

# Exploring Gender-Inclusive Pedagogical Strategies in Mathematics

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**Abstract:** *Gender-inclusive pedagogies in mathematics address the unique challenges faced by different genders, aiming to cultivate an inclusive learning environment that values diverse experiences and fosters learners' success in mathematics. This study employed a systematic review in exploring the existing research articles on gender-inclusive teaching methods in mathematics education. Results revealed four (4) emerging themes on gender-inclusive pedagogical strategies in mathematics namely; (1) Unmasking Gender Biases and Stereotypes in Textbooks; (2) Language Choices and Equity in the Classroom; (3) Dismantling Bias Through Diverse Role Models; and (4) Promoting Equitable Distribution of Opportunities. This review emphasizes the significance of gender-inclusive teaching methods in mathematics. By actively dismantling stereotypes through diverse representation and ensuring equal opportunities, mathematics educators cultivate a supportive learning environment that fosters mathematical success for all genders. Furthermore, incorporating various teaching approaches tailored to individual learning styles and age groups empowers students to effectively engage and excel in mathematics leading to a more inclusive and equitable mathematics education experience.*

**Keywords—gender-inclusive; pedagogical strategies; mathematics**

## 1. INTRODUCTION

Mathematics has long been considered a male-dominated field, with women often facing significant barriers to entry and success (Hyde et al., 2008). Despite the increasing number of women pursuing careers in mathematics, gender disparities persist, particularly in terms of participation and achievement (Else-Quest, Hyde, & Linn, 2010). This systematic review aims to explore gender-inclusive pedagogical strategies in mathematics education, with a focus on addressing these disparities and promoting gender equality.

Gender-inclusive pedagogy is an approach that seeks to create an inclusive learning environment that acknowledges and values the diverse experiences and perspectives of all students (Chetcuti, 2009). In mathematics education, this approach involves recognizing the unique challenges that girls and women face and implementing strategies that support their engagement and success in the subject (Reilly, Neumann, & Andrews, 2014). This systematic review examines the existing literature on gender-inclusive pedagogical strategies in mathematics education, identifying effective approaches and highlighting areas for further development.

The review focuses on studies that have explored the impact of gender-inclusive pedagogy on student outcomes, including participation, engagement, and achievement in mathematics. This also considers the role of teacher attitudes and behaviors in creating an inclusive learning environment, as well as the impact of broader societal factors on gender disparities in mathematics education.

The findings of this systematic review contribute to the understanding of the most effective strategies for promoting gender equality in mathematics education. By identifying and

implementing gender-inclusive pedagogical strategies, mathematics educators can help to create a more inclusive and equitable learning environment for all students, regardless of gender. This review provides valuable insights for educators, policymakers, and researchers seeking to address gender disparities in mathematics education and promote gender equality in the field.

## 2. METHODS

This study utilized a systematic review (Strech & Sofaer, 2011) to explore gender-inclusive pedagogical strategies in mathematics education. They employed a comprehensive search strategy utilizing various databases, academic journals, and books. Search terms focused on "Gender-Inclusive Pedagogical Strategies in Mathematics". The review prioritized peer-reviewed English publications from the past decade.

Following an initial search that yielded a vast number of articles, a screening process based on titles and abstracts narrowed the selection to twenty-seven (27) articles for in-depth review. This thorough examination revealed common themes and patterns, providing a comprehensive understanding of gender-inclusive strategies in mathematics.

This systematic approach integrated diverse research, offering a well-rounded perspective on the topic. Valuable insights were gleaned from specific articles, highlighting effective strategies for fostering inclusivity. The identified common themes aim to inform future research, discussions, and strategic decisions to address the gender gap in mathematics education.

## 3. RESULTS AND DISCUSSION

### Gender-Inclusive Pedagogical Strategies in Mathematics

### 1. Unmasking Gender Biases and Stereotypes in Textbooks

Textbooks play a significant role in shaping students' perceptions of mathematics and mathematicians. By predominantly portraying mathematicians as male, textbooks inadvertently reinforce the stereotype that math is a male-dominated field (Leahey & Guo, 2001). This portrayal can have a detrimental effect on female students, as it may lead them to internalize the belief that math is not a subject where they can excel or belong. When students consistently see images and read about male mathematicians in their textbooks, it sends a subtle yet powerful message that math is primarily for men, potentially discouraging female students from pursuing mathematics with confidence and enthusiasm (Duffy, Warren, & Walsh, 2001).

Furthermore, this gender bias in textbooks can contribute to the underrepresentation of women in STEM fields by perpetuating the stereotype that math is a male domain. When female students do not see themselves reflected in the examples, stories, and images presented in their math materials, it can create a sense of exclusion and erode their self-efficacy in mathematics (Hand, Rice, & Greenlee, 2017). To address this issue, educators and textbook publishers need to actively work towards creating more inclusive and diverse representations of mathematicians in textbooks. By showcasing a variety of mathematicians from different backgrounds and genders, textbooks can help break down stereotypes, inspire all students to see themselves as capable mathematicians, and foster a more inclusive learning environment where everyone feels valued and empowered to excel in math (Aguilar & Castaneda, 2020).

### 2. Language Choices and Equity in the Classroom

Unconscious teacher bias can significantly impact the learning environment for students, particularly for female students in mathematics. Phrases like "boys are naturally good at math" or praising boys for their effort while attributing girls' success to luck can have a demotivating effect on female students (Robinson-Cimpian et al., 2014). These language choices can reinforce gender stereotypes and create a self-fulfilling prophecy where girls internalize the idea that they are not as capable in math as boys.

When teachers unconsciously favor boys over girls in their language choices, it can create an imbalance in the classroom environment. Boys may receive more positive reinforcement and encouragement, which can boost their confidence and motivation in math. On the other hand, girls may feel less valued and less likely to take risks or engage fully in the subject. This imbalance can perpetuate the gender achievement gap in mathematics, as girls may not receive the same level of support and encouragement to excel in the subject (Tiedemann, 2002).

To address this issue, teachers need to be aware of their language choices and actively work towards creating an inclusive learning environment. This can involve using gender-neutral language, praising all students for their efforts

and achievements, and avoiding gender stereotypes in their teaching practices (Monsen, Ewing, & Kwoka, 2014). By consciously addressing unconscious bias, teachers can help create a more equitable and supportive learning environment where all students, regardless of gender, feel encouraged and empowered to excel in mathematics.

### 3. Dismantling Bias Through Diverse Role Models

Incorporating a wider range of historical figures in mathematics education, including women and mathematicians from various ethnicities, plays a crucial role in broadening students' perception of who can excel in this field (Prast et al., 2018). When students are exposed to diverse representations of successful mathematicians who share their backgrounds, it can inspire and motivate individuals from underrepresented groups. By showcasing mathematicians from different genders and ethnicities, mathematics education becomes more inclusive and reflective of the diverse society we live in. This approach not only breaks down stereotypes but also sends a powerful message that anyone, regardless of their background, can succeed in mathematics (Chiu & Xihua, 2008).

The inclusion of women and mathematicians from various ethnic backgrounds in mathematics education is essential for creating a more equitable learning environment. When students see historical figures who look like them or come from similar backgrounds excelling in mathematics, it can boost their confidence, sense of belonging, and motivation to pursue the subject (Nasir & Cobb, 2002). By highlighting the achievements of diverse mathematicians, educators can help students envision themselves as capable mathematicians and challenge the notion that math is a domain reserved for a specific gender or ethnicity. Ultimately, incorporating a wide range of historical figures in mathematics education not only enriches the curriculum but also empowers all students to see themselves as part of the mathematical community, fostering a more inclusive and supportive learning environment (Niepel, Stadler, & Greiff, 2019; Pang-an, et al, 2022).

### 4. Promoting Equitable Distribution of Opportunities

Ensuring all students receive challenging problems and equal access to learning opportunities is paramount in fostering a supportive and inclusive mathematics learning environment (Luzano & Ubalde, 2023). When teachers assign tasks solely based on perceived ability, it can have detrimental effects on students, especially those facing societal biases (Gniewosz & Watt, 2017). By providing challenging problems to all students, educators can help cultivate a growth mindset, resilience, and a deeper understanding of mathematical concepts across the entire spectrum of learners (Boaler et al., 2022; Luzano, 2023).

When students are not given equal access to challenging problems and learning opportunities, it perpetuates inequalities and reinforces existing societal biases. Students who are already marginalized or underestimated may be unfairly limited in their mathematical growth potential if they are not exposed to tasks that push their boundaries and encourage

them to think critically (Chiu, 2010). By offering all students the chance to tackle challenging problems, educators can create a more equitable learning environment where every individual is allowed to excel and develop their mathematical skills to their fullest potential (Boaler, 2008; Luzano, 2020).

Furthermore, by ensuring equal access to challenging tasks, teachers can help combat the stereotype threat that often affects students facing societal biases. When all students are presented with rigorous mathematical problems regardless of perceived ability, it sends a message of belief in their capabilities and potential for growth (Baysu et al., 2016). This approach not only promotes academic achievement but also fosters a sense of inclusivity, empowerment, and confidence among all learners, ultimately contributing to a more equitable and enriching mathematics education for everyone.

#### 4. CONCLUSION AND RECOMMENDATION

In conclusion, gender-inclusive pedagogical strategies in mathematics play a crucial role in challenging biases, fostering a supportive learning environment, and broadening the perception of mathematics. By identifying and addressing prevalent gender stereotypes through diverse representation and equitable opportunities, educators can create a more inclusive classroom that promotes mathematical success for all students. Additionally, incorporating diverse teaching methods tailored to different learning styles and age groups enhances the effectiveness of math education, ensuring that students of all genders can engage with and excel in mathematical concepts.

To further advance gender-inclusive pedagogy in mathematics, educators are encouraged to continue implementing strategies that promote a growth mindset, collaboration, and confidence-building among students. It is also vital to address math anxiety through targeted interventions and create a supportive atmosphere where all students feel empowered to explore and excel in mathematics. By broadening the perception of mathematics through real-world applications, diverse role models, and highlighting the contributions of female mathematicians, educators can inspire a new generation of mathematicians from all backgrounds and genders. Embracing these recommendations will not only enhance mathematical learning outcomes but also contribute to creating a more equitable and inclusive educational environment for all students.

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