

Gender Stereotyping Among Women in Mathematics Courses

Dr. Gener S. Subia¹, Dr. Lorinda E. Pascual², Dr. Alma G. Galang³, Dr. Erlinda C. Mones⁴, Dr. Apolinar M. Alfonso⁵, Dr. Nenita L. Pongco⁶

Professor, Wesleyan University Philippines¹

Professor IV, Nueva Ecija University of Science & Technology²

Gender and Development Director, Nueva Ecija University of Science & Technology³

Professor, Master of Social Work, Wesleyan University Philippines⁴

Professor, Wesleyan University Philippines⁵

Professor, Graduate Studies, Nueva Ecija University of Science & Technology⁶

Abstract

This study explored gender stereotyping among women in mathematics courses. The respondents of the study who were chosen purposively were 81 female math teachers in Region 3 from the provinces of Nueva Ecija, Tarlac, Bulacan, and Pampanga. The instrument was a questionnaire crafted by the researchers which were composed of the respondents' teaching experiences and awards, their involvements in gender stereotyping, and their actions to avoid this act in their job as teachers.

The study found out that the respondents have worked as math teachers for more than five years and have noticed and experienced gender stereotyping in their field. They are math achievers and multi-awardees, implying that ladies have mathematical bents as well. They've been subjected to gender stereotypes. The most prevalent experience is that their male peers are invariably chosen as math group contest leaders. Finally, assertions like "males are math geniuses, while ladies are only for verbal courses" and "males are better math teachers than females" are made in response. Gender stereotyping has also been seen in the respondents' schools and classes. In order to combat any stereotype, they encouraged their students to accept girls' arithmetic ability and created a gender-neutral classroom environment. The results of this study have implications for the Gender and Development Program of academic institutions in the country.

Keywords: Achievement, education, gender stereotyping, gender and development, Mathematics,

Introduction

Gender Stereotyping is evident in the field of education. Gender Stereotyping is defined as the beliefs humans hold about the characteristics associated with males and females (Vega, Prieto, and Carreon, 2009). One issue about gender is a comment such as "girls can't do math" which holds some potential pitfalls especially for teachers (Sadker and Sadker, 1994). US society and the US mathematical community, in particular, should avoid discouraging girls and women from the study of mathematics by suggesting that they are incapable of it. The objective record suggests that they are very capable, without any need for special treatment or sex-segregated classrooms. Since the under-representation of US women in mathematics now

begins at the point of transition from undergraduate to graduate study, academic departments of mathematics should be examining themselves to determine whether their attitudes and advice to women students are responsible for this fact. It is not accounted for by the lower rates of participation of women in the graduate study generally (Chipman, 1996).

Women have made substantial progress in technological fields, according to Janet Hyde. Female students make up half of the medical school students, and 48 percent of undergraduate math majors are female. "Why are women getting these majors if they can't do math?" she wondered. ScienceDaily (ScienceDaily, 2010). Even if a woman is brilliant, her achievements can be treated differently by coworkers. Maria Emelianenko, a mathematician at George Mason University, told the story of a colleague who was exposed on her first day as an assistant professor at another university. "When she arrived, she had a sign on her door that said 'Mrs. Smith'—but the rest of the signs in the department all read 'Dr. So-and-So.' She's on the same level as her other colleagues, but somehow they referred to her differently" (Hu, 2016).

Historically, women have been discouraged from applying their minds to mathematics—but a few persevered. One of them is Hypatia (c.355-415) who was claimed as the first woman known to have taught mathematics. Her father Theon, who taught his daughter math and astronomy then sent her to Athens to study the teachings of Plato and Aristotle, was a famous mathematician in Alexandria who wrote commentaries on Euclid's *Elements* and works by Ptolemy (MacDonald, 2018). Other times, female mathematicians' accomplishments are chalked up to the "gender card." Mathematician Sarah Brodsky says that after she was awarded the National Science Foundation's prestigious Graduate Research Fellowship, there were colleagues who told her that she'd won the award only because she's a woman. This kind of thinking—that women's professional accomplishments are due to tokenism, not their abilities or hard work—plays a role in why women may be overlooked for leadership roles in their field, like editorial positions. "Editorial boards are looking for someone who is mature, has the expertise, and can review articles and point toward directions that elucidate deficiencies in others' work," says Emelianenko. "They want to be assured that this person is very well-qualified. But this doubt—"this lady has published a lot and gotten some grants, but it's because she's a woman"—may hurt women." (Hu, 2016)

Current literature investigating why there are so few women in STEM reveals the following three themes: (1) the existence of perceived gender differences (the continued notion that men are mathematically innately superior and therefore better suited to careers in STEM), (2) the lack of interest in STEM by women, and (3) the influence of the STEM workplace environment (American Association of University Women, 2010).

Recently, researchers have also identified a lack of focus on the communal and social values that a STEM career affords as another possible deterrent to women's participation (Diekman, Brown, Johnston, and Clark, 2010). Given these three influences, namely, the persistent lack of women in STEM majors and careers, the trend toward mathematics instruction that is both conceptual and attentive to societal issues, and the recognition of the value of including

women's perspectives in creating a sense of belonging have tickled the minds of the researchers to dig deeper on the gender stereotyping among women in education, particularly their experiences in Mathematics courses. As professors and educators, this study will be beneficial to the researchers to raise awareness and advocate fair treatment among genders in the academe.

Methodology

This study employed a descriptive survey type of research. According to Calderon (2000), "descriptive research is a fact-finding study with adequate and accurate interpretation of data and describes with emphasis what actually exists such as the current condition of the phenomenon". The respondents of the study who were chosen purposively (Subia, 2018) were 81 female math teachers who are teaching for 5 years or more in Central Luzon from the provinces of Nueva Ecija, Tarlac, Bulacan, and Pampanga. The questionnaire was composed of the respondents' teaching experiences and awards, their involvements in gender stereotyping, and their actions to avoid this act in their job as teachers. The computed reliability coefficient of the questionnaire is 0.81. Graphs, frequency, percent, rank, and tables were used to compute and present the data gathered in this study.

Results and Discussion

1. Number of Years in Teaching Math

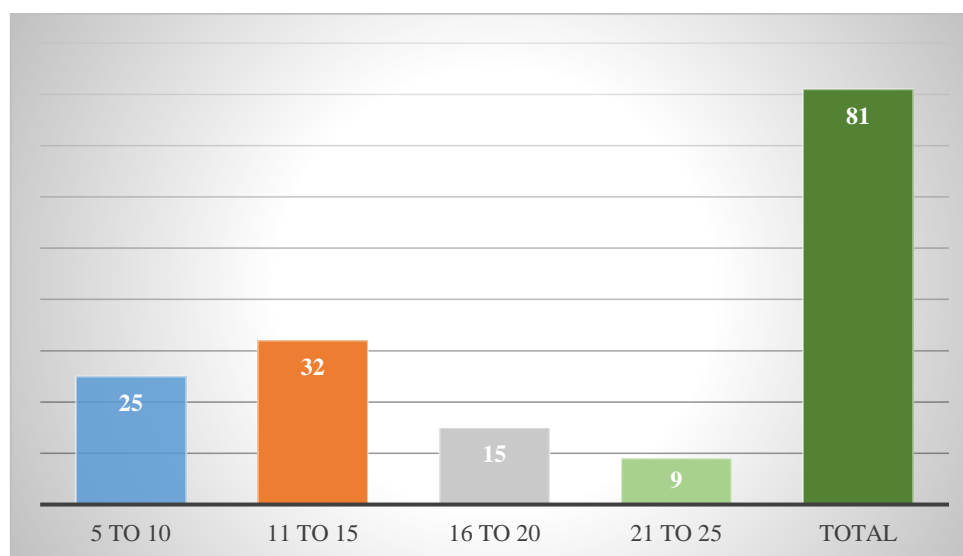


Fig 1. Years in Teaching Math

The figure shows that there are 81 female teacher respondents. Twenty-five of them are teaching for 5 to 10 years, 32 from 11 to 15 years, 15 are handling for 16 to 20 years and 9 are from 21 to 25 years. This means that the respondents are qualified enough to handle mathematics and are experienced to prove that there is gender stereotyping that is happening in their field of specialization.

2. Achievement as Math Teacher

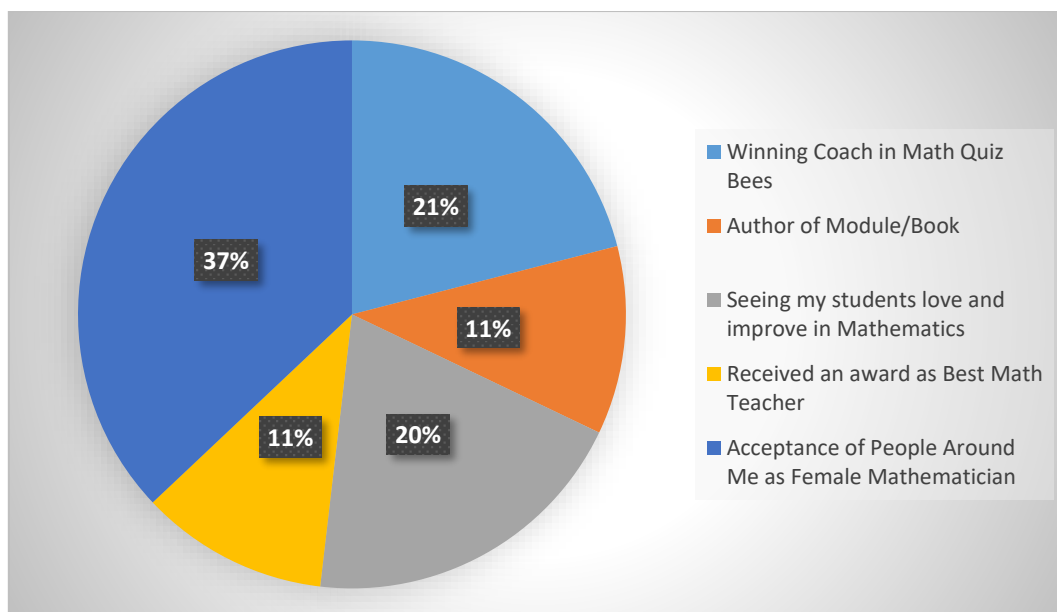


Fig 2. Achievement as Math Teacher

Figure 2 presents the different achievements earned by the respondents. Acceptance of people around them as recognized female mathematicians was their greatest achievement according to 37% of respondents. It is followed by winning coaches in math quiz bees and seeing their students love and improve in mathematic. Additionally, 11% of them are authors of the module/book and received an award as the best math teacher. This finding implies that the respondent female teachers are comparable to math teachers since they are multi-awardees and are concerned with their student's performance in mathematics.

Table 1. Stereotyping Female Mathematicians

Instances where you feel that you were being Stereotyped as Female Mathematicians	Frequency	Rank
There are male teachers claiming that they are better teachers than us.	12	3
A statement from my colleague that Males are geniuses in Math and Females are for verbal courses only.	27	2
Our male classmates are always chosen as leaders in the math group contest.	28	1
When we were still studying, our male classmates laugh at our female classmates when they did not solve problems on the board.	10	4
Our male students always say that females are not inclined in Mathematics.	4	5

Table 1 reveals the situations where the respondents felt that they experienced gender stereotyping. First in rank is the item “our male classmates are always chosen as leaders in the math group contest”. It is followed by a statement that “males are genius in math and females

are for verbal courses only” while 3rd in rank is the claim of their male colleagues that “they are better math teachers than females”.

This stereotyping among females must be addressed immediately since according to theory, stereotype danger lowers girls' math test scores while having no impact on boys' math scores. (Flore, Mulder & Wicherts, 2018).

Table 2. Actions Against Female Stereotyping

Actions Against Stereotyping among Women in Math	Frequency	Rank
I educate my students that girls and boys are equal in their math skills.	12	5
I encourage my students to respect girls’ math abilities.	17	2
I deal with any stereotyping of girls and act immediately especially during my math recitations.	22	1
I create a classroom environment that is free from stereotyping among girls.	16	3
I approach directly a student who committed an act of stereotyping girls.	14	4

When asked about their actions to fight stereotyping among their female students, they claimed that they “deal with any stereotyping to girls and act immediately especially during my math recitations”, encourage their students to respect girls’ math abilities’ and “create a classroom environment that is free from stereotyping among girls”.

These actions of the respondents were very vital in lessening or totally eradicating the bad effect of stereotyping. According to Zawisza (2018), “stereotype threat leads to a vicious circle. Stigmatized individuals experience anxiety which depletes their cognitive resources and leads to underperformance, confirmation of the negative stereotype, and reinforcement of the fear” (p.1).

Conclusions and Recommendation

The respondents are more than five years as math teachers and observed and experienced that there is gender stereotyping in their field. They are math achievers and multi-awardees which suggests that females are also inclined in Mathematics. They have experienced gender stereotyping. The most common is they experienced their male classmates are always chosen as leaders in the math group contest. Then by statements that “males are genius in math and females are for verbal courses only” and “males are better math teachers than females”. Additionally, the respondents have observed gender stereotyping in their schools and classrooms. They dealt with any stereotyping by encouraging their students to respect girls’ math abilities and by creating a classroom environment that is free from stereotyping among

girls. Equal representation of both genders may also be considered by mathematics teachers particularly in math quiz bees and in grouping activities.

References

1. American Association of University Women (2010), *Why So Few? Women in Science, Technology, Engineering, and Mathematics*, Washington, D.C.
2. Calderon, J.F. (2000). *Statistics for educational research simplified*. Ermita, Manila: Educational Publishing House.
3. Chipman S.F. (1996) *Female Participation in the Study of Mathematics: The US Situation*. In: Hanna G. (eds) *Towards Gender Equity in Mathematics Education*. New ICMI Study Series, vol 3. Springer, Dordrecht
4. Aarushi, Naveen Nandal, Parul Agrawal. AN EXPLORATORY RESEARCH IN PRODUCT INNOVATION IN AUTOMOBILE SECTOR. *JCR*. 2020; 7(2): 522-529. doi:10.31838/jcr.07.02.98
5. Kumar, S. (2022). Effective hedging strategy for us treasury bond portfolio using principal component analysis. *Academy of Accounting and Financial Studies Journal*, Vol. 26, no.2, pp. 1-17
6. Diekman, A., Brown, E., Johnston, A., and Clark, E. (2010), Seeking congruity between goals and roles: A new look at why women opt out of science, technology, engineering, and mathematics careers, *Psychological Science* 21, 1051–1057
7. Flore, P., Mulder, J. & Wicherts, J. (2018) The influence of gender stereotype threat on mathematics test scores of Dutch high school students: a registered report, *Comprehensive Results in Social Psychology*, 3:2, 140-174, DOI: 10.1080/23743603.2018.1559647
8. Hu, J.C.(2016). *Why Are There So Few Women Mathematicians?*
9. Macdonald, J.(2018). 15 Female Mathematicians Whose Accomplishments Add Up. <http://mentalfloss.com/article/88279/15-female-mathematicians-whose-accomplishments-add>
10. ScienceDaily (2010). Females are equal to males in math skills, a large study shows. <https://www.sciencedaily.com/releases/2010/10/101011223927.htm>
11. Sadker, M. and Sadker, D. (1994). *Teachers, Schools, and Society*. 2nd Edition. New York, USA: McGraw-Hill Companies, Inc.
12. Sawisza, M.(2018). The terrifying power of stereotypes – and how to deal with them. <https://theconversation.com/the-terrifying-power-of-stereotypes-and-how-to-deal-with-them-101904>.
13. Subia, G. (2018) *Comprehensible Technique in Solving Consecutive Number Problems in Algebra*. *Journal of Applied Mathematics and Physics*, 6, 447-457. doi: 10.4236/jamp.2018.63041.
14. Vega, V., Prieto, N., and Carreon, M.(2009). *Social Dimensions of Education*. Lorimar Publishing, Inc., Cubao, Quezon City, Philippines.