Gender Differences In Mathematics Proficiency And Mastery Of The Learning Competencies In General Mathematics Of Senior High School Students

Emil C. Alcantara, Rhea Rose M. Abanador

Graduate Program Faculty, College of Teacher Education, Batangas State University,
Batangas City, Philippines, 4200
alcantara_emil0204@yahool.com

San Pascual Senior High School
San Pascual, Batangas, Philippines, 4204
rrmabanador@gmail.com

Abstract: This study aimed to determine the gender differences in the mathematics proficiency and mastery of the learning competencies in General Mathematics of Grade 11 students in the senior high schools of San Pascual District, Division of Batangas, Philippines. This study utilized descriptive method of research. Two hundred seventy seven (277) students out of the total of 894 Grade-11 students during the SY 2016-2017 were used as the subjects of the study. There is no gender difference in learning strategies accounted for male and female in terms of mathematics proficiency. There is no significant difference between the male and female students' extent of mastery of the learning competencies in functions and their graphs. Female students are more likely to have greater extent of mastery of the learning competencies in business mathematics than male students. Male students tend to have greater extent of mastery of the learning competencies in Math logic than female students. It can be attributed to the tendency of male students to use more novel problem-solving strategies, whereas female students are more likely to follow school-taught procedures. Intervention activities and preparation of strategic intervention materials that focus on these gender gaps are likely to yield educational benefits.

Keywords: gender, General Mathematics, learning competencies, mastery, mathematics proficiency

1. Introduction

Gender is a complex, dynamic force that affects every social interaction, including interactions in educational settings. Its effects are woven into educational outcomes, and at times contribute to complicated disparities, specifically in the field of mathematics education. The greatest shift in Philippine educational system over the last few decades is now at hand. Since the full implementation of the K-12 system, the first batch of Grade 11 students is now inching closer to making history as the first senior high school graduates of the country. Together with these drastic changes are the challenges that senior high school teachers are facing. Moreover, the demand for quality education which students are expecting is tremendously high. The expectations of this curriculum lie heavily on teachers. This is true especially in subjects like Mathematics, one of the most challenging courses any student has to take. Based on K-12 Enhanced Basic Education Curriculum, General Mathematics will be one of the core subjects of Grade-11 students for the first semester [1]. General Mathematics, as one of the core subject in Grade 11, is broken down into three components which are Functions and Their Graphs, Business Mathematics, and Logic. At the end of the course, the students should be able to solve problems involving rational, exponential, and logarithmic functions; to solve business-related problems; and to apply logic to real-life situations. Most current research is in agreement about the existence of a gap between males and females in the areas of mathematics achievement and attitudes towards mathematics [2]-[3]. The research has generally attributed the disparity to societal and cultural forces that affects females' belief systems, confidence levels, and desire to learn math. Since the turn of the century gender differences are persistent and even widening in affect, participation, and achievement for some grade levels and domains in mathematics. It is for these reasons that prompted the researchers to conduct a study on the gender differences in mathematics proficiency and extent of mastery of the learning competencies in general mathematics of senior high school students. The study aimed to determine the gender differences in the mathematics proficiency and extent of mastery of the learning competencies in General Mathematics of Grade 11 students in the senior high schools; ascertain the significant difference on the mathematics proficiency of male and female senior high school students; and identify the significant difference on the extent of mastery of the learning competencies in General Mathematics of male and female senior high school students.

2. Methods

This study utilized descriptive method of research. Two hundred seventy seven (277) students out of the total of 894 Grade-11 students in the senior high schools of San Pascual District, Division of Batangas, Philippines during the SY 2016-2017 were used as the subjects of the study. The mathematics proficiency of the students was based on their grades in General Mathematics. The study also utilized a teacher-made test to determine the extent of mastery of the learning competencies in General Mathematics. The 70-item test undergone validation. The validated test with table of specification consists of 35 items covering functions and their graphs, 20 items covering business mathematics, and 15 items covering Math Logic. The researchers asked permission from the Division Superintendent through the

Education Program Supervisor in Mathematics to conduct this study in San Pascual District. The t-test for independent samples was used to compare the means of two groups of students.

3. Results and Discussion

3.1 Level of Mathematics Proficiency

Table 1 presents the level of proficiency in General Mathematics of Grade 11 students.

***Table 1**: Level of Proficiency in General Mathematics of Grade 11 students*

Grades in General Mathematics	Level of Proficiency	Male	Female	Overall	%
90 and above	Advanced Proficiency	11	26	37	13.3
85 – 89	Proficient	46	77	123	44.4
80 – 84	Approaching Proficiency	42	54	96	34.7
75 – 79	Developing	10	11	21	7.6
74 and below	Beginning	0	0	0	0
	TOTAL	109	168	277	100
	Mean	84.79	85.58	85.27	
	SD	3.989	4.273	4.174	

As shown in the table, the mean grade of male students of 84.79 with standard deviation of 3.989 indicates that they are proficient in General Mathematics while the mean grade of female students of 85.58 with a standard deviation of 4.273 indicates that they are proficient in General Mathematics. The overall mean grade of 85.27 with standard deviation of 4.174 indicates that majority of the Grade 11 students are proficient in General Mathematics.

3.2 Extent of Mastery of the Learning Competencies In General Mathematics

Table 2 to Table 4 present the extent of mastery of the learning competencies in General Mathematics of the Grade 11 students.

***Table 2**: Students' Extent of Mastery of the Learning Competencies in Functions and their Graphs*

Range of Score	Percentage of Score	Extent of Mastery	Male	Female	Overall	%
27–35	75 and above	Mastered	9	7	16	5.8
18–26	50 – 74	Nearing Mastery	24	56	80	28.9
17 and below	49 and below	Not Mastered	76	105	181	65.3
		TOTAL	109	168	277	100
		Mean	14.50	15.85	15.32	
		SD	7.526	5.895	6.605	

As shown in Table 2, the male students' mean score of 14.50 with a standard deviation of 7.526 indicates that they did not mastered the expected learning competencies in functions and their graphs. Similarly, female students' mean score of 15.85 with a standard deviation of 5.895 indicates that they did not mastered the expected learning competencies in functions and their graphs. The overall mean score of 15.32 with a standard deviation of 6.605 indicates that majority of the Grade 11 students, which is 65.3%, did not mastered the expected learning competencies in functions and their graphs.

***Table 3**: Students' Extent of Mastery of the Learning Competencies in Business Mathematics*

Range of Score	Percentage of Score	Extent of Mastery	Male	Female	Overall	%
15–20	75 and above	Mastered	5	8	13	4.7
10–14	50 – 74	Nearing Mastery	34	82	116	41.9
9 and below	49 and below	Not Mastered	70	78	148	53.4
		TOTAL	109	168	277	100
		Mean	8.09	9.43	8.90	
		SD	3.800	3.487	3.666	

As shown in Table 3, the male students' mean score of 8.09 with a standard deviation of 3.800 indicates that they did not mastered the expected learning competencies in Business Mathematics. Similarly, female students' mean score of 9.43 with a standard deviation of 3.487 indicates that they did not mastered the expected learning competencies in Business Mathematics. The overall mean score of 8.90 with a standard deviation of 3.666 indicates that majority of the Grade 11 students, which is 53.4%, did not mastered the expected learning competencies in Business Mathematics.

***Table 4**: Students' Extent of Mastery of the Learning Competencies in Math Logic*

Range of Score	Percentage of Score	Extent of Mastery	Male	Female	Overall	%
12–15	75 and above	Mastered	2	1	3	1.1
8 – 11	50 – 74	Nearing Mastery	17	37	54	19.5
7 and below	49 and below	Not Mastered	90	130	220	79.4
		TOTAL	109	168	277	100
		Mean	5.48	4.77	5.20	
		SD	2.522	2.814	2.659	

As shown in Table 4, the male students' mean score of 5.48 with a standard deviation of 2.522 indicates that they did not mastered the expected learning competencies in Math Logic. Similarly, female students' mean score of 4.77 with a standard deviation of 2.814 indicates that they did not mastered the expected learning competencies in Math Logic. The overall mean score of 5.20 with a standard deviation of 2.659 indicates that majority of the Grade 11 students, which is 79.4%, did not mastered the expected learning competencies in math logic.

3.3 Differences in the Level of Proficiency in General Mathematics

As shown in Table 5, the computed t-value of -1.540 with a p-value of 0.125 (<0.05) indicates that there is no sufficient evidence to reject the null hypothesis. This means that there is no gender difference in learning strategies accounted for male and female in terms of mathematics proficiency. Male and female senior high school students tend to have similar level proficiency in General Mathematics.

***Table 5**: Differences in the Level of Proficiency in General Mathematics of Male and Female Students*

Gender	Mean	t-value	p-value	Decision on Ho	Verbal Interpretation
Male	84.79	-1.540	0.125	Failed to Reject	Not Significant
Female	85.58				

3.4 Differences in the Extent of Mastery of the Learning Competencies in General Mathematics

The gender difference in the extent of mastery of the learning competencies in General Mathematics was presented in Table 6.

***Table 6**: Differences in the Extent of Mastery of the Learning Competencies in General Mathematics of Male and Female Students*

Areas of General Mathematics	Gender	Mean	t-value	p-value	Decision on Ho	Verbal Interpretation
Functions and their Graphs	Male	14.50	-1.663	0.097	Failed to Reject	Not Significant
	Female	15.85				
Business Mathematics	Male	8.09	-3.008	0.003	Reject	Significant
	Female	9.43				
Math Logic	Male	5.48	-2.191	0.029	Reject	Significant
	Female	4.77				

As shown in Table 6, the computed t-value of -1.663 with a p-value of 0.097 (>0.05) indicates that there is no sufficient evidence to reject the null hypothesis. This means that there is no significant difference between the male and female students' extent of mastery of the learning competencies in functions and their graphs. In terms of business mathematics, the computed t-value of -3.008 with a p-value of 0.003 (<0.05) indicates that there is a sufficient evidence to reject the null hypothesis. This means that there is a significant difference between the male and female students' extent of mastery of the learning competencies in business mathematics. Female students are more likely to have greater extent of mastery of the learning competencies in business mathematics than male students. In terms of math logic, the computed t-value of -2.191 with a p-value of 0.029 (<0.05) indicates that there is a sufficient evidence to reject the null hypothesis. This means that there is a significant difference between the male and female students' extent of mastery of the learning competencies in math logic. Male students tend to have greater extent of mastery of the learning competencies in Math logic than female students. It can be attributed to the tendency of male students to use more novel problem-solving strategies, whereas female students are more likely to follow school-taught procedures.

4. Conclusions

There is no gender difference in learning strategies accounted for male and female in terms of mathematics proficiency. There is no significant difference between the male and female students' extent of mastery of the learning competencies in functions and their graphs. Female students are more likely to have greater extent of mastery of the learning competencies in business mathematics than male students. Male students tend to have greater extent of mastery of learning competencies in Math logic than female students.

5. Recommendations

It is recommended to conduct a similar study on the gender differences on the mathematics achievement and attitudes towards mathematics among senior high school students. Preparation of strategic intervention materials (SIM) are encouraged to address these gender gaps to yield educational benefits.

References

[1] K to 12 Curriculum Guide MATHEMATICS (Grade 1 to Grade 10). [Online]. Available: goo.gl/3Qxsj5. [Accessed: January 2, 2016].

[2] Forgasz, H. J. et. al, International Perspectives on Gender and Mathematics Education. Charlotte, NC: Information Age Publishing, 2010.

[3] Kenny-Benson, G. A. et. al., Sex Differences in Math Performance: The Role of Children's Approach to Schoolwork. Developmental Psychology. 42(1). 2006, doi:10.1037/0012-1649.42.1.11.

Author Profile

Emil C. Alcantara received the B.S. in Physics for Teachers degree from Philippine Normal University, Manila, Philippines in 1997 under the DOST-SEI-PNU Project 8102 Ed. Scholarship program. He also studied Master of Science Teaching major in Physics at the De La Salle University, Manila. In 2013, he received the Doctor of Philosophy in Education major in Mathematics degree from University of Batangas, Philippines. He is now connected with Batangas State University as a professor of mathematics and physics both in the undergraduate and graduate levels.