Ready or Not Ready: Extent of Readiness in Mathematics of Grade 7 Students

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Abstract: This study aimed to find out the level of mathematics readiness of Grade 7 students in Tairan National High School. The Mathematics Readiness Assessment (MRA) measured the Grade 6 mathematics competencies of the students in terms of whole numbers, fractions, decimals, percentages, geometry, measurements, and graphs. It made use of descriptive research design to describe the extent of readiness in mathematics through the mean, standard deviation, and Mean Percentage Scores (MPS). Only Fifty (50) out of 116 students were conveniently chosen to be the respondents of this study. The MRA results show that the Grade 7 students are not ready with an overall Mean Percentage Score of 29.85, indicating that students have low mastery in Mathematics. Moreover, a welch t-test results revealed that there is no significant difference in the mathematics readiness of male and female students. The researchers, then, recommend that concerned authorities must take immediate action and design interventions to address the learning needs of the students.

Keywords— Achievement, Mathematics Readiness, Mean Percentage Score

1. INTRODUCTION

Mathematics is an integral part of our daily life. The core skills that students need to master, which is the twin goal of the K-to-12 Curriculum, include critical thinking and problem solving (DepEd, 2016). One should acquire the skills needed in order for them to surpass 21st-century challenges. However, many students are struggling in understanding concepts which leads to lesser appreciation of mathematics.

Mathematics readiness needs to be accurately assessed and "identify students at risk of developing low math skills" at the beginning of the elementary year (Mejias et al., 2019). Mathematics readiness is "level of preparation a student needs in order to enroll and succeed – without remediation" (Conley, 2007). It is usually measured through the placement test, nationally standardized test, and other international mathematics assessments.

Philippines ranked 2nd from the bottom in science and mathematics among the participating countries in the Program for International Students Assessment (PISA) 2018 (DepEd, 2019). It is also reported that "only 1 out of 5 Filipino students or approximately 19.7% attained at least the minimum proficiency level (Level 2) in Mathematics Literacy" (DepEd, 2019).

The "mathematics achievement of the students is very low" (DepEd Press Released, 2009). Grade 7 students struggle in Mathematics lessons in terms of fractions, decimals, percentages, geometry, measurement, and graphs (Galabo, 2018). Galabo (2018) pointed out that "the Grade 7 students are prepared for Grade 5 level and when it is analyzed by sex it was established that female students were more prepared than male students."

The COVID-19 pandemic posed greater challenges in education. Evidences of learning loss are filling up showing how the pandemic broadens the line of education inequality across the globe (UNICEF, 2022). Most of the schools in the country adopted Modular Distance Learning (MDL) as an alternative modality in delivering quality education amidst the pandemic. However, UNICEF reports revealed that distance learning is less effective and calls for immediate reopening of the classes to recover the learning loss incurred during the pandemic.

A group of researchers from Azim Premji University (2021) reported that "82% of children on an average have lost at least one specific mathematical ability from the previous year which include identifying single and two digit numbers, performing arithmetic operations, using basic arithmetic operations for solving problems and describing 2D/3D shapes as well as reading and drawing inferences from data".

This school year, the Grade 7 students were exposed to Modular Distance Learning when they were in elementary. These group of learners are definitely affected by the learning loss in mathematics which also affects their mathematics readiness for secondary mathematics. Elementary students moving in to secondary level should be assessed to monitor who need intervention and to help school administrator and mathematics teachers design programs that will address learning loss in mathematics.

With diminishing Mathematics Literacy in the country, this study will help to address and assess the level of mastery in Mathematics among Grade 7 students of Tairan National High School. This study will evaluate the Grade 7 level of Mathematics performances, mastery of Basic Mathematics Operation, Mathematics formulas, Equation Analysis.

2. STATEMENT OF THE PROBLEM

This study aims to identify the least mastered competencies and basis for intervention especially in Mathematics subjects of Grade 7 students in Tairan National High School.

Specifically, it aims to answer the following questions:

1. Determine the extent of readiness in Mathematics of Grade 7 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. METHODOLOGY

3.1 RESEARCH DESIGN

In this study, a descriptive research design was used to describe the extent of mathematics readiness of the Grade 7 students (Koh & Owen, 2000; Conjointly, n.d.). The achievement or mastery level per indicator was computed through the Mean Percentage Score (MPS). In addition, Welch T-test was used to evaluate if there is a mean difference in the mathematics readiness of male and female students.

3.2 Participants

The respondents of the study were the Grade 7 students of Tairan National High School in this school year 2021-2022. Fifty (50) out 116 Grade 7 students were conveniently chosen to be the respondents for this study. There were 24 females and 26 males.

3.3 Research Instrument

Mathematics Readiness Assessment (MRA) is a 40-item researcher-made multiple choice assessment with four (4) options aligned with the Most Essential Learning Competencies (MELC) prescribed by the Department of Education (DepEd) for Mathematics 6. MRA had been used to measure students' mathematical achievement and level of readiness on the topic under Whole numbers, Fractions, Decimals, Percentage, Geometry, Measurements, and Graphs.

The MRA was carefully validated by mathematics teachers from Tairan National High School and was pilot tested to 15 non-participant students. It was found that the MRA was sufficiently reliable with a Cronbach's Alpha coefficient of .70 (Institute for Digital Research and Education Statistical Consulting, 2020). Also, the deletion of test items does not increase the reliability of the test. Meanwhile, the difficulty index of the MRA was .263, indicating that the assessment is classified as average.

3.4 Data Gathering Procedure

Before the conduct of the study, the validity and reliability of the instrument were measured and pertinent documents were secured such as the informed consent for the respondents, permission to conduct the study from the School Head, and the endorsement letter from the school head.

During this study, the MRA was administered to the respondents to determine the extent of readiness in mathematics. This study used questionnaire as a method of survey research to collect the data from the chosen respondents. The data was collected from fifty (50) Grade 7 students of Tairan National High School.

After the assessment, the data were summarized and analyzed using the appropriate statistical treatment.

3.5 Data Analysis

The researchers computed the achievement or mastery level per indicator through the Mean Percentage Scores (MPS). Based from the DepEd Memorandum No. 160, series of 2012, the MPS per indicator can be calculated by dividing the computed mean scores of the MRA by the total number of items multiplied by 100. The Mean Percentage Scores were interpreted using the descriptive ratings below (Herrera Jr & Dio, 2016).

MPS %	DESCRIPTORS	REMARKS
96-100	Mastered	Ready
86-95	Closely Approximating Mastery	Ready
66-85	Moving Towards Mastery	Moderately Ready
35-65	Average Near Mastery	Moderately Ready
15-34	Low Mastery	Not Ready
5-14	Very Low Mastery	Not Ready
0-4	Absolutely No Mastery	Not Ready

The Mathematics Readiness Assessment (MRA) results were analyzed and interpreted using R Statistical Package, an open software. The researchers performed a Shapiro-Wilk test for normality. The Shapiro-Wilk test results showed no significant departure from normality were found; $W(26) = 0.95916$, $p = .3754$ for MRA scores of male students and $W(24) = 0.97461$, $p = .7798$ for MRA scores of female students. Hence, a parametric test was used. Moreover, the researchers checked the homogeneity of the data and the Levene's test results indicated that the homogeneity of variances assumption was not met for this variable. Hence, the Welch t-test was used to find out if there is a significant difference in the level of readiness in Mathematics when analyzed by sex in terms of the Grade 6 Mathematics competencies.

4. RESULTS AND DISCUSSIONS

4.1 Level of Readiness in Mathematics of Grade 7 Students using MRA

To determine the extent of Mathematics readiness of students in terms of the Grade 6 mathematics competencies, the Mean Percentage Scores (MPS) per indicator were

calculated. Table 1 shows the MPS results per indicator and the level of readiness in mathematics.

Table 1. Mathematics Readiness of Grade 7 Students per Indicator

Indicators	MPS %	Interpretation
Whole Numbers	25.2	Not Ready
Fractions	26.5	Not Ready
Percentage	34.5	Moderately Ready
Decimals	25.2	Not Ready
Geometry	38	Moderately Ready
Measurement	22.8	Not Ready
Graphs	41.6	Moderately Ready
Overall Mean	**29.85**	**Not Ready**

As shown in Table 1, the Mean Percentage Scores (MPS) per indicator were relatively low for Whole Numbers, Fractions, Decimals, and Measurement. This indicate that the Grade 7 students have not mastered the said learning competencies. On the other hand, the students demonstrated average near mastery of the Grade 6 mathematics learning competencies in terms of Percentage, Geometry, and Graphs. This means that the students are moderately ready for these learning competencies. However, the overall MPS of the Mathematics Readiness Assessment (MRA) revealed that the students have not mastered the Grade 6 Mathematics competencies. These findings corroborate the previous observation of Galabo (2018) that the Grade 7 students are not ready for secondary mathematics.

The Grade 7 students demonstrated low mastery of the competencies that involved order of operations with whole numbers. The students have misconceptions in evaluating whole numbers with PEMDAS (Parentheses, Exponents, Multiplication, Division, Addition, Subtraction). This concept is essential for secondary mathematics particularly in evaluating multi-operational expressions, equations, and functions. This result is supported by the study of Quintanilla (2013), Joseph (2014) and Maxwell (2020).

In addition, Fractions and decimals remained to be the least mastered competencies among students (Lyons, 2013; Lortie-Forgues, Tian, & Siegler, 2015 & 2017; Hoof et al.,

2018). Most of the students struggled to convert fractions to decimals and perform basic operations, and solve problems involving fractions and decimals.

Students also demonstrated low mastery of the learning competencies in terms of measurement. Students struggled in converting time, temperature, and length in metric system. The same findings were found by Drake (2014) that students have difficulty understanding measurement.

On the other hand, students were moderately ready for Grade 6 mathematics competencies in terms of Percentages, Geometry, and Graphs. However, the MPS were still below the threshold which indicate average near mastery of the competencies. Based on this findings, the students' low performance in Whole numbers, Fractions, Percentages, Decimals, Measurement, Geometry, and Graphs shall be the focused in the mathematics intervention program of the school to address the least mastered competencies of Grade 7 students.

4.2 Level of Mathematics of Grade 7 Students using MRA when analyzed by Sex

To determine if determine there is a significance difference in the level of readiness in Mathematics when analyzed by sex, a Welch t-test was used. Table 2 presents the results of the Welch t-test statistics per indicator by sex. The Cohen's d values are also reported to quantify the magnitude of difference in the performance of male and female students using MRA.

As shown in Table 2, the p-values for Whole Numbers, Fractions, Percentage, Geometry, and Graphs were not significant. This means that there is no significant difference in the level of mathematics readiness in terms of these competencies when analyzed by sex. In terms of Decimals, the results indicate that female students performed better than male students; $t(37.18) = -2.05$, $p = .047$. The effect size for this analysis ($d = 0.59$) was found to exceed Cohen's (1988) convention for a medium effect ($d = .50$). In terms of Measurement, the p-value of .004 indicate that the male students performed better than the female students. This effect size difference was found to be large ($d = 0.84$). However, there was no significant difference in the overall MRA results when compared by sex. These results do not agree with the findings of Galabo (2018) that "female students performed better than male students" in Grade 6 mathematics.

Table 2. Level of Readiness in Mathematics of Grade 7 Students using MRA when analyzed by Sex

Indicators	Male		Female		df	t	p	Cohen's d
	M	SD	M	SD				
Whole Numbers	1.27	0.78	1.25	1.03	42.65	0.07	.941	0.02
Fractions	2.88	1.48	2.96	1.00	44.12	-0.21	.836	0.06
Percentage	1.46	1.17	1.29	.075	42.90	0.61	.542	0.17
Decimals	0.96	0.77	1.58	1.28	37.18	-2.05	.047*	0.59
Geometry	1.85	0.92	1.96	1.20	43.25	-0.37	.714	0.11
Measurement	1.46	0.95	0.79	0.59	42.22	3.03	.004*	0.84
Graphs	2.15	1.26	2.00	1.22	47.88	0.44	.662	0.12
Overall	12.04	3.63	11.83	2.71	46.09	0.23	.821	0.06

Note. Welch test is reported because Levene's test indicated that the homogeneity of variances assumption was not met for this variable. *Significant at $p < .05$ (two-tailed).

5. CONCLUSIONS

Based on the findings, the following conclusions were drawn:

1. Students demonstrated low mastery of the Grade 6 Mathematics competencies. Hence, students are not ready for secondary mathematics. Furthermore, all the indicators should be the focused of the intervention to help students mastered the least mastered competencies.

2. There is no significant difference in the level of mathematics readiness of male and female students.

6. RECOMMENDATIONS

This study revealed the students have low mastery of the Grade 6 mathematics competencies and are not ready for high school mathematics. Hence, the following recommendations are hereby presented:

1. Mathematics teachers should plan intervention programs to address the least mastered competencies and learning loss in mathematics;

2. The Ministry of Basic, Higher, and Technical Education (MBHTE) through Mathematics Supervisor and School Heads should monitor and give technical assistance to mathematics teachers through seminars/trainings to help them plan programs to improve the mathematics achievement of the students.

3. The researchers further recommend that the same study to be replicated and expand the assessment of mathematics readiness of the Grade 7 students across the Division.

7. ACKNOWLEDGMENT

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