

Exploring Gendered Views of Mathematics: A Study of Female Primary School Teachers

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ABSTRACT

The study investigates female teachers' gender perspectives in mathematics, defined as viewing the world through lenses shaped by social and cultural gender norms. The research is grounded in gender studies and uses a qualitative methodology, involving semi-structured interviews with eight female teachers at a Mexico City public primary school. Findings indicate teachers distinguish between talent and ability in mathematics: talent is defined as an inherent, genetic capacity, while ability refers to skills gained through practice and continual exercise. Teachers associate talent primarily with boys, attributing their mathematical success to innate advantages, whereas they link girls' success to acquired skill through effort and persistence. Teachers consistently report that boys possess a "natural" advantage, while girls may approach but not equal this talent through diligence. This belief is underscored by teachers attributing "aggressiveness-activity" traits to boys and "passivity-dedication" traits to girls, considering aggressiveness essential for excelling in mathematics. These perceptions point to teachers' recognition of male-oriented sociocultural constructs that they believe facilitate mathematical learning.

Keywords: Gender Differences; Mathematical Ability; Social Skills; Primary School; Stereotype.

INTRODUCTION

Research over four decades links mathematical performance and achievement of men and women to gender stereotypes. Findings from studies by Ernest (1980), Burton (1986, 1990), Leder (1987), Leder & Forgasz (1992), Gray (1996), Hyde et al. (1990), Padilla et al. (2020), Cárcamo et al. (2020), and Becker & Hall (2024) confirm this. Mathematics has long been seen as a male domain, a notion that has only recently changed (Xie & Liu, 2023). This belief stems from perceived sex differences. Along with biological factors, socioeconomic status, ethnicity, age, religion, culture, family background, education, teachers, and personality, these factors create complex hierarchies. These influences not only affect girls' math performance but also their engagement.

Women are often exposed to stereotypes during their education, such as the perception that women are less capable in mathematics or science. There is a common belief that women excel in language and the arts, while men are viewed as more proficient in mathematics and science, which can reinforce these perceptions throughout schooling.

Past research reveals two key effects of masculine stereotypes in math: boys and girls form different personal beliefs about the subject, and mathematical skills are attributed early, shaping each sex's relationship with math. This study examines the second effect in depth.

State of the Art

Over the past century, two main perspectives have explained what shapes male and female behavior in a culture: one attributes differences to biology, while the other emphasizes cultural factors. The latter recognizes sexual differences as part of a genetic program, but argues this is not enough to define behaviors or attitudes exclusive to one sex. Nor does it justify one sex's dominance. Gender studies fit this framework by examining social differences between women and men (García et al., 2019).

Gender is a sociocultural construct shaped by learned norms. These norms dictate what is required, forbidden, or allowed, as well as the roles for each gender. Socialization passes these norms along.

Muñoz et al. (2020) define socialization as the process by which people internalize society's rules and expectations. Bustos (2002) says family, school, religion, and mass media are the main socializing institutions. These institutions shape, transmit, and maintain beliefs, values, and attitudes. They influence how people think and act (p. 139).

Socialization is a complex process in which every individual is both an agent and an object of influence. Through this process, people learn gender roles. These roles are "the set of norms and prescriptions society dictates for male or female behavior" (Ramírez et al., 2019). This process starts in the maternal womb.

Men and women build different gender identities through individual and social processes. Each gender is linked with specific spheres of action. The roles and functions assigned to men and women are not natural or biological. Instead, they come from a socio-historical and cultural process. This process creates unequal power relations from the start of masculine and feminine identity formation.

Gender identity is "the set of socially accepted ways of being a man or a woman in a given era, society, and culture" (Bonelli, 2019). Each person interprets the world through their gender identity.

Gender limits and shapes perception and experience. Here, gender perspective means viewing the world through society's and culture's definitions of what fits each sex.

Studies on Mathematics and Gender

In the 1990s, gender became an analytic category in mathematics research, using a qualitative approach. This approach considers all sociocultural elements around individuals. People are seen as different with unique characteristics, but above all, as human beings. Leyva & Nazemi (2024) state that research examines how "mathematics reflects the practices and values of the culture in which it evolves" (p. 296).

Studies by Fox (cited in Fox & Soller, 2001), Merino et al. (2018), Simón-Ramos et al. (2022), and Becker & Hall (2024) show that gender differences come from socio-educational influences. This led to studies in Australia, England, and the U.S. that sought to link gender differences with how mathematics is taught and learned.

Two decades ago, gender studies in Mexican mathematics were just beginning (Ramírez, 2006). Now, more researchers are exploring this area (Márquez & Ramos, 2017; Guzmán & Díaz, 2022).

Purpose of the Research

Schools reproduce the system's culture. They help individuals adapt to existing values and norms, reinforcing roles assigned to men and women. Gender stereotypes learned at home persist throughout schooling via its structure and organization (Spencer & Sarah, 1993; Ursini & Ramírez-Mercado, 2017; Vargas & Matus Correa, 2022). Schools offer segregated and differentiated education (Moreno, 1986).

Historically, from the 17th to most of the 20th century, schools separated boys and girls by sex and prepared them for different life roles (Sa'dijah et al., 2021), further reinforcing these societal expectations through formal education.

Teaching shapes how constructs are understood in school. Teachers' behaviors, attitudes, beliefs, and perceptions are significant factors in their roles as educators (González, 2003; Bermejo & Hernández, 2019; Méndez, 2020; Watson & Rubie-Davies, 2024).

This study explores how female primary teachers view their own math skills and those of boys and girls, and whether these perceptions affect their teaching. The goal is to outline teachers' gender perspectives on mathematics.

METHOD

This qualitative research follows the approach of Hernández & Mendoza (2018). To understand female math teachers' gender perspectives and their views of students, a semi-structured interview was developed (Cohen, 1990; Goetz & Le Compte, 1988) with 12 questions in three sections:

1. How teachers perceive themselves in terms of ability and mastery of mathematics.
2. How teachers perceive boys and girls as mathematics students.

3. Whether teachers' perceptions influence their teaching practice.

The instrument's validity was checked through item triangulation (Goetz & Le Compte, 1988). The interview was conducted with female teachers at a public primary school in Mexico City during the 2023–2024 academic year.

Profile of the Teachers

The participants are teachers in the Mexican public education system. They are assigned to a primary school in northern Mexico City that operates in the morning. Eight teachers participated in the study.

Of these, 71% graduated from a Normal Básica program (teacher training after secondary school). The other 29% graduated from a Normal with a bachelor's degree (a four-year specialization after upper secondary education). Teaching experience among the participants ranges from 6 to 34 years. Their ages range from 32 to 59 years.

Teachers cited vocational calling, family tradition, economic factors, and balancing work with family as reasons for choosing the profession. These situations reflect traditional female roles (Salces, 2018; Park et al., 2018; García et al., 2019; Sa'dijah et al., 2021; Bermejo & Hernández, 2019).

RESULTS

The results follow the three interview sections:

1. How teachers perceive themselves regarding ability and mathematics mastery.
2. How teachers perceive boys and girls as mathematics students.
3. Whether teachers' perceptions of boys and girls influence their teaching practice.

The first dimension addressed in the results concerns how teachers perceive themselves regarding their ability and mastery of mathematics.

This section examines teachers' levels of self-confidence in their mastery and application of math. It also considers their attitude toward the subject.

The results show that 93% of teachers reported medium to low self-confidence in both mastering and using mathematical content. They attributed their limited confidence to the perceived difficulty of mathematics and to gaps in their own schooling. Teachers described mathematics as complex and abstract. They said it was poorly taught during their training.

Selected excerpts from the interviews illustrate this perception:

A: "...Since my time at the Normal School, the preparation we received in this subject was very poor..."

B: "...What we were taught was very repetitive—just exercise after exercise. It wasn't about applying mathematics to everyday life. They told us how to solve problems but not what they were for or how to use them..."

C: "...Mathematics has always been difficult for me to handle..."

Limited teacher mastery of mathematics does not necessarily hinder teaching at the primary level, especially in *lower grades* (first to fourth year). However, teaching mathematics in *upper grades* (fifth and sixth years) is seen as requiring more time for reviewing and practicing the content.

These observations are further illustrated by the following excerpts from the interviews, which highlight how teachers approach preparation for mathematics instruction:

D: "I need to review the textbook beforehand and make sure I understand it, because the exercises are very complex."

E: "I take the book home to solve and study the exercises there."

F: "If you don't go over the book in advance, you're lost—you have to study it, otherwise the kids notice."

To assess teachers' attitudes, their responses were grouped using criteria from Muñoz (1994) and Traver & Segarra (1997), who define attitude as three parts:

- The affective component (feelings, emotions, and preferences), and
- The behavioral component (actions and statements of intent).

The categorized responses reflecting each attitudinal component are summarized in Table 1 below.

Table 1. Teachers' attitudes toward mathematics

[Table 1]

As shown in Table 1, in the cognitive component, more than 57% of the teachers reported avoiding mathematics. They cited difficulty as the main reason. Regarding the affective component, 28.6% of the teachers expressed enjoyment of mathematics and of teaching it. Only a small proportion of the teachers demonstrated acceptance or willingness toward mathematics at the behavioral level.

It is important to note that *acceptance* and *willingness* here refer to knowledge that must be reviewed or addressed in class. This is because it is part of the school curriculum, and mathematics is considered an instrumental subject. Through mathematics, students build other forms of knowledge.

Teachers with high self-confidence in their mastery and use of mathematical knowledge tend to exhibit a positive attitude toward mathematics. In contrast, teachers with average or low levels of mastery display neutral or negative attitudes.

Flores (1994), in his study on Mexican society, concluded that:

“The most common representation of femininity lies within the expressive and emotional sphere, oriented toward others, where elements such as sensitivity, affectivity, and dependence constitute its main traits. Masculinity, on the other hand, is represented in the instrumental sphere, characterized by the ability to confront challenges, achievement motivation, rationality, and goal-oriented activity” (p. 75).

Based on the above, teachers’ tendency toward the affective component links to the common representation of femininity in Mexico. Mexican women generally gravitate toward the affective domain. This may limit teachers’ ability to develop mathematical skills and mastery.

Although teachers recognize a relationship between the gender stereotypes they hold and their self-perceptions of mathematical ability and mastery, this relationship varies with the degree of each teacher’s stereotype: the stronger the stereotype, the stronger the associated self-perception.

How Teachers Perceive Boys and Girls as Students of Mathematics?

The categories of analysis for this section include: the attitudes that teachers perceive in students toward mathematics; students’ behavioral and academic performance; teachers’ expectations regarding the relationship between mathematics and students’ future career paths; and an emergent category not initially considered in the study design: the difference between talent and ability.

Attitudes Teachers Perceive in Students Toward Mathematics

Attitudes play an important role in the learning and teaching of mathematics (Muñoz, 1994; Traver & Segarra, 1997), especially when teachers’ attitudes mediate students’ attitudes and academic performance (Karacabey et al., 2019). The teachers’ responses were analyzed according to the categories shown in Table 2.

Table 2. Students’ attitudes toward mathematics as perceived by teachers
[Table 2]

As shown in Table 2, teachers did not see evidence of the cognitive component of attitude in their students. Instead, they noticed only the affective and behavioral components. Each of these made up about half of the responses. More teachers reported a positive affective attitude toward mathematics, while fewer — none statistically significant — reported negative attitudes.

Most teachers observed that students displayed positive behavioral dispositions toward mathematics. Teachers explained this was because mathematics is mandatory in the school curriculum, so students cannot avoid it. They also said this willingness was linked to the practical usefulness of mathematics in daily life.

Behavioral Patterns

When asked about their perception of specific behaviors in girls and boys, 85.7% of teachers described girls as quiet, calm, less restless, more hardworking, and more defensive than boys. Excerpts from the interviews illustrate these perceptions:

A: “...They are more responsible and quiet...”

B: “...Girls are calm and reserved...”

C: “...They are more responsible and dedicated...”

D: “...Girls are quieter and pay more attention in class...”

Conversely, boys were characterized as rough, confident, aggressive, impulsive, daring, mischievous, unruly, careless, restless, playful, concrete, fast, and more straightforward. The following excerpts reflect these descriptions:

E: “...They are rough, confident, and more aggressive...”

F: “...Boys are restless and playful, but sometimes irresponsible...”

G: “...Violent, mischievous, and impulsive...”

H: “...Boys are tougher and more aggressive...”

Only 14.3% of teachers believed that girls and boys are equally mischievous. From this, it can be inferred that most teachers attribute stereotypical behaviors to their students. This indicates that, for these teachers, passivity is typical of girls, while aggressiveness is characteristic of boys.

According to Hierro (1990), such differentiation “...enables and conditions the progressive conquest of new forms of life and mastery over nature. This attitude is perceived as inherently male and undesirable for women” (p. 106).

Academic Behavior

Although 85.7% of teachers perceive passive–aggressive behavioral stereotypes among students, it is important to determine whether these stereotypes influence academic behavior in mathematics. To explore this, teachers’ characterizations of boys’ and girls’ performance were analyzed, as shown in Table 3.

Table 3. Academic behaviors attributed by teachers to boys and girls during mathematics class
[Table 3]

As observed in Table 3, teachers attribute opposite characteristics to boys and girls. The presence of a trait in one corresponds to its absence in the other. Teachers describe boys as aggressive and uninhibited “by nature” (aggressiveness previously reported by Gray, 1996). This is seen as an advantage that allows boys to excel in mathematics. They are considered “more participative and enthusiastic due to their talent.” In contrast, teachers see girls as having a passive role—dedicated, careful, responsible, and attentive. This passivity is believed to hinder participation, as girls do not engage with the same force and drive as their male peers in math class.

It seems that the stereotypes teachers hold about talent-aggressiveness and dedication-passivity are highly relevant. They shape the different ways boys and girls interact with mathematics. Moreno (1986) observes that although boys perform better on tasks requiring mathematical reasoning, they tend to be more careless with homework and assignments. In contrast, girls excel at neat, organized, and clear presentation when solving mathematical problems.

These talent-aggressiveness and dedication-passivity stereotypes are assigned to boys and girls, respectively. They seem to affect students’ self-confidence in participating and performing in math class. Later, they may also influence choices about math-related courses, career paths, and future job opportunities.

Teachers’ Expectations regarding the Mathematics–Career Relationship for Students

Half of the teachers believe mathematics is more important for boys. They link math to utility, practicality, and independence. This matches Espinosa (2021), who found similar practical and utilitarian value in mathematics. The following interview excerpts reflect these views:

B: “...(Boys)...because they will be ‘responsible for supporting the family’ due to the family’s finances...”

D: “...they (boys) seek financial gain, what benefits them most... boys aim to work in something that will reward them, earn more...”

Teachers see the practical and utilitarian nature of mathematics as tied to boys’ future social roles. They connect the usefulness of mathematics to boys’ confidence in learning the subject. Leder & Forgasz (1992) found that boys develop this link between utility and confidence. Over time, this factor affects boys and girls differently.

This suggests that 50% of teachers expect boys to take paid jobs, while girls are seen as economically dependent. The other half of the teachers consider mathematics equally relevant to both genders, as seen in these interview excerpts:

From this, it can be inferred that 50% of teachers associate boys with mathematics, viewing it as a means of utility and practicality that enables them to access higher education, achieve higher family and social status, and consequently secure better jobs.

Difference between Talent and Skill

Throughout the interviews, teachers consistently referred to an interesting distinction between girls and boys in mathematics development: the talent-skill dichotomy.

Teachers defined talent as “the natural and genetic ability to carry out a task” (capacity, aptitude, understanding), and skill as “the ability developed through practice, effort, and training” (dexterity, practice, experience). The difference, therefore, is that one is innate, and the other can be developed.

Based on this distinction, 85.7% of teachers believed boys are more talented in mathematics than girls. Of these, 50% considered that girls are more skilled. According to these teachers, boys are naturally talented in mathematics due to genetic predisposition, whereas girls can excel through practice, effort, and training, as reflected in the following interview excerpts:

A: “Boys are more talented... mathematics is more for boys, although girls also manage to excel with practice...”

B: “...girls occasionally excel in math, while boys are very good; it comes naturally to them.”

C: “[For girls]... reasoning is harder, even if they have better memory... boys are more attuned to math, they are more talented.”

D: “...Boys outperform girls in this subject; they are faster, it comes easier to them, they are born with this gift.”

E: “...Boys are more talented in mathematics, as they are the ones sent to run errands, and due to being boys, it comes easier to them...”

Only 14.3% of teachers did not make a distinction between talent and skill, considering both boys and girls to be talented and skilled in mathematics. Notably, these teachers see themselves as competent in mathematics teaching and practice.

Gray (1996) notes that the phrase “women cannot do mathematics” reflects the belief in a genetic inability for mathematics. According to 85.7% of the teachers, mathematics is perceived as a male domain, in which women can only excel through effort, never equaling men's natural talent.

Do Teachers' Perceptions of Boys and Girls as Mathematics Students Influence their Teaching Practices?

At this point, it was found that 93% of teachers believe they do not make distinctions between boys and girls in their teaching practice. These teachers stated that when planning, organizing, and conducting classes, they do so without differentiating by gender, as expressed in their words:

A: “My class planning and organization are gender-neutral.”

B: “I am very inclusive.”

Only 7% of teachers reported making distinctions between boys and girls in their math classes, stating they provide more support to girls. Their support is justified by balancing the girls' needs against the boys' perceived talent.

C: “Boys outperform girls in math class... I would like it to be more equal.”

Thus, 7% of teachers plan activities considering academic differences between boys and girls, exclusively in math class, and use mixed-gender teams as their sole strategy.

D: “To balance things, when we work in teams, we always form mixed groups.”

While most teachers believe they provide equal opportunities for boys and girls in mathematics, a small number unconsciously acknowledge the male-math stereotype and attempt to compensate by giving girls more attention. This suggests it would be valuable to conduct research comparing what teachers say with what they actually do in practice, as it would offer an interesting perspective.

DISCUSSION

The majority of teachers perceive mathematics as a male-dominated domain, inherently difficult, and genetically predetermined. They view it as a subject that offers access to higher education, occupational, and social status, aligning with Watson and Rubie-Davies's (2024) findings. From this perspective, boys are considered naturally talented in mathematics, while girls are seen as skilled—able to achieve success through effort, practice, and training (Cárcamo et al., 2020). This distinction implies that innate talent can significantly shape children's educational trajectories, social empowerment, and future employment opportunities (Espinosa, 2021).

Teachers' perceptions are also shaped by behavioral and academic stereotypes. Boys are frequently described as active, assertive, impulsive, and confident, whereas girls are seen as calm, diligent, careful, and responsible. These traits are often linked to mathematical performance: boys' assertiveness and activity are associated with perceived aptitude, while girls' diligence and responsibility are associated with skill development (Gray, 1996). Early attribution of these stereotypes may influence how children relate to mathematics, both now and in the future.

CONCLUSIONS

Persistent gender inequalities emerge from cumulative influences throughout life. Early experiences in the family and school, alongside broader societal norms, shape self-concepts, choices, and behaviors, which in turn reinforce gendered patterns. Even minor biases, when repeated over time, can result in significant disparities between boys and girls, despite comparable abilities and social backgrounds. If left unaddressed, these patterns may restrict equal access to future opportunities. Addressing these inequalities requires raising awareness, promoting inclusive practices, and implementing institutional policies that foster gender equality in education.

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