
PUPILS' MATHEMATICAL READINESS AND PERFORMANCE IN COASTAL ELEMENTARY SCHOOLS

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ABSTRACT

To determine the mathematical readiness and performance of the pupils in the coastal elementary schools in the District of Batad, Iloilo. The study employed a descriptive-correlational research design. The respondents in the survey were Grade VI pupils in the coastal elementary schools of the District of Batad, selected through stratified random sampling. The pupils' mathematical readiness and performance were the dependent variables, while sex and school were the independent variables. The statistical tools employed were Cronbach's alpha, frequency counts and percentages, mean, standard deviation, t-test, one-way ANOVA, and Pearson's r; the significance level was set at 0.05. The results showed that respondents had low levels of both readiness and performance in Mathematics. A significant difference in respondents' performance in Mathematics was observed when grouped by sex; however, when grouped by school, no significant difference was observed. No significant difference was also observed in the level of readiness when classified by sex and school. Furthermore, a substantial relationship between respondents' mathematical readiness and performance was observed.

Keywords — *Pupils, Mathematical Readiness, Mathematical Performance, Coastal Elementary Schools*

I. INTRODUCTION

Mathematics in society is seen as the foundation of scientific ideas, which is very important in the nation's social-economic development ^[1]. Because of this, mathematics is seen as one of the essential subjects in the academe, and students need to understand its underlying concepts not just to excel academically but also in life.

Mathematics in Asian schools is considered one of the most critical subjects, and students are encouraged to study it ^[2]. In the Philippines, mathematics is a general education subject in both primary and higher education, where students are expected to learn and appreciate its principles by applying problem-solving, critical thinking, and reasoning skills to navigate many career fields and make life decisions ^[3]. Moreover, despite the significant role of mathematics in society and its critical position in the school curriculum, most students still find it challenging to understand and apply its ideas in real-life scenarios ^[4, 5]. Hence, the importance of teaching the basics of mathematics at the early stages of primary and secondary education must be effectively addressed so students can better engage in mathematical activities and support advanced learning.

Learners' school readiness is considered one of the factors contributing to the success of their academic endeavors ^[6]. Consequently, it is highly relevant to evaluate learners' early math skills, or mathematical school readiness, especially

during the elementary years, to appropriately strategize interventions to fill gaps in their learning ^[7,8]. Many studies have shown that even many high school graduates, especially those from ethnic minorities, were not academically prepared for college-level mathematics courses ^[9]. Because of this, mathematical readiness plays an essential role in students' mathematical performance.

The difficulty in learning math can begin before students enter school, often due to a lack of mathematics enrichment in their home environment ^[10]. To enhance academic performance and quality, the school-home-community partnership must be strengthened. This is important because learning facilitation should not occur only in the classroom but also outside, where their skills' value is expected to be measured ^[11].

The ultimate purpose of school lies in the success and achievement of its learners. Therefore, efforts must be made to improve achievement for every learner [12] continuously. The Valerio P. Palmares National High School (VPPNHS), upon its founding, strives to achieve excellence. Now, upon the implementation of the K-12 Curriculum in VPPNHS, many pedagogical adjustments are to be commenced. It has to look for any potential problems that may hinder its academic performance and provide immediate solutions or mitigations to produce quality graduates who are ready for “Trabaho”, “Negosyo”, and “Kolehiyo”.

VPPNHS, as one of the adopted Schools of Northern Iloilo State University (Batad Campus), is geographically situated in a coastal area of Brgy. Tanao, Batad, Iloilo. This serves as the receiving school for graduates from nearby coastal elementary schools, as reflected in its enrolment data from its establishment to the present. Relevantly, its future academic achievement depends on the quality of graduates these coastal elementary schools will produce.

As observed by the researcher, the teachers at this receiving school find it difficult to address students' performance, especially in Mathematics. Only countable graduates from coastal elementary schools perform well in their Mathematics subject. This is now the main problem of the mathematics teachers in the said school. Also, one concern for mathematics teachers is the low mean percentage score (MPS) of students in mathematics. As shown in the previous National Achievement Test (NAT) from S. Y. 2013- 2014 and S. Y. 2014- 2015, the mathematics mean percentage score (MPS) of students was 45.57% and 56.43%, respectively, which signifies a low proficiency level in Mathematics and were very far from the passing standard MPS given by the Division of Iloilo.

To address this problem, the Department of Education initiated the “Sulong Edukalidad” program to provide quality basic education ^[13]. Despite the efforts of the government and various researchers to properly determine the causes of students' poor performance in mathematics and address the gap, low performance in mathematics remains evident. According to ^[14], the performance of Filipino learners in mathematics needs to be improved, as reflected in the 2016-2017 Global Competitiveness Report, where the Philippines ranked 79th out of 138 countries in terms of the quality of science and math education. This report was consistent with the results of the Department of Education (DepEd) National Achievement Test (NAT), in which the mean percentage score (MPS) of high school students was below the DepEd requirement of 50%. Moreover, in the 2019 Trends in International Mathematics and Science Study (TIMSS) results, the Philippines ranked last among the 58 participating countries in Grade 4 math and science. Filipino learners fall behind their neighboring countries, such as South Korea, Hong Kong, Singapore, Japan, and Chinese Taipei, in mathematics performance ^[15].

Learners' poor mathematical performance is evident not only in the Philippines but also in other Asian countries and other parts of the world ^[3]. In Indonesia, the 2012 PISA results showed that learners achieved very low scores in

math and were ranked second-to-last among the 65 participating countries ^[16]. To address this problem, it is essential to evaluate its status at the school level ^[17]. It is necessary to assess students' mathematical performance and readiness to address this emerging problem.

This study investigated the readiness of Grade VI pupils to learn the Mathematics curriculum in coastal elementary schools. This variable was found to have a significant impact on pupils' mathematical performance. It was believed that if pupils were ready to learn the curriculum, it signifies high academic performance ^[18].

The researcher undertook this study to determine the level of readiness and performance in Mathematics of pupils in coastal elementary schools of the district of Batad, Iloilo.

II. METHODOLOGY

Research Design

This study employed a descriptive-correlational research design to determine the level of pupils' Mathematical readiness and performance in coastal elementary schools in the District of Batad, Iloilo.

Locale and Respondents of the Study

This study was conducted in the three coastal elementary schools of the District of Batad, Iloilo. The respondents in the survey were Grade VI pupils in the coastal elementary schools of the District of Batad, Iloilo. They were selected through stratified random sampling.

Table 1 shows the distribution of respondents according to certain variables.

Table 1. Distribution of Respondents According to Variables

Categories	F	%
A. Entire Group	137	100
B. Sex		
Male	72	52.6
Female	65	47.4
C. School		
Coastal Elementary School A	63	46.0
Coastal Elementary School B	38	27.7
Coastal Elementary School C	36	26.3

Research Instrument

Varied data instruments were used in this study to gather valid and reliable quantitative data. One of these was the researcher-made test, which was used to determine the level of readiness in Mathematics of pupils. The test consisted of two parts: Part I, the pupils' profile, which included the name, sex, school name, and average grade of respondents; and Part II, the Mathematics test. The Mathematics test had 24 items, with four choices per item. The lessons involved in the test were taken from first and second quarter lessons in Grade VI such as: 1.) four fundamental operations on fractions and decimals, 2.) reducing fraction into its lowest term, 3.) changing mixed fractions to improper fractions and vice versa, 4.) problem solving involving fractions and decimals, 5.) place value of numbers in decimal form, 6.) arranging decimals from least to most significant and vice versa, 7.) order of operations on integers, 8.) ratio and proportion, 9.) percent, 10.) problem solving on percent problems (discounts, original price, rate of discount, sale price, and marked-up price), and 11.) basic operations on integers. Also, the pupils' performance in Mathematics was based on their average grade for the first and second grading periods.

The test was submitted for reliability testing using Cronbach's alpha to determine its reliability. It was administered once to 36 Grade VI pupils at Embarcadero Elementary School, a coastal elementary school, who were not the study's respondents. The result was an alpha of 0.837, indicating a high correlation.

Statistical Techniques

The data obtained from the study were subjected to descriptive and inferential analyses. Chronbach's alpha was used to determine the reliability of the test questionnaire; frequency count and percentage were used in analyzing the distribution of respondents; mean was used in determining the pupils' mathematical readiness and performance level; and standard deviation was used to assess the spread of data from the mean on the level of performance and readiness of pupils in mathematics.

Furthermore, t-test was used to determine the significant differences on the pupils' performance and readiness in mathematics when classified according to sex; one-way ANOVA was used to determine the significant difference on the pupils' performance and readiness in mathematics when classified according to school; and the Pearson product moment coefficient (Pearson r) was used to determine the relationship between the Mathematical readiness of pupils and performance in mathematics. All inferential statistical analyses were set at 0.05 level of significance.

III. RESULTS AND DISCUSSION

Level of Readiness in Mathematics of the Respondents

Table 2 shows the respondents' level of readiness in Mathematics.

Table 2. Level of Pupils' Mathematical Readiness When Taken as a Whole and When Classified by Sex and School

Categories	Mean	SD	Description
A. Entire Group	10.19	3.75	Low
B. Sex			
Male	9.64	3.81	Low
Female	10.80	3.62	Low
C. School			
Coastal Elementary School A	10.24	3.38	Low
Coastal Elementary School B	9.84	4.76	Low
Coastal Elementary School C	10.47	3.23	Low

The level of pupils' mathematical readiness in coastal elementary schools of the district of Batad was determined using the mean. When respondents were taken as a whole, they showed a low level of readiness ($M = 10.19$, $SD = 3.75$). When the respondents were classified by sex, both males ($M = 9.64$, $SD = 3.81$) and females ($M = 10.80$, $SD = 3.62$) exhibited a low level of readiness. When the respondents were classified by school, those from Coastal Elementary School A ($M = 10.24$, $SD = 3.38$), Coastal Elementary School B ($M = 9.84$, $SD = 4.76$), and Coastal Elementary School C ($M = 10.47$, $SD = 3.23$) all exhibited a low level of readiness. They were homogeneously grouped in terms of preparedness when taken as a whole and when classified by sex and school, with standard deviation ranges of 3.23 to 4.76. These results contradicted the research findings, which revealed a high level of readiness in mathematics among elementary pupils in upland schools ^[19].

Moreover, the teachers' perceived reasons for students' non-readiness in mathematics were as follows: anxiety and a negative attitude towards the subject, and a weak foundation in basic mathematics. It was also found out that heavy teaching workloads and limited professional growth of teachers, inadequate and poor quality of learning materials and facilities, disruption of classes, lack of parents' involvement in the education of their children, disadvantages of spiral progression and the "No Child Left Behind Act", and numerous competencies in the mathematics curriculum were some of the contributing factors to the non-readiness of the learners in mathematics ^[20].

Level of Performance in Mathematics of the Respondents

Table 3 shows the respondents' performance levels in Mathematics.

Table 3. Level of Pupils' Mathematical Performance When Taken as a Whole and When Classified Into Sex and School

Categories	Mean	SD	Description
A. Entire Group	81.70	3.69	Low
B. Sex			
Male	80.65	3.34	Low
Female	82.87	3.73	Low
C. School			
Coastal Elementary School A	82.34	3.30	Low
Coastal Elementary School B	81.29	4.38	Low
Coastal Elementary School C	81.03	3.45	Low

The level of pupils' mathematical performance in the district of Batad's coastal elementary schools was determined using the mean. When the respondents were taken as a whole, they showed a low level of performance ($M = 81.70$, $SD = 3.69$). When the respondents were classified by sex, both males ($M = 80.65$, $SD = 3.34$) and females ($M = 82.87$, $SD = 3.73$) exhibited a low level of performance. When the respondents were classified by school, those from Coastal Elementary School A ($M = 82.34$, $SD = 3.30$), Coastal Elementary School B ($M = 81.29$, $SD = 4.38$), and Coastal Elementary School C ($M = 81.03$, $SD = 3.45$) all exhibited a low level of performance. They were homogeneously grouped in terms of performance when taken as a whole and when classified by sex and school, with standard deviation ranges of 3.30 to 4.38. This finding supported the result of the 2018 Programme for International Student Assessment (PISA) of the Organization for Economic Co-operation and Development (OECD), which revealed that the Philippines ranked second to the last in mathematics and in science among the 79 participating countries wherein they only got a mean score of 353 which is lower than the OECD mean score of 489 ^[21].

According to this result, the Mathematics subject appeared to be one of the challenging, if not tricky, subjects in school, as perceived by the learners ^[22, 23]. Because of this impression, most learners had fears about learning the subject ^[24].

Difference in the Level of Readiness in Mathematics of the Respondents

Table 4 shows the difference in the level of readiness in mathematics of the respondents when classified into sex.

Table 4. Difference in the Level of Pupils' Mathematical Readiness in Coastal Elementary Schools of the District of Batad When Classified Into Sex

Compared Group	Mean	t	df	P	Eta squared
A. Sex					
Male	9.64	-1.82	135	0.07	0.02
Female	10.80				

The difference in the level of pupils' mathematical readiness in coastal elementary schools of the district of Batad when classified into sex was determined using the independent-samples t-test. The result showed no significant difference in the level of readiness for males (M= 9.64, SD= 3.81) and females (M= 10.80, SD= 3.62); $t(135) = -1.82, p = 0.07$, (two-tailed). The magnitude of the differences in the means (mean difference= -1.16, 95% CI: -2.42 to 0.10) was small (eta squared= 0.02). This result contradicted to the findings of the study which revealed that male pupils have different level of readiness when compared to female pupils ^[19]. The result implied that pupils, regardless of their sex, did not differ on their level of readiness in Mathematics.

Table 5 shows the difference in the level of readiness in mathematics of the respondents when classified into school.

Table 5. Difference in the Level of Pupils' Mathematical Readiness in Coastal Elementary Schools of the District of Batad When Classified Into School

		df	F	P	Eta squared
Mathematics Readiness	Between Group	2	0.27	0.77	0.00
	Within Group	134			
	Total	136			

One-way ANOVA was used to determine whether a significant difference existed in the level of readiness in Mathematics among pupils of coastal elementary schools in the district of Batad, when classified by school. Respondents were divided into three groups according to school (Group 1: Coastal Elementary School A; Group 2: Coastal Elementary School B; Group 3: Coastal Elementary School C). The result showed no statistically significant difference at the $p < 0.05$ level in level of readiness for the three school groups: $F(2, 134) = 0.27, p = 0.77$. The actual difference in mean scores between groups was minimal. The effect size, calculated as eta squared, was 0.00. This result implied that pupils did not differ in their level of readiness regardless of the school they attended.

Difference in the Level of Performance in Mathematics of the Respondents

Table 6 shows the difference in the level of performance in mathematics of the respondents when classified into sex.

Table 6. Difference in the Level of Pupils' Mathematical Performance in Coastal Elementary Schools of the District of Batad When Classified Into Sex

Compared Group	Mean	t	df	P	Eta squared
A. Sex					
Male	80.65	-3.67*	135	0.00	0.09
Female	82.87				

* - significant at 0.05 alpha level

The independent-samples t-test was conducted to compare the level of pupils' mathematical performance in coastal elementary schools of the district of Batad when classified to sex. There was a statistically significant difference in the level of performance for males (M= 80.65, SD= 3.34) and females (M= 82.87, SD= 3.73); $t(135) = -3.67$, $p = 0.00$, (two-tailed). The magnitude of the differences in the means (mean difference -2.22, 95%CI: -3.41 to -1.02) was medium (eta squared 0.09).

The results showed that female pupils (M= 82.87, SD= 3.73) performed better than male pupils (M= 80.65, SD= 3.34) in the mathematics subject. This result contradicts the findings of [25], which showed that boys perform better in mathematics than girls. However, this result supported a study on self-concept and academic performance in math among Russian high school students, which revealed a significant difference in mathematics achievement, with girls achieving higher grades than boys [26].

Table 7 shows the difference in the level of performance in mathematics of the respondents when classified into school.

Table 7. Difference in the Level of Pupils' Mathematical Performance in Coastal Elementary Schools of the District of Batad When Classified Into School

		Df	F	p	Eta squared
Mathematics Performance	Between Group	2	1.807	0.17	0.03
	Within Group	134			
	Total	136			

One-way ANOVA was used to determine whether there was a significant difference in the level of mathematical performance of pupils in the coastal elementary schools in the district of Batad, grouped by school. Respondents were divided into three clusters based on their school (Group 1: Coastal Elementary School A; Group 2: Coastal Elementary School B; Group 3: Coastal Elementary School C). The result showed there was no statistically significant difference at

the $p < 0.05$ level in the level of performance for the three school groups: $F(2, 134) = 1.81$, $p = 0.17$. The actual difference in mean scores between groups was slight. The effect size, calculated as eta squared, was 0.03.

Relationship between Mathematical Readiness and Performance of the Respondents

Table 8 shows the relationship between mathematical readiness and respondents' performance.

Table 8. Relationships between Mathematical Readiness and Performance of Pupils of Coastal Elementary Schools in the District of Batad

	Mathematics Performance
Mathematics Readiness r	0.56**
P	0.00

** Correlation is significant at the 0.01 level (2-tailed)

The relationship between Mathematics readiness and Mathematics performance of pupils in coastal elementary schools in the district of Batad was determined using Pearson's r . Preliminary analyses were performed to ensure that the assumptions of normality, linearity, and homoscedasticity were not violated. There was a moderate, positive correlation between the two variables, $r = 0.56$, $n = 137$, $p = 0.00$, with a high level of mathematics readiness associated with a high level of Mathematics performance. This revealed that the pupils' readiness level influenced their mathematics performance.

This result contradicted the research findings, which indicated that no significant relationship existed between pupils' performance in Mathematics and their readiness level for learning the curriculum in the District of Tapaz West, Division of Capiz [19].

IV. CONCLUSIONS

Low levels of mathematical readiness and performance were observed when respondents were considered as a whole and when classified by sex and school. Lack of learning strategies and self-efficacy, lack of effort and prerequisite knowledge, reluctance to seek help from others, inattention during class, and lack of motivation were among the significant reasons why mathematics is a complex subject for some students [27]. Also, instructional enhancements, along with content, innovative teaching strategies, interactive instructional materials, and authentic assessment, were seen as necessary to improve learners' readiness in the mathematics subject [20].

The sex and school of the pupils did not differ significantly in their level of readiness in Mathematics. This implied that, regardless of sex and school, the Grade VI pupils of the coastal elementary schools in the district of Batad, Iloilo, did not differ in their level of readiness in Mathematics.

The sex of the pupils had a significant effect on the level of performance in Mathematics, while the school did not. Sex of the pupils played a substantial role in mental development, as males have different interests in the Mathematics subject compared to females, and vice versa ^[28].

Mathematics readiness and Mathematics performance of the pupils were significantly related to each other. Readiness in Mathematics influences pupils' performance in Mathematics. This means that the higher the pupils' preparedness, the higher their performance in Mathematics, and vice versa.

Based on the study's findings, a remediation program was proposed to enhance students' readiness and performance in mathematics. Training programs for teachers should also be conducted. Since pupils from coastal elementary schools in the district of Batad, Iloilo, were not yet ready to learn Mathematics, teaching approaches and styles of teachers may be improved. Teaching strategies and appropriate motivation or encouragement from teachers and parents are also essential to enhance pupils' readiness in the subject. Determining pupils' learning readiness and performance is significant for providing them with appropriate and practical learning activities. Mathematics instruction may be guided by the principles of gender and development to ensure that the achievement levels of both males and females in Mathematics are maintained. The schools should also examine the curriculum and programs to determine whether students' performance in Mathematics has improved.

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