I ask questions to clarify gray details.	3.83	Highly Helpful
6	I am answering the given seatwork.	3.98	Highly Helpful
7	I review my lesson at home.	3.67	Highly Helpful
General Mean Rating		**3.72**	**Highly Helpful**

The findings of the research conducted by Toraman and Demir (2016) demonstrated that learners in the experimental group, in which studies were conducted according to the constructivist approach, displayed many more positive attitudes toward the lesson than those in the control group who were taught according to more traditional learning methods.

Table 7 shows the mean rating and interpretation of respondents' usage of the traditional approach in terms of the level of understanding in using the approach. "I can follow the steps of the approach" (Item 1) had a 3.55 mean rating, which was interpreted as highly helpful; "I can execute the steps of the approach" (Item 2) had a 3.55 mean rating, which was interpreted as highly helpful; "I can arrive at the correct answer" (Item 3) had a 3.52 mean rating, which was interpreted as highly helpful; "I can solve immediately" (Item 4) had a 2.98 mean rating, which was interpreted as helpful; "I can demonstrate how I come up with my answer" (Item 5) had a 3.17 mean rating, which was interpreted as helpful; "I can explain how I arrive at my answer" (Item 6) had a 3.21 mean rating, which was interpreted as helpful; and "I can teach my classmates the procedures" (Item 7) had a 3.17 mean rating, which was interpreted as helpful. In terms of the level of understanding in using the approach, the general mean rating of respondents' usage of the traditional approach was 3.31, and it was interpreted as helpful.

Table 7. Mean Rating and Interpretation of Respondents' Usage of Traditional Approach in terms of Level of Understanding in Using the Approach

Item	Indicator	Mean Rating	Interpretation
1	I can follow the steps of the approach.	3.55	Highly Helpful
2	I can execute the steps of the approach.	3.55	Highly Helpful
3	I can arrive with the correct answer.	3.52	Highly Helpful
4	I can solve immediately.	2.98	Helpful
5	I can demonstrate how I come up with my answer.	3.17	Helpful
6	I can explain how I arrive with my answer.	3.21	Helpful
7	I can teach my classmates the procedures.	3.17	Helpful
General Mean Rating		**3.31**	**Helpful**

Education reform has been focused on curriculum, assessment, instruction, and more recently standards and data, with these efforts only bleeding over into how learners think briefly. This means that the focus of finite teacher and school resources is not on promoting thinking and understanding, but rather on what kinds of things learners are going to be thinking about and how they will prove they understand them (Heich, 2019).

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Table 8 shows the mean rating and interpretation of respondents' usage of the traditional approach in terms of applying the approach in real-life situations. "I apply this when I am buying" (Item 1) had a 4.14 mean rating, which was interpreted as highly helpful; "I apply this when I am giving change" (Item 2) had a 3.93 mean rating, which was interpreted as highly helpful; "I apply this when I divide food equally" (Item 3) had a 3.93 mean rating, which was interpreted as highly helpful; "I apply this when I am preparing food" (Item 4) had a 4.02 mean rating, which was interpreted as highly helpful; "I apply this when I am budgeting" (Item 5) had a 3.81 mean rating, which was interpreted as highly helpful; "I apply this when I cut objects equally" (Item 6) had a 3.88 mean rating, which was interpreted as highly helpful; and "I apply this when I measure something" (Item 7) had a 3.74 mean rating, which was interpreted as highly helpful. In terms of applying the approach in real-life situations, the general mean rating of respondents' usage of the traditional approach was 3.92, and it was interpreted as highly helpful.

Table 8. Mean Rating and Interpretation of Respondents' Usage of Traditional Approach in terms of Applying the Approach in Real-Life Situation

Item	Indicator	Mean Rating	Interpretation
1	I apply this when I am buying.	4.14	Highly Helpful
2	I apply this when I am giving change.	3.93	Highly Helpful
3	I apply this when I divide food equally.	3.93	Highly Helpful
4	I apply this when I am preparing food.	4.02	Highly Helpful
5	I apply this when I am budgeting.	3.81	Highly Helpful
6	I apply this when I cut objects equally.	3.81	Highly Helpful
7	I apply this when I measure something.	3.74	Highly Helpful
General Mean Rating		**3.92**	**Highly Helpful**

The education model of the industrial era saw a one-size-fits-all approach where learners were required to listen and not question, memorize, and repeat in preparation for a vastly different workforce than the one today. As times have changed, so too has the way of educating. Nurturing in-depth understanding and a passion for innovation, educators today seek to maximize learning experiences so learners can develop the skills needed to navigate a rapidly evolving world (The Sydney Morning Herald, 2018).

4.3. Usage of Block Model Approach

Table 9 shows the mean rating and interpretation of respondents' usage of the block model approach in terms of attitudes toward the lesson. "I am listening attentively to the teacher" (Item 1) had a 3.65 mean rating, which was interpreted as highly helpful; "I follow what the teacher has instructed" (Item 2) had a 4.12 mean rating, which was interpreted as highly helpful; "I focus my attention on the lesson" (Item 3) had a 3.77 mean rating, which was interpreted as highly helpful; "I avoid making noise" (Item 4) had a 3.07 mean rating, which was interpreted as helpful; "I ask questions to clarify gray details" (Item 5) had a 4.49 mean rating, which was interpreted as very highly helpful; "I am answering the given seatwork" (Item 6) had a 4.37 mean rating, which was interpreted as very highly helpful; and "I review my lesson at home" (Item 7) had a 3.58 mean rating, which was interpreted as highly helpful. In terms of attitudes toward the lesson, the general

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mean rating of respondents' usage of the block model approach was 3.86, and it was interpreted as highly helpful.

Table 9. Mean Rating and Interpretation of Respondents' Usage of Block Model Approach in terms of Attitudes toward the Lesson

Item	Descriptor	Mean Rating	Interpretation
1	I am listening attentively to the teacher.	3.65	Highly Helpful
2	I follow what the teacher instructed.	4.12	Highly Helpful
3	I focus my attention in the lesson.	3.77	Highly Helpful
4	I avoid making noise.	3.07	Helpful
5	I ask questions to clarify gray details.	4.49	Very Highly Helpful
6	I am answering the given seatwork.	4.37	Very Highly Helpful
7	I review my lesson at home.	3.58	Highly Helpful
General Mean Rating		**3.86**	**Highly Helpful**

Izadi, Hadipour, and Ahmadabadi (2018) conducted a study that explained the attitudes toward mathematics among learners based on goal adjustment strategies and metacognitive beliefs. The results showed a significant negative relationship between goal adjustment strategies and certain components of the attitude toward math. Also, the regression results showed that there is a significant negative-positive relationship between metacognitive strategies and some of the attitudes toward mathematics. These results also indicated that goal adjustment strategies and metacognitive beliefs are predictive of components of attitude toward mathematics. From the findings of this study, it can be inferred that goal adjustment strategies and metacognitive beliefs were important factors in the attitudes toward mathematics in learners. Therefore, in educational programs for mathematics among learners, goal adjustment strategies and metacognitive beliefs require more attention.

Table 10 shows the mean rating and interpretation of respondents' usage of the block model approach in terms of the level of understanding in using the approach. "I can follow the steps of the approach" (Item 1) had a 4.00 mean rating, which was interpreted as highly helpful; "I can execute the steps of the approach" (Item 2) had a 3.93 mean rating, which was interpreted as highly helpful; "I can arrive at the correct answer" (Item 3) had a 3.70 mean rating, which was interpreted as highly helpful; "I can solve immediately" (Item 4) had a 3.37 mean rating, which was interpreted as helpful; "I can demonstrate how I come up with my answer" (Item 5) had a 3.40 mean rating, which was interpreted as highly helpful; "I can explain how I arrive at my answer" (Item 6) had a 3.51 mean rating, which was interpreted as highly helpful; and "I can teach my classmates the procedures" (Item 7) had a 3.79 mean rating, which was interpreted as highly helpful. In terms of the level of understanding in using the approach, the general mean rating of respondents' usage of the block model approach was 3.67, and it was interpreted as highly helpful.

Table 10. Mean Rating and Interpretation of Respondents' Usage of Block Model Approach in terms of Levels of Understanding in Using the Approach

Item	Descriptor	Mean	Interpretation

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		Rating	
1	I can follow the steps of the approach.	4.00	Highly Helpful
2	I can execute the steps of the approach.	3.93	Highly Helpful
3	I can arrive with the correct answer.	3.70	Highly Helpful
4	I can solve immediately.	3.37	Helpful
5	I can demonstrate how I come up with my answer.	3.40	Highly Helpful
6	I can explain how I arrive with my answer.	3.51	Highly Helpful
7	I can teach my classmates the procedures.	3.79	Highly Helpful
General Mean Rating		**3.67**	**Highly Helpful**

There are different levels of understanding. While there are some concepts that a learner may not understand, there are still connections that learners make to previously learned material and concepts which serve to inform a recently learned procedure – and ultimately may lead to further understanding. One can operate at a very basic level of understanding that grows over time. While some basic levels are thought of as rote memorization, lower-level procedural skills inform higher-level understanding skills in tandem (Bgarelick, 2018).

Table 11 shows the mean rating and interpretation of respondents' usage of the block model approach in terms of applying the approach in real-life situations. "I apply this when I am buying" (Item 1) had a 4.40 mean rating, which was interpreted as very highly helpful; "I apply this when I am giving change" (Item 2) had a 4.51 mean rating, which was interpreted as very highly helpful; "I apply this when I divide food equally" (Item 3) had a 3.88 mean rating, which was interpreted as highly helpful; "I apply this when I am preparing food" (Item 4) had a 3.37 mean rating, which was interpreted as helpful; "I apply this when I am budgeting" (Item 5) had a 3.95 mean rating, which was interpreted as highly helpful; "I apply this when I cut objects equally" (Item 6) had a 4.16 mean rating, which was interpreted as highly helpful; and "I apply this when I measure something" (Item 7) had a 3.93 mean rating, which was interpreted as highly helpful. In terms of applying the approach in real-life situations, the general mean rating of respondents' usage of the block model approach was 4.03, and it was interpreted as highly helpful.

Table 11. Mean Rating and Interpretation of Respondents' Usage of Block Model Approach in terms of Applying the Approach in Real-Life Situation

Item	Descriptor	Mean Rating	Interpretation

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1	I apply this when I am buying.	4.40	Very Highly Helpful
2	I apply this when I am giving change.	4.51	Very Highly Helpful
3	I apply this when I divide food equally.	3.88	Highly Helpful
4	I apply this when I am preparing food.	3.37	Helpful
5	I apply this when I am budgeting.	3.95	Highly Helpful
6	I apply this when I cut objects equally.	4.16	Highly Helpful
7	I apply this when I measure something.	3.93	Highly Helpful
General Mean Rating		**4.03**	**Highly Helpful**

Mathematics has been a subject that many learners struggle with. Most people respond to the learners by saying that they may need it for a future job or that it improves the critical thinking ability of the brain. While these responses are good and well-intended, they do not serve the practical and immediate needs of the child (Wanamaker, 2018).

4.4. Mathematics Performance of the Respondents

Table 12 shows the mean rating and interpretation of respondents' performance in mathematics in terms of pre-test and post-test. The table shows that the traditional approach recorded a 1.43 mean rating for the pre-test and a 3.24 mean rating for the post-test. The block model approach recorded a 3.19 mean rating for the pre-test and a 5.09 mean rating for the post-test.

Table 12. Mean Rating and Interpretation of Respondents' Performance in Mathematics in terms of Pre-test and Post-test

Item	Approach	Mean Rating	
		Pre-test	Post-test
1	Traditional	1.43	3.24
2	Block Model	3.19	5.09

In civilized and developed countries, schooling resources which cost money are positively associated with learner outcomes. Although money alone may not be the only solution, the more equitable and adequate allocation of financial inputs to schooling provides opportunities for improving the equity and adequacy of outcomes. Applying various approaches in teaching is not a guarantee that learners will have their best performance, especially when the approach is adapted from other countries (Idowu, 2016).

4.5. Difference Between the Usage of Traditional Approach of the Respondents and Their Profile

Table 13 shows the test of correlation between respondents' usage of the traditional approach and their profile using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the usage of the traditional approach and the profile of the respondents in terms of age (-0.049 against 0.168) and monthly family income (0.044 against 0.168) respectively. On the other hand, since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there

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is a significant correlation between the usage of the traditional approach and the profile of the respondents in terms of sex (0.298 against 0.168), number of siblings (0.257 against 0.168), and average grade in mathematics (-0.337 against 0.168).

Table 13. Test of Difference between Respondents' Usage of Traditional Approach and their Profile

Respondents' Profile	Correlation Statistic	Interpretation
Age	-0.049	Not Significant
Sex	0.298	Significant
Number of Siblings	0.257	Significant
Monthly Family Income	0.044	Not Significant
Average Grade in Mathematics	-0.337	Significant
The correlational critical coefficient at 5% significance level with df=40 is 0.168		

A child's age in comparison to the age of his or her classmates (relative age) has been found to be an influential factor in academic achievement, particularly but not exclusively at the beginning of formal schooling. However, few studies have focused on the generalizability of relative age effects. Results indicated relative age effects for reading and mathematics in favor of the relatively older learners in Grade 2 that become somewhat smaller in size in Grade 3. By Grade 8, relative age effects had vanished in reading and had been reversed in favor of the relatively young in mathematics. Furthermore, relative age effects were not found to be systematically different among learners with and without immigrant backgrounds, learners' cohorts, or across classes (Thoren, Heinig, & Brunner, 2016). There is a need to disrupt the idea of having only one teacher in front of a group of learners at once. With so many different learning styles and learners at different places in their learning within a grade and within subjects, learners and schools will benefit greatly from co-teaching models. Depending on the complexity of the topic, learners might have teams of two, three, or four teachers at once. This is somewhat related to the number of siblings that really affect the individual because of their differences (Glatter, Deruy, & Wong, 2016).

4.6. Difference Between the Usage of Block Model Approach of the Respondents and Their Profile

Table 14 shows the test of correlation between respondents' usage of the block model approach and their profile using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the usage of the traditional approach and the profile of the respondents in terms of age (-0.016 against 0.168) and number of siblings (0.017 against 0.168) respectively. On the other hand, since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the usage of the traditional approach and the profile of the respondents in terms of sex (0.368 against 0.168), monthly family income (-0.175 against 0.168), and average grade in mathematics (0.243 against 0.168).

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Table 14. Test of Difference between Respondents' Usage of Block Model Approach and their Profile

Respondents' Profile	Correlation Statistic	Interpretation
Age	-0.016	Not Significant
Sex	0.368	Significant
Number of Siblings	0.017	Not Significant
Monthly Family Income	-0.175	Significant
Average Grade in Mathematics	0.243	Significant
The correlational critical coefficient at 5% significance level with df=41 is 0.168		

Mathematics is a very important subject. It is the language of science and technology and so it is a force to reckon with in the development of any nation. The results of the study conducted by Owolabi and Adejoke (2017) showed average performance in the algebra course. Besides, the differences in achievement across gender, age, and mathematics anxiety groupings were all not significant.

4.7. Difference Between the Mathematics Performance of the Respondents and Their Profile

Table 15 shows the test of correlation between respondents' profiles and their mathematics performance in terms of the pre-test of the traditional approach using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the pre-test of the traditional approach and the respondents' profile in terms of the number of siblings (0.044 against 0.168) and monthly family income (0.142 against 0.168). On the other hand, since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the pre-test traditional approach and the respondents' profile in terms of age (-0.267 against 0.168), sex (0.193 against 0.168), and average grade in mathematics (-0.400 against 0.168).

Table 15. Test of Correlation between Respondents' Profile and their Mathematics Performance in terms of the Pre-test of Traditional Approach

Demographic Profile	Correlation Statistic	Interpretation
Age	-0.267	Significant
Sex	0.193	Significant
Number of Siblings	0.044	Not Significant
Monthly Family Income	0.142	Not Significant
Average Grade in Mathematics	-0.400	Significant
The correlational critical coefficient at 5% significance level with df=40 is 0.168		

Table 16 shows the test of correlation between respondents' profiles and their mathematics performance in terms of the post-test of the traditional approach using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the

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post-test of the traditional approach and the respondents' profile in terms of age (0.020 against 0.168), sex (0.138 against 0.168), number of siblings (0.057 against 0.168), and average grade in mathematics (0.119 against 0.168). On the other hand, since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the post-test of the traditional approach and the respondents' profile particularly monthly family income (0.198 against 0.168).

Table 16. Test of Correlation between Respondents' Profile and their Mathematics Performance in terms of the Post-test of Traditional Approach

Demographic Profile	Correlation Statistic	Interpretation
Age	0.020	Not Significant
Sex	0.138	Not Significant
Number of Siblings	0.057	Not Significant
Monthly Family Income	0.198	Significant
Average Grade in Mathematics	0.119	Not Significant
The correlational critical coefficient at 5% significance level with df=40 is 0.168		

Table 17 shows the test of correlation between respondents' profiles and their mathematics performance in terms of the pre-test of the block model using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the pre-test of the block model approach and the respondents' profile in terms of age (-0.082 against 0.168), number of siblings (0.001 against 0.168), and monthly family income (-0.090 against 0.168). On the other hand, since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the pre-test block model approach and the respondents' profile in terms of sex (0.570 against 0.168) and average grade in mathematics (-0.460 against 0.168).

Table 17. Test of Correlation between Respondents' Profile and their Mathematics Performance in terms of the Pre-test of Block Model Approach

Demographic Profile	Correlation Statistic	Interpretation
Age	-0.082	Not Significant
Sex	0.570	Significant
Number of Siblings	0.001	Not Significant

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Monthly Family Income	-0.090	Not Significant
Average Grade in Mathematics	-0.460	Significant

The correlational critical coefficient at 5% significance level with df=41 is 0.168

Table 18 shows the test of correlation between respondents' profiles and their mathematics performance in terms of the post-test of the block model approach using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the post-test of the block model approach and the respondents' profile in terms of age (-0.137 against 0.168), sex (0.011 against 0.168), number of siblings (-0.067 against 0.168), monthly family income (0.019 against 0.168), and average grade in mathematics (0.073 against 0.168).

Table 18. Test of Correlation between Respondents' Profile and their Mathematics Performance in terms of the Post-test of Block Model Approach

Demographic Profile	Correlation Statistic	Interpretation
Age	-0.137	Not Significant
Sex	0.011	Not Significant
Number of Siblings	-0.067	Not Significant
Monthly Family Income	0.019	Not Significant
Average Grade in Mathematics	0.073	Not Significant

The correlational critical coefficient at 5% significance level with df=41 is 0.168

The results revealed that there was no significant relationship between attitudes and performance (Dowker, Cheriton, Horton, & Mark, 2019).

4.8. Correlation Between the Usage of Traditional Approach and the Mathematics Performance of the Respondents

Table 19 shows the test of correlation between respondents' usage of the traditional approach and their mathematics performance in terms of the pre-test using the chi-square test. Since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the pre-test and the respondents' usage of the traditional approach in terms of attitude toward the lesson (0.397 against 0.168), level of understanding in using the approach (0.397 against 0.168), and applying the approach in a real-life situation (0.313 against 0.168). The general mean correlation statistic is higher than the chi-square critical value at the five (5) percent level of significance (0.369 against 0.168), the null hypothesis is rejected; thus, there is a significant correlation between the pre-test and the respondents' usage of the traditional approach.

Table 19. Test of Correlation between Respondents' Usage of Traditional Approach and their Mathematics Performance in terms of the Pre-test

Usage of Traditional Approach	Correlation Statistic	Interpretation
Attitude toward the Lesson	0.397	Significant

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Level of Understanding in Using the Approach	0.397	Significant
Applying the Approach in Real-Life Situation	0.313	Significant
General Mean Correlation Statistic	**0.369**	**Significant**

The correlational critical coefficient at 5% significance level with df=40 is 0.168

Table 20 shows the test of correlation between respondents' usage of the traditional approach and their mathematics performance in terms of the post-test using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the post-test and the usage of the traditional approach in terms of attitude toward the lesson (0.125 against 0.168) and level of understanding in using the approach (-0.015 against 0.168). On the other hand, since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the post-test and the usage of the traditional approach particularly applying the approach in a real-life situation (0.176 against 0.168). The general mean correlation statistic is lower than the chi-square critical value at the five (5) percent level of significance (0.095 against 0.168), the null hypothesis is accepted; thus, there is no significant correlation between the post-test and the respondents' usage of the traditional approach.

Table 20. Test of Correlation between Respondents' Usage of Traditional Approach and their Mathematics Performance in terms of Post-test

Usage of Traditional Approach	Correlation Statistic	Interpretation
Attitude toward the Lesson	0.125	Not Significant
Level of Understanding in Using the Approach	-0.015	Not Significant
Applying the Approach in Real-Life Situation	0.176	Significant
General Mean Correlation Statistic	**0.095**	**Not Significant**

The correlational critical coefficient at 5% significance level with df=40 is 0.168

The study conducted by Shaban (2016) aimed to find out whether there was a relationship between mathematics subjects' grades and the academic performance of the accounting students at Al-Zaytoonah University of Jordan. It was found that mathematics subjects' grades have a significant positive effect on the academic performance of the accounting department students.

4.9. Correlation Between the Usage of Block Model Approach and the Mathematics Performance of the Respondents

Table 21 shows the test of correlation between respondents' usage of the block model approach and their mathematics performance in terms of the pre-test using the chi-square test. Since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the pre-test and the respondents' usage of the block model approach in terms of attitude toward the lesson (0.315 against 0.168), level of understanding in using the approach (0.330 against 0.168), and applying the approach in a real-life situation (0.337 against 0.168). The general mean correlation statistic is higher than the chi-square critical value at the five (5) percent level of

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significance (0.327 against 0.168); the null hypothesis is rejected; thus, there is a significant correlation between the pre-test and the respondents' usage of the block model approach.

Table 21. Test of Correlation between Respondents' Usage of Block Model Approach and their Mathematics Performance in terms of the Pre-test

Usage of Block Model Approach	Correlation Statistic	Interpretation
Attitude toward the Lesson	0.315	Significant
Level of Understanding in Using the Approach	0.330	Significant
Applying the Approach in Real-Life Situation	0.337	Significant
General Mean Correlation Statistic	**0.327**	**Significant**
The correlational critical coefficient at 5% significance level with df=41 is 0.168		

Table 22 shows the test of correlation between respondents' usage of the block model approach and their mathematics performance in terms of the post-test using the chi-square test. Since the chi-square statistic is lower than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is accepted; thus, there is no significant correlation between the post-test and the usage of the block model approach, particularly attitude toward the lesson (0.067 against 0.168). On the other hand, since the chi-square statistic is higher than the chi-square critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant correlation between the post-test and the usage of the block model approach in terms of level of understanding in using the approach (0.254 against 0.168) and applying the approach in a real-life situation (0.187 against 0.168). The general mean correlation statistic is higher than the chi-square critical value at the five (5) percent level of significance (0.169 against 0.168); the null hypothesis is rejected; thus, there is a significant correlation between the post-test and the respondents' usage of the block model approach.

Table 22. Test of Correlation between Respondents' Usage of Block Model Approach and their Mathematics Performance in terms of Post-test

Usage of Block Model Approach	Correlation Statistic	Interpretation
Attitude toward the Lesson	0.067	Not Significant
Level of Understanding in Using the Approach	0.254	Significant
Applying the Approach in Real-Life Situation	0.187	Significant
General Mean Correlation Statistic	**0.169**	**Significant**
The correlational critical coefficient at 5% significance level with df=41 is 0.168		

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The teaching method used by teachers largely determines learners' performance in mathematics. Secondary school learners have in the past years continued to perform dismally in mathematics and therefore the study conducted by Muema, Mulwa, and Mailu (2018) aimed to examine the influence of teaching methods on learners' academic achievement in mathematics in Dadaab Sub Country, Garissa County. It was found that there was a positive correlation between teaching methods and learners' achievement in mathematics. Teaching using ICTs was strongly correlated to learners' achievement than traditional methods of teaching.

4.10. Difference Between the Mathematics Performance of the Respondents

Table 23 shows the test of significance between the traditional approach pre-test and post-test results assuming equal variance. Since the t-test statistic is higher than the t-test critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant difference between the traditional approach pre-test and post-test results (-6.677 against 1.683).

Table 26. Test of Significance between Traditional Approach Pre-test and Post-test Result Assuming Equal Variance

	Pre-test	Post-test
Mean	1.429	3.238
Variance	1.226	2.186
Observations	42	42
Pearson Correlation	0.100	
Hypothesized Mean Difference	0	
df	41	
t Stat	-6.677	
t Critical one-tail	1.683	
t Critical two-tail	2.020	
Interpretation: **Significant** *(at 5% level of significance)*		

Table 24 shows the test of significance between the block model approach pre-test and post-test results assuming equal variance. Since the t-test statistic is higher than the t-test critical value at the five (5) percent level of significance, the null hypothesis is rejected; thus, there is a significant difference between the block model approach pre-test and post-test results (-2.884 against 1.682).

Table 24. Test of Significance between Block Model Approach Pre-test and Post-test Result Assuming Equal Variance

	Pre-test	Post-test
Mean	3.19	5.09
Variance	4.584	16.705
Observations	43	43
Pearson Correlation	0.142	
Hypothesized Mean Difference	0	

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df	42
t Stat	-2.884
t Critical one-tail	1.682
t Critical two-tail	2.018
Interpretation: **Significant** *(at 5% level of significance)*	

Researchers are often interested in exploring predictors of change and commonly use a regression-based model or a gain score analysis to compare the degree of change across groups. Methodologists have cautioned against the use of the regression-based model when there are non-random group differences at baseline because this model inappropriately corrects for baseline differences. Less research has addressed the issues that arise when exploring continuous predictors of change. If continuous predictors of change correlate with pre-test scores, the modeled relationship between predictors and change may be an artifact. This two-part study explored the statistical artifact, or overestimation of effect estimates, that may arise when continuous predictors of change are included in pre-test-post-test regression-based models (Farmus, Arpin-Cribbie, & Cribbie, 2019).

4.11. Action Plan in Improving the Mathematics Performance of the Learners

To improve learners' mathematics performance, an action plan was implemented with various objectives and strategies. Evidence-Based Training and Development was organized to disseminate research results and suggest ways to better understand mathematics through district-based training involving pupils, parents, teachers, principals, and resource speakers from July to October 2020, funded by the School MOOE Fund. Concurrently, an INSET on the Block Model Approach was conducted for teachers. From July 2019 to April 2022, several initiatives were launched: the Journal of Mathematics Lessons to record significant stories; Understanding Mathematics Lessons to develop mechanisms for better comprehension; Goal: Perfect Score to motivate through positive reinforcement; Record Breaker to promote self-improvement; The Reason to inspire through role models; and Advance Life to help pupils demonstrate their understanding, funded by the School Canteen Fund. These programs aimed to enhance understanding, motivation, and academic performance in mathematics.

5. CONCLUSIONS

1. Most of the respondents were males, aged 10 years old, with three (3) to four (4) siblings, from families with a monthly income of P20,000 to P29,999, and had average grades of 85 to 89 in mathematics.
2. A majority of the respondents perceived that attitudes toward the lesson and applying the approach in real-life situations were highly helpful in using the traditional approach, while the levels of understanding in using the approach were helpful in using the traditional approach.
3. The respondents perceived that attitudes toward the lesson, levels of understanding, and applying the approach in real-life situations were highly helpful in using the block model approach.
4. The traditional approach recorded an increment of 1.81, while the block model approach recorded an increment of 1.90.
5. There was no significant correlation between the respondents' usage of the traditional approach and their profile in terms of age and monthly income; thus, the null hypothesis was accepted. There was a significant correlation between the respondents' usage of the traditional approach and their

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profile in terms of sex, number of siblings, and average grade in mathematics; thus, the null hypothesis was rejected.

6. There was no significant correlation between the respondents' usage of the block model approach and their profile in terms of age and number of siblings; thus, the null hypothesis was accepted. There was a significant correlation between the respondents' usage of the block model approach and their profile in terms of sex, monthly family income, and average grade in mathematics; thus, the null hypothesis was rejected.

7. There was no significant correlation between the pre-test of the traditional approach and the respondents' profile in terms of the number of siblings and monthly family income; thus, the null hypothesis was accepted. There was a significant correlation between the pre-test of the traditional approach and the respondents' profile in terms of age, sex, and average grade in mathematics; thus, the null hypothesis was rejected. There was no significant correlation between the post-test of the traditional approach and the respondents' profile in terms of age, sex, number of siblings, and average grade in mathematics; thus, the null hypothesis was accepted. There was a significant correlation between the post-test of the traditional approach and the respondents' profile, particularly monthly family income; thus, the null hypothesis was rejected. There was a significant correlation between the pre-test of the block model approach and the respondents' profile in terms of age, number of siblings, and monthly family income; thus, the null hypothesis was accepted. There was a significant correlation between the pre-test of the block model approach and the respondents' profile in terms of sex and average grade in mathematics; the null hypothesis was rejected. There was no significant correlation between the post-test of the block model approach and the respondents' profile in terms of age, sex, number of siblings, monthly family income, and average grade in mathematics; the null hypothesis was accepted.

8. There was no significant correlation between the mathematics performance in terms of pre-test and the respondents' usage of the traditional approach in terms of attitude toward the lesson, level of understanding in using the traditional approach, and applying the traditional approach in real-life situations; thus, the null hypothesis was accepted. There was no significant correlation between the mathematics performance in terms of post-test and the respondents' usage of the traditional approach in terms of attitude toward the lesson and level of understanding in using the traditional approach; thus, the null hypothesis was accepted. There was a significant correlation between the mathematics performance in terms of post-test and the respondents' usage of the traditional approach, particularly the application of the traditional approach in real-life situations; thus, the null hypothesis was rejected.

9. There was a significant correlation between the mathematics performance in terms of pre-test and the respondents' usage of the block model approach in terms of attitude toward the lesson, level of understanding in using the block model approach, and applying the block model approach in real-life situations; thus, the null hypothesis was accepted. There was no significant correlation between the mathematics performance in terms of post-test and the respondents' usage of the block model approach, particularly attitude toward the lesson; the null hypothesis was accepted. There was a significant correlation between the mathematics performance in terms of post-test and the respondents' usage of the block model approach in terms of level of understanding in using the block model approach and applying the block model approach in real-life situations; thus, the null hypothesis was rejected.

10. There was a significant difference between the pre-test and post-test of the traditional and block model approaches.

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11. The proposed action plan to better understand mathematics lessons was developed.

6. RECOMMENDATIONS

1. Proper guidance and assistance from parents and teachers are needed to improve the mathematics performance of the learners.
2. Learners need to improve their attitudes toward the lesson, levels of understanding of the approach, and applying the approach in real-life situations.
3. Teachers must consider the best approaches in teaching that are suited to the learners in order to improve their performance.
4. Parents and teachers must be sensitive to the demographic profile that contributed to the improvement of the mathematics performance of the learners, such as age, sex, number of siblings, monthly family income, and average grade in mathematics.
5. The learners must be well-informed of their classroom performance for them to help their learners improve their mathematics performance.
6. Attitudes toward the lesson, level of understanding in using the approach, and applying the approach in real-life situations must be taken into consideration by the teachers to look for the suited approaches intended for the learners.
7. Teachers must determine the diversity of the learners for them to apply the suited approaches that can address their diversities.
8. Learning styles of the learners must be investigated to determine the line of interest of the learners and align all classroom activities according to their interests.
9. Learners must devote some of their time to studying their mathematics lessons for them to improve their class performances.
10. The improved performance of the learners must be cascaded to all concerned for them to be informed of their classroom or school achievements.
11. The Block Model Approach must be used in teaching mathematics in all grade levels, from grade one to six or even in high school.
12. The action plan to better understand mathematics lessons must be implemented.
13. Other related studies must be conducted to describe the effectiveness of using traditional and block model approaches in teaching mathematics.

7. ACKNOWLEDGEMENT

The researcher extends profound appreciation to all who played pivotal roles in the successful culmination of this study. Foremost, Edgar B. Geniza PhD, Editha B. Geniza PhD, Elisa A. Menor PhD, Elvira C. Pallen EdD, Yzagany Ivarra B. Geniza PECE, MS, and Arturo P. Caseñas Jr. MIT, MHRM, MBA, from Mondriaan Aura College, Subic Bay Freeport Zone for their insightful feedback and constructive recommendations, which greatly enriched the study's depth and quality. Gratitude is also extended to Samson G. Cava, EdD, Public Schools District Supervisor, Juliet R. Borja, Isagani C. Canonizado EdD, Marjorie M. Batara, Virgie J. Costales, and Ruby D. Quijano. The active engagement and valuable contributions of the Grade 5 learners at San Felipe Elementary School West, San Felipe District, Schools Division of Zambales were instrumental in shaping the research trajectory. The steadfast support and unwavering assistance of the researcher's family members, including Nelson J. Badillo, Liza L. Badillo, Lynell L. Badillo, Gener J. Badillo, Jenalyn

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L. Badillo, and Lyzdyn Alexis Felicity L. Badillo, were indispensable throughout this academic pursuit. This acknowledgment is a testament to the collective effort and collaboration that contributed to the successful completion of the research project.

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