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The Level of Readiness in Mathematics of First Year High School Students of Cluster 6 Tugbok Secondary Schools: Basis for Intervention Program

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Abstract: The purpose of the study was to determine the level of readiness in Mathematics of First-Year High School students of Cluster 6 Tugbok Secondary Schools, Division of Davao City, Philippines. The test contained Mathematics learning competencies, namely: Whole Numbers, Fractions, Decimals, Percentage, Geometry, Measurement, and Graphs. It used a descriptive quantitative method of research where means and standard deviations were computed to determine the level of mathematical readiness. Respondents were chosen through a random sampling technique. Mean ratings based on the three achievement tests administered were very low for Grade 6, moderate for Grade 5, and high for Grade 4. Results showed that the respondents are prepared for the Grade 5 level. Based on the t-test results on the significant difference in terms of mathematical readiness when analyzed by sex, it was established that female students were more prepared than male students. The results suggest an intervention program to be formulated in order to improve the level of Mathematical readiness of freshman students.

Keywords: *Mathematics, readiness, public schools, Philippines*

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INTRODUCTION

In the United States, the National Council of Teachers of Mathematics has conducted a readiness test in Mathematics of college freshmen. They found out that 12th grade students do not demonstrate mathematical proficiency, suggesting that students making the transition from high school to college Mathematics may not be ready for its rigors (Corbishley & Truxaw, 2010).

In the Philippines, the Department of Education (DepED) conducted annually the National Achievement Test (NAT) for second year high school students. DepED has embarked on intervention programs aimed at improving key performance indicators in basic education. Based on the result of the previous years, the Mathematics achievement of the students is very low (DepED Press Release, 2009). In the Division of Davao City, it was observed that students performance in Mathematics is very low. Based on the ranking of all the Divisions in Region XI, Davao City is considered as low performing. This shows that math teachers through the cooperation of the students shall do something in order to attain its objective to mastery level especially in Mathematics achievement (DepED Advisory, 2011). In lieu with this, the researcher sought to determine the level of readiness of students in Mathematics which would serve as benchmark for generating an intervention program especially that there was no existing program intended to resolve this predicament.

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Objectives of the Study

The study was conducted to determine the level of readiness in Mathematics of freshman students in Cluster 6 Tugbok Secondary Schools. Specifically, it aimed to answer the following questions: (1) What is the level of readiness in Mathematics of students in terms of: Whole Numbers, Fractions, Decimals, Percentage, Geometry, Measurement, and Graphs? (2) Is there a significant difference in the level of readiness in Mathematics when analyzed by sex? (3) What intervention program can be generated based on the findings?

Hypothesis

The null hypothesis was formulated and tested that there is no significant difference in the level of readiness in Mathematics when analyzed by sex.

LITERATURE REVIEW

Readiness in Mathematics

A study on investigating childrens readiness in Mathematics was conducted by Lee, Autry, Fox, and Williams (2008); Pengmanee (2016). According to their findings that children's Mathematics readiness depended not only on their demographic variables and pre-kindergarten experience, but also on their growth and development in all domains (e.g., language, social, physical, and emotional developmental domains) and their social/cultural context.

In the United States, a large number of students graduate high school unprepared for post-secondary education and ill-equipped for the labor force of the 21st century. Research on college readiness reveals the prominent role that mathematics preparedness plays in the fulfillment of hopes and dreams for a college degree. As requirements for post-secondary education and qualifications for the workforce merge, college readiness in mathematics is a significant factor in job opportunities and career choices. This calls for advancement in mathematics preparedness in the education of todays high school students (Chen, 2016; Harn, 2015; McCormick & Lucas, 2011).

Whole Numbers

This refers to numbers that are counting, natural and integers including its fundamental operations. According to Nunes (2015) that numbers have two types of meaning: a representational meaning, which refers to the use of numbers to represent quantities, and an analytical meaning, which is defined by a number system. These different meanings of number provide a foundation for the distinction between arithmetic and quantitative reasoning.

For whole numbers, number comparison tasks have found evidence of an ordered, magnitude mental representation known as the mental number line through which the magnitude of a whole number is automatically processed (Jones, 2017).

Fractions

Fraction and decimal arithmetic are crucial for later mathematics achievement and for ability to succeed in many professions. Unfortunately, these capabilities pose large difficulties for many children and adults, and students proficiency in them has shown little sign of improvement over the past three decades. Results revealed that inherent difficulties of fraction and decimal arithmetic and culturally contingent difficulties that could be reduced by improved instruction and prior knowledge of learners (Lortie-Forgues, Tian, & Siegler, 2015).

Decimals

The study of Van Hoof, Degrande, Ceulemans, Verschaffel, and Van Dooren (2018) showed that learners first develop an understanding of decimal numbers before they have an increased understanding of fractions.

Percentage

A percentage is a way of expressing a fraction of 100, or another way of writing hundredths. The ability to understand and work competently with percentages depends on the students having a sound understanding of place value, of our decimal number system and of fractions and their operations. It is important that students are given opportunities to explore, recognize, demonstrate and articulate these connections for themselves and to be able to work fluently between them (Nzmaths, 2018).

Geometry

Students experience difficulty in learning geometry because of unpleasantness and lack of depth of understanding. Eventually, it resorted to rote memorization which is not attractive to most of the students for it is time consuming and energy exhausting (Schwartz, 2008).

The study of Adolphus (2011) revealed that the problems of teaching and learning geometry are namely: the foundation of most mathematics teachers in geometry is poor; the students have poor foundation in mathematics; and the teaching and learning environment is not conducive.

Measurements

Its concepts and skills give students the ability to perform tasks related to everyday life. Length, area, volume, capacity, mass, time and temperature are measurement concepts that we are exposed to everyday. Students begin using non-standard units such as their own height and progress to using standard measurement units. Being able to recognize and use for comparison, common measurement units such as the meter or foot, allows students to use their estimation skills to help them solve problems in measurement. Measurement tools enable students to learn hands-on and develop a deeper understanding of measurement concepts (Math-Drills.com, 2018).

Graphs

Students are particularly weak in drawing inferences and predicting from data. Study reported that students had fairly well-developed skills in reading, interpreting, and predicting from graphs, and that these increased with ability level and peer level, but the students still experienced difficulty related to prior knowledge, missing data, scale, and pattern (Sharma, 2006).

According to STEM Learning (2015) that students often interpret graphs incorrectly because they do not consider the scale on each axis and may not think about the units involved. You could test this with some examples where the scale on the axes is different or the units are not what you might expect. Show familiar scientific graphs without a title, scale or axis labels and ask students what the graph could be showing. It is often helpful to students if you tell the story of the graph and relate this to the behavior of the variables.

THEORETICAL AND CONCEPTUAL FRAMEWORK

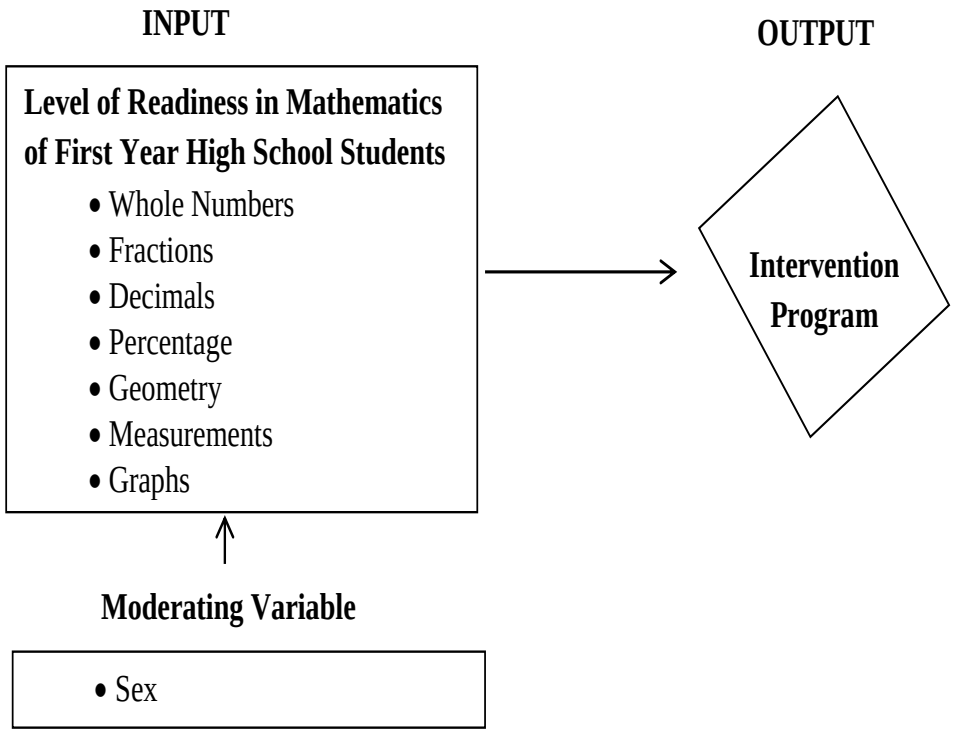

Figure 1 *Conceptual Framework of the Study*

This research was anchored on the theory of Piaget as cited by Kellough (1995) who accentuated the development of number concepts in children. He emphasized the stages of cognitive development which served as the basis in determining the factors to consider in teaching Math concepts to children and how to prepare their minds in learning Mathematics. During the sensorimotor stage (0-2 years), concepts of Mathematics were believed to develop as children grasp small and large objects, touch a variety of blocks, or move objects of different shapes around on the floor. The preoperational period, ages 2 through 7 or 8, is characterized by the development of pre-concepts whereby children can manipulate symbols or representations of physical world. Furthermore, in the concrete operations stage (7 or 8 to 11 or 12 yrs.), children continue to expand logico-mathematical thought wherein they are operational in their thinking. Besides, children in this stage are ready to think about classes, seriations, and numbers as well as they can reverse thought, complete calculations, and develop logical ideas of number weight, area and time. As a result, in the formal operations stage (11 years to adult), the children are able to consider powerful mathematics ideas or problems, make maps, and deal with problems concerning time and distance, Probability and Geometry.

RESEARCH METHODOLOGY

Quantitative method of research using descriptive statistics was employed in this study to ensure high levels of reliability of gathered data. Descriptive Statistics deals with procedures used to summarize the information contained in a set of measurements (Aidara, 2018). The means and standard deviations were computed in order to determine the level of readiness in Mathematics among freshman students. *T*-test was used to determine the significant difference between the Mathematics performance of male and female students.

Research Subject

The respondents of the study were the 327 First Year high school students in the Cluster 6 of Tugbok Secondary Schools, Tugbok, Davao City, Philippines. The number of respondents of each school is computed using the Slovins formula as shown in Table 1 below.

Table 1 *Distribution of Respondents*

Name of School*	Enrolment Data**	Number of Respondents (N)	Sex	
			Male	Female
Biao NHS	133	25	11	14
Talandang HS	67	13	7	6
Los Amigos NHS	256	48	25	23
Mintal Comprehensive HS	462	86	46	40
Tacunan HS	105	20	12	8
Tugbok NHS	167	32	18	14
Sto. Nino NHS	198	37	20	17
Optaciano Hilay NHS	69	13	7	6
Mulig NHS	33	6	4	2
Tagakpan NHS	125	24	12	12
Estipona HS	120	23	12	11
TOTAL	1735	327	174	153

Note. *Schools belonged to Cluster 6 Tugbok Secondary Schools. **Enrolment data of freshman secondary students only.

Research Instrument

Adopted validated questionnaire was administered by the researcher in the gathering of data. There were two sets of questionnaire used namely Grade 6 and Grade 4 tests adopted from the Division Achievement Test 2005 and Grade 5 test adopted from the Regional Achievement Test 2010. A written approval was granted by DepED Davao City and Region XI to utilize the said questionnaires. Further, it underwent a validation process by experts. The following scale was used:

Table 2 *Research Instruments*

Range of Mean	Descriptive Level	Meaning
90-100	Very High	It means the level of readiness in Mathematics of the freshman students is outstanding.
80-89	High	It means the level of readiness in Mathematics of the freshman students is very satisfactory.
70-79	Moderate	It means the level of readiness in Mathematics of the freshman students is satisfactory.
60-69	Low	It means the level of readiness in Mathematics of the freshman students is fair.
50-59	Very Low	It means the level of readiness in Mathematics of the freshman students is poor.

RESULTS AND DISCUSSION

The level of readiness in Mathematics of freshman students using Grade 6 Test is 57.59 (*SD* = 4.70) or very low as shown in Table 3. This means that the respondents showed a very low performance in Mathematics. The Grade 6 learning competencies like fractions, decimals, percentage, geometry and measurements are very low; however, in terms of graphs they get a mean of 77.52(*SD* = 0.66) or moderate level. Findings show that the respondents have not mastered the Grade 6 Math competencies.

Table 3 *The Level of Readiness in Mathematics of Freshman Students Using Grade 6 Test*

Indicators	Mean Score	*SD*
Whole Numbers	63.94	1.65
Fractions	52.23	1.52
Decimals	58.45	1.37
Percentage	56.53	1.01
Geometry	46.75	0.82
Measurements	50.48	1.72
Graphs	77.52	0.66
Overall Mean	57.59	4.70

The low mathematics performance of students in fractions and decimals is supported by the study of (Van Hoof et al., 2018). They emphasized that students struggle with understanding rational numbers because of natural number bias, relating to size, operations, and density. The first aspect involves the numerical size of numbers. Learners often consider a fraction as two independent numbers, instead of a ratio between the numerator and denominator. This incorrect interpretation of a fraction can lead to the misconception that the numerical value of a fraction increases when the numerator, denominator, or both increase, just like it is the case with natural numbers. For example, 1/8 can be judged larger than 1/6, just like 8 is larger than 6. Similarly, in the case of decimal numbers, some learners have been found to wrongly assume that, just like it is the case with natural numbers, longer decimals are larger, while shorter decimals are smaller. For example, these learners judge 0.12 larger than 0.8, just like 12 is larger than 8.

In addition, the data affirm with the idea of Brumbaugh (2013) who emphasized that if students are unable to convert to between fractions and decimals, and understand the relationship, they will struggle with percents. He added that it also gives a strong message on how important fractions and decimals are as readiness skills.

In the concepts of basic geometry, data mean that students showed a very poor level of readiness. This is supported in the study of (Schwartz, 2008) which revealed the findings of Pierre and Dina Van Hiele, Dutch researchers who examined the question of why so many people have difficulty learning geometry. What they found was that people

develop their knowledge and understanding of geometric concepts in a predictable sequence of levels of development. Pierre and Diana Van Hiele Model depicted the five developmental levels of geometric reasoning namely: Level 0 (Basic Level) visualization; Level 1 analysis; Level 2 informal deduction; Level 4 deduction; and Level 4 Rigor. In this study, the freshman secondary students are in Level 0 or basic level based on Van Hiele Model since the respondents have very low result in the conducted test. Also, in measurements, students level of readiness is poor which means that they have not yet mastered its concepts particularly with comprehension of surface area, volume, and meter readings. Based on the results, the students low performance in fractions, decimals, percentage, geometry and measurements shall be focused in making the intervention program.

In Table 4 below, the findings illustrate that the level of mathematical readiness using Grade 5 test is 75.11 (*SD* = 2.37) or moderate. This means that the freshman students have shown satisfactory performance in Mathematics particularly in Grade 5 test. The highest mean score obtained is in Percentage which is 90.08 (*SD* = 0.40) or very high level. Whole Numbers, Fractions and Geometry obtain a mean of 89.16 (*SD* = 0.31), 87.49 (*SD* = 0.53), 82 (*SD* = 0.93) or high level, respectively. In terms of Measurements the respondents get a mean score of 69.51 or low level. Among all indicators, Graphs is the lowest with a mean of 59.56 (*SD* = 1.00) or very low level which means poor performance in Mathematics. This implies that measurements and graphs shall be also included in the intervention plan.

Table 4 *The Level of Readiness in Mathematics of Freshman Students Using Grade 5 Test*

Indicators	*N*	Mean Score	*SD*
Whole Numbers	327	89.16	0.31
Fractions	327	87.49	0.53
Percentage	327	90.08	0.40
Geometry	327	82.00	0.93
Measurements	327	69.51	1.23
Graphs	327	59.56	1.00
Overall Mean	327	75.11	2.37

The result is congruent with (Sharma, 2006) that students are particularly weak in drawing inferences and predicting from data. A preliminary study into primary and post-primary described the students' understanding of pictographs and bar graphs. The students wanted to move quickly to manipulation of information instead of making inferences and interpretation on the presented graphs. Table 5 show that level readiness of freshman secondary students in Mathematics using Grade 4 test is 84.13 (*SD* = 2.40) or very high. It means that the students showed a very satisfactory performance in Grade 4 Mathematics. An outstanding performance is manifested in Whole Numbers and Graphs whose mean scores are 92.31 (*SD* = 0.81) and 91.87 (*SD* = 0.28) or very high level, respectively. In Decimals and Geometry, students show a high level or very satisfactory performance. On the other side, Fractions and Measurements are in moderate level which means a satisfactory performance in Grade 4 Mathematics competencies.

Table 5 *The Level of Readiness in Mathematics of Freshman Students Using Grade 4 Test*

Indicators	*N*	Mean Score	*SD*
Whole Numbers	327	92.31	0.81
Fractions	327	78.41	0.91
Decimals	327	83.97	0.90
Geometry	327	84.08	0.73
Measurements	327	73.62	1.04
Graphs	327	91.87	0.28
Overall Mean	327	84.13	2.40

Since the respondents are already in the First Year High School, it is expected that they are 100 percent ready for Mathematics in the secondary level for they have mastered the learning competencies in Grades 4 to 6. However, this study is guided with the two conditions namely: the individual passing score of students is at least 80 percent; and the total passing rate of the total sample shall be at least 95 percent. It is only in Grade 4 test that the students reached to 95 percent passing rate from the total sample tested as shown in Table 6 below. Thus, the students mathematical readiness is Grade 5 level.

Table 6 *The Level of Readiness in Mathematics of Freshman Students based on 95 Percent Passing Rate*

Mathematical Readiness of First Year Secondary Students	Achievement Score	
	Mean Score	Passing Rate
1. Using Grade 6 Test	57.59	58.00
2. Using Grade 5 Test	75.11	73.33
3. Using Grade 4 Test	84.13	95.00

Presented in Table 7 is the significance of the difference of the level of readiness in Mathematics using Grade 6 test when analyzed according to sex. As shown in Table 7 , the p-value for Whole Numbers is 0.992 or not significant, 0.000 or significant for Fractions, 0.001 or significant for Decimals, 0.000 or significant for Percentage, 0.000 or significant for Geometry, 0.099 or not significant for Measurement, 0.000 or significant for Graphs and the overall p-value is 0.010 or significant. The computed values are described significant since they are all less than 0.05 alpha level. Therefore, the null hypothesis is rejected. This means that female respondents perform better than males in Grade 6 Mathematics although their mastery level is low.

Table 7 *The Level of Readiness in Mathematics of Freshman Students Using Grade 6 Test when Analyzed by Sex*

Indicators	Sex				
	Male	Female	*t*	*df*	*p*
Whole Numbers	63.95 (1.59)	63.93 (1.71)	0.010	327	0.992*
Fractions	48.53 (1.53)	55.92(1.50)	3.961	327	0.000*
Decimals	56.22 (1.42)	60.67 (1.32)	3.218	327	0.001*
Percentage	47.82(0.95)	65.23 (1.07)	7.784	327	0.000*
Geometry	37.93(0.80)	55.5 (0.83)	3.911	327	0.000*
Measurement	52.23(1.51)	48.73 (1.93)	1.654	327	0.099*
Graphs	89.4 (0.47)	65.58 (0.85)	9.632	327	0.000*
Overall	56.24(4.43)	58.93 (4.96)	2.587	327	0.010*

Note. *= $p \leq .05$. Standard Deviations appear in the parentheses below means.

In Table 8, the obtained p-values in the test of differences are 0.195 or not significant for Whole Numbers, 0.214 or not significant for Fractions, 0.000 or significant for Percentage, 0.426 or not significant for Geometry, 0.162 or not significant for Measurement, 0.000 or significant for Graphs and 0.013 or significant for the overall p-value. Therefore, the null hypothesis is rejected. It means female freshmen perform better than males in Grade 5 Mathematics test.

Table 9 show the significance of the difference on the level of Math readiness using Grade 4 test when analyzed according to sex. The computed overall p-value is 0.016 or significant. Specifically, as tested, the students earned the following p-values namely 0.752 or not significant for Whole Numbers, 0.012 or significant for Fractions, 0.004 or significant for Decimals, 0.380 or not significant for Geometry, 0.803 or not significant for Measurement and 0.149 or not significant for Graphs. Therefore, the null hypothesis is rejected. This means that female freshmen showed more impressive performance than male students based on Grade 4 Mathematics test.

Table 8 *The Level of Readiness in Mathematics of Freshman Students Using Grade 6 Test when Analyzed by Sex*

Indicators	Sex				
	Male	Female	*t*	*df*	*p*
Whole Numbers	91.38 (0.28)	86.93 (0.34)	1.298	327	0.195*
Fractions	88.70 (0.49)	86.27 (0.57)	1.246	327	0.214*
Percentage	85.05 (0.47)	95.10 (0.32)	4.446	327	0.000*
Geometry	81.32 (0.88)	82.68 (0.97)	0.797	327	0.426*
Measurement	70.38 (1.30)	68.63 (1.16)	1.400	327	0.162*
Graphs	53.10 (0.98)	66.01 (1.02)	5.820	327	0.000*
Overall	73.93 (2.40)	76.28 (2.34)	2.505	327	0.013*

Note. *= $p \leq .05$. Standard Deviations appear in the parentheses below means.

Table 9 *The Level of Readiness in Mathematics of Freshman Students Using Grade 4 Test when Analyzed by Sex*

Indicators	Sex				
	Male	Female	*t*	*df*	*p*
Whole Numbers	92.19 (0.72)	92.43 (0.89)	0.317	327	0.752*
Fractions	77.01 (0.92)	79.81 (0.89)	2.513	327	0.012*
Percentage	82.38 (0.91)	85.55 (0.88)	2.868	327	0.004*
Geometry	83.19 (0.74)	84.97 (0.72)	0.879	327	0.380*
Measurement	73.91 (1.04)	73.33 (1.03)	0.250	327	0.803*
Graphs	89.66 (0.31)	94.08 (0.24)	1.446	327	0.149*
Overall	83.33 (2.27)	84.93 (2.53)	2.410	327	0.016*

Note. *= $p \leq .05$. Standard Deviations appear in the parentheses below means.

The data presented above in Table 7, Table 8 and Table 9 show a consistent dominance of females over male students in terms of Mathematics performance. This is supported by the study of Felson and Trudeau (1991) that highly publicized studies found that high school girls performed worse on math tests. Today, however, the perception that men and women have vastly different aptitudes in Math and Science is largely a myth. Although, in the study of Hughes and Scheuch (2011), they reported that the gender gap in college enrollments decreased; however, women still outnumber men in higher education. With regard to readiness levels, more men enter into college with higher readiness levels in Mathematics and reading than women. For writing, readiness levels for both genders appear to be similar.

SUMMARY OF FINDINGS

The findings of the study were as follows: (1) the level of readiness in Mathematics of First Year secondary students using Grade 6 test had a grand mean rating of 57.59. In using Grade 5 test, the level of readiness had a grand mean rating of 75.11. However, the level of readiness in Mathematics of freshman students using Grade 4 test had a grand mean score of 84.13; (2) there was a significant difference in the level of readiness in Mathematics students when they were grouped by sex as revealed in *t*-computed values of 2.587 for Grade 6; 2.505 for Grade 5; and 2.410 for Grade 4. All *p*-values were less than α 0.05, therefore, the null hypothesis was rejected; and (3) there was a need to make an intervention program based on the findings.

CONCLUSION

Based on the foregoing findings, the following conclusions on the level of readiness in Mathematics of freshman students are drawn: (1) the level of readiness of freshman students in Mathematics is very low for Grade 6 test, a moderate level for Grade 5 test and a high level in Grade 4 test. Thus, the freshman students were prepared for Grade 5 level; (2) there is a significant difference in the level of readiness in Mathematics of freshmen students when analyzed by

sex. It was shown that females perform better than males; and (3) the Mathematics Intervention Program is formulated for implementation.

RECOMMENDATIONS

Based on the foregoing findings and conclusions, the following recommendations are offered: (1)The proposed intervention scheme may be considered and be implemented in the public secondary schools in order to improve students readiness in learning Mathematics; (2) The Department of Education through the Education Program Supervisors in Mathematics and School Administrators may maintain monitoring the Math teachers and continue giving them with teaching guides, innovative teaching strategies, and authentic assessment tools through initiating comprehensive trainings/seminars; and (3) The Mathematics teachers who have the direct contact with the students may not take for granted or neglect those students who are slow in learning Math concepts but instead help them appreciate the significance of Math in real life.

PROPOSED INTERVENTION PROGRAM

The proposed intervention scheme is focused on the least learned competencies based from the findings of the research. In the target beneficiaries, male students are given more exercises and activities since their readiness is significantly different compared to females.

Rationale

The global concern about Mathematics performance of students is indeed a fact that cannot be denied. The low performance of students challenges the world to do something better for systems of education. Moreover, the Department of Education in the Philippines found out also the low mastery level of students in Mathematics learning competencies based on the result of the annual National Achievement Test in both elementary and secondary schools. Even in the Third International Mathematics and Science Study (TIMSS), Philippines ranked very low in the mathematical achievement of students. Besides, findings of this present study show that first year high students obtained a very low performance in Mathematics.

General Objective

The general objective of this intervention program is to improve the level of Mathematical readiness of freshman students in terms of the following least learned competencies namely: Fractions, Decimals, Percents, Geometry and Measurement.

Target Beneficiaries

The expected beneficiaries of this Mathematics Remediation Program are the students of Cluster 6 Tugbok Secondary Schools, Davao City, Philippines especially in the First Year/Grade 7 Curriculum.

REFERENCES

Adolphus, T. (2011). Problems of teaching and learning of geometry in secondary schools in Rivers State, Nigeria. *International Journal of Emerging Sciences*, *1*(2), 143–152.

Aidara, N. (2018). *Introduction to probability and statistics*. Nairobi, Kenya: African Virtual University.

Brumbaugh, D. K. (2013). *Teaching middle school mathematics*. Abingdon, UK: Routledge.

Chen, T. S. (2016). Researching college students conceptions of mathematics in calculus. *Journal of Advances in Humanities and Social Sciences*, *2*(6), 297-302. doi:https://doi.org/10.20474/jahss-2.6.1

Corbishley, J. B., & Truxaw, M. P. (2010). Mathematical readiness of entering college freshmen: An exploration of perceptions of mathematics faculty. *School Science and Mathematics*, *110*(2), 71–85. doi:https://doi.org/10.1111/j.1949-8594.2009.00011.x

DepED Advisory. (2011). *ALS accreditation and equivalency test*. Pasig City, Philippines. Retrieved from https://bit.ly/2NymG8L

DepED Press Release. (2009). *ALS accreditation and equivalency test.* Pasig City, Philippines. Retrieved from https://bit.ly/2NymG8L

Felson, R. B., & Trudeau, L. (1991). Gender differences in mathematics performance. *Social Psychology Quarterly*, *54*(2), 113–126.

Harn, P. (2015). The exploratory study on the relationships among Taiwanese college students construallevel, gratitude and intimate attachment. *International Journal of Humanities, Arts and Social Sciences*, *1*(1), 1-5. doi:https://doi.org/10.20469/ijhss.20001

Hughes, J., & Scheuch, K. (2011). *College readiness among First Time in College (FTIC) students*. Temple Terrace, FL: The Florida College System.

Jones, C. M. (2017). *Mental representations of fractions and decimals: Differences, commonalities and implications for understanding* (Tech. Rep.). Huddersfield, West Yorkshire, UK: University of Huddersfield.

Kellough, R. D. (1995). *Integrating mathematics and science for kindergarten and primary children*. Englewood Cliffs, NJ: Prentice Hall.

Lee, J., Autry, M. M., Fox, J., & Williams, C. (2008). Investigating children's mathematics readiness. *Journal of Research in Childhood Education*, *22*(3), 316–328. doi:https://doi.org/10.1080/02568540809594630

Lortie-Forgues, H., Tian, J., & Siegler, R. S. (2015). Why is learning fraction and decimal arithmetic so difficult? *Developmental Review*, *38*, 201–221. doi:https://doi.org/10.1016/j.dr.2015.07.008

Math-Drills.com. (2018). *Measurement worksheets.* Retrieved from https://bit.ly/2KT49Fm

McCormick, N. J., & Lucas, M. S. (2011). Exploring mathematics college readiness in the United States. *Current Issues in Education*, *14*(1), 1-28.

Nunes, B. P., T. (2015). The development of quantitative reasoning. In U. M. LS Liben (Ed.), *Handbook of child psychology and developmental science* (7th ed.). Hoboken, NJ: John Wiley & Sons.

Nzmaths. (2018). *Percentages.* Retrieved from https://bit.ly/2KXKNvT

Pengmanee, S. (2016). Developing students mathematical reasoning ability based on constructivist approach. *Journal of Advances in Humanities and Social Sciences*, *2*(4), 221-231. doi:https://doi.org/10.20474/jahss-2.4.3

Schwartz, J. (2008). Why do people have difficulty with geometry. Retrieved from https://bit.ly/2m03Jzd

Sharma, S. V. (2006). High school students interpreting tables and graphs: Implications for research. *International Journal of Science and Mathematics Education*, *4*(2), 241–268. doi:https://doi.org/10.1007/s10763-005-9005-8

STEM Learning. (2015). *Interpreting graphs.* Heslington, UK. Retrieved from https://bit.ly/2u6RJAr

Van Hoof, J., Degrande, T., Ceulemans, E., Verschaffel, L., & Van Dooren, W. (2018). Towards a mathematically more correct understanding of rational numbers: A longitudinal study with upper elementary school learners. *Learning and Individual Differences*, *61*, 99–108. doi:https://doi.org/10.1016/j.lindif.2017.11.010

APPENDIX

Mathematics Intervention Matrix			
1. **Key Result Area - Fraction** **Objective:** To enable the students master concepts about fractions specifically the following competencies: name/rename fractions, form equivalent fractions & solve for the missing terms, reduce to lowest terms, find the LCD of a set of fraction, and solve mentally problems involving fractions add, subtract, multiply, divide all types of fractions solve word problems involving operation of fractions			
Strategies	Success Indicators	Time Frame	Estimated Budget
Manipulative/ Laboratory Approach Exposition Games and Drills Problem Solving *Practices/exercises before, during or after the lesson proper.	Improved formative test results Increased summative results Checked worksheets	June 2018	P2,000 for materials and supplies, printing expenses Source of Funds: School/PTA
2. **Key Result Area - Decimals** **Objective:** To enable the students master concepts about decimals specifically the following: name a decimal, use different models to show a given decimal (region/blocks, money, number line), rename fractions into decimal form and vice-versa, read and write decimals through ten thousandths, compare and order decimals, round-off decimals, add, subtract, multiply and divide decimals and solve word problems applying operation of decimals			
Strategies	Success Indicators	Time Frame	Estimated Budget
Manipulative/Laboratory Approach Drills & Exposition Problem Solving *Practices/exercises before, during or after the lesson proper.	Improved formative test results Increased summative results Checked worksheets	July 2018	P2,000 for materials and supplies , printing expenses Source of Funds: School/PTA
3. Key Result Area - Percent **Objective:** To enable the students master concepts about percent specifically the following: gives the meaning of the elements used in solving percentage problems, determine the percentage rate and base in a given problem, apply percent, solve three types of percentage problems, solve word problems involving finding the percentage/rate/base e.g. discounts, original price, commissions, etc.			

Mathematics Intervention Matrix			
Strategies	Success Indicators	Time Frame	Estimated Budget
Exposition Cooperative Learning Drills Problem Solving *Practices/exercises before, during or after the lesson proper.	Improved formative test results Increased summative results Checked worksheets	August 2018	P2,000 for materials and supplies, printing expenses Source of Funds: School/PTA
4. Key Result Area - Geometry **Objective:** To enable the students master concepts about basic geometry specifically the following: draw plane figures, draw different kinds of angles, draw 3- to 4-sides polygons, visualize, identify and describe polygons, draw 5- or more-sided polygons, draw different spatial figures, visualize the different spatial figures, cube, rectangular prism, cylinder, sphere, pyramid, cone and the like, and describes the different spatial figures			
Strategies	Success Indicators	Time Frame	Estimated Budget
Drawing, Analogy, & ICT Integration Experiential Learning *Practices/exercises before, during or after the lesson proper.	Improved formative test results Increased summative results Checked worksheets	September 2018	P2,000 for materials and supplies , printing expenses Source of Funds: School/PTA
5. Key Result Area - Measurements **Objective:** To enable the students master concepts about measurements specifically the following: find the area of other plane figures, find circumference of a circle & solve word problems, find the volume of a cube/rectangular prism, give body/weather temperature using degree Celcius, find surface area of solids, read and interpret readings from electric and water meters			
Strategies	Success Indicators	Time Frame	Estimated Budget
Problem Solving Experiential Learning Cooperative Learning Discovery Approach *Practices/exercises before, during or after the lesson proper.	Improved formative test results Increased summative results Checked worksheets	October 2018	P2,000 for materials and supplies, printing expenses Source of Funds: School/PTA

6. Key Result Area - Graphs*			
Objective: To enable the students master concepts about graphs specifically the following: read/interpret data presented in a line graph, read a line graph, construct a line graph, organize data presented in a line graph and find the average of data presented in a line graph			
Strategies	Success Indicators	Time Frame	Estimated Budget
Sketching/Graphing Project Internet Tutorial Laboratory Approach *Practices/exercises before, during or after the lesson proper.	Improved formative test results Increased summative results Checked worksheets	December 2018	P2,000 for materials and supplies, printing expenses Source of Funds: School/PTA

*Graphs in Grade 5 Test obtained a very low mean rating.