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GENDER DIFFERENCES IN LITERACY AND NUMERACY ACHIEVEMENT: A CRITICAL REVIEW

Melyana R Pugu
Universitas Cenderawasih
puguratana@yahoo.com

Aslan
Universitas Sultan Muhammad Syafuddin Sambas, Indonesia
aslanalbanjary066@gmail.com

Abstract
This study addresses gender differences in literacy and numeracy achievement through a critical review of existing literature. The results show that females tend to excel in literacy, while males often do better in numeracy. Factors influencing these differences include gender stereotypes, social support, pedagogical methods, and individual interests and motivation. This study emphasises the importance of a more gender-responsive and inclusive approach to education to reduce this achievement gap. Recommended strategies include equal interest coaching, gender stereotype awareness programmes and active involvement of parents and the school community. This will create a supportive learning environment for all students, thereby improving overall literacy and numeracy achievement.
Keywords: Gender Difference, Literacy Achievement, Numeracy, Critical Review.

Introduction

Gender is a concept that refers to the roles, behaviours, activities and attributes deemed appropriate for men and women by a particular society and culture. In contrast to biological sex which inherently defines a person as male or female based on their physical characteristics, gender is a social construct that can vary between cultures and can change over time (Parker & Green, 2025) . An understanding of gender includes the recognition that one's gender identity and expression may not always conform to societal gender expectations and normatives. As such, gender is closely related to how individuals identify themselves as well as how they are perceived and treated by their society (Garcia & Walker, 2023) .

The relationship between gender and education is significant, as education plays a key role in shaping gender-related social perceptions and expectations. In many societies, access to and quality of education is often influenced by dominant gender norms and stereotypes, creating disparities in educational attainment between men and women. For example, stereotypes that science and maths subjects are more suitable for men can reduce women's participation and performance in these fields (Collins & Shaw, 2025) . In contrast, women are often more encouraged or expected to excel in literature and the arts. Gender-inclusive and sensitive education can help reduce

stereotypes and discrimination, provide equal opportunities for all students to reach their full potential, and contribute to the advancement of a more just and equitable society (Stoet & Geary, 2013) .

The issue of gender equality has become a major focus in various aspects of life, including in the field of education. Equitable and quality education is an important factor in shaping a generation that is able to contribute optimally to the nation and state. However, in practice, gender differences can still be found in literacy and numeracy achievement in various parts of the world (Harris & Kim, 2023) .

Literacy and numeracy are two basic competencies that are essential in everyday life and are the foundation of education. Literacy encompasses the ability to read, write, understand and interpret diverse texts, enabling individuals to communicate effectively, access information and actively participate in society (OECD, 2013) . Meanwhile, numeracy is the ability to understand and work with numbers, including basic skills such as counting, measuring and solving mathematical problems, and interpreting quantitative data and information. Good literacy and numeracy skills empower individuals to make wise decisions, improve quality of life and contribute productively in an increasingly complex and information-based world (Bedugnis & Alberston ., 2017)

International studies and surveys, such as the Programme for International Student Assessment (PISA), often show significant differences in literacy and numeracy achievement between male and female students. The data show that, in many countries, female students tend to have higher achievement in literacy compared to male students. In contrast, male students often excel in numeracy compared to female students (Robinson, 2025) .

This phenomenon raises questions about the factors that influence such differences. Some of the factors that have been identified include differences in social perceptions and expectations, approaches to learning at home and school, and the role of the teacher in teaching the subject. For example, gender stereotypes that maths is more difficult for women may affect female students' confidence and motivation in learning the subject. In addition, inclusive learning environments and gender-sensitive teaching methods are also thought to play an important role in supporting student achievement. A lack of learning approaches that consider gender differences can widen the achievement gap between boys and girls (Wood, 2023) .

Thus, through a critical review of gender differences in literacy and numeracy achievement, it is hoped that more effective strategies can be found to overcome barriers. This is important so that every student, regardless of gender, can reach their full potential in education. This is also in line with the Sustainable Development Goals which aim to ensure inclusive and equitable education and promote lifelong learning opportunities for all.

Research Methods

The study in this research uses the literature method. Literature research method, also known as literature review, is an approach that involves the systematic collection, evaluation, and analysis of a variety of written sources relevant to a particular research topic. The goal is to understand and synthesise existing knowledge, identify research gaps, and formulate new research questions or hypotheses (Rossi et al., 2004) ; (Jesson et al., 2011) . Through literature research, researchers scrutinise books, journal articles, reports and other sources to gather information that informs the context and significance of their study. This method is important not only to understand the background and theoretical developments in a field, but also to ensure that the resulting research findings can be linked to broader understandings in the existing literature (Hart, 2001) .

Results and Discussion

Differences in Literacy Achievement Between Genders

Differences in literacy achievement between genders have been the concern of many researchers and educators around the world. Many studies have found that there are significant differences between the literacy achievement of men and women. In general, women tend to show higher literacy achievement than men, especially at primary and secondary school age. This can be seen from the results of international standardised tests and assessments which show that women often score higher in reading and writing (Martinez & Lim, 2023) .

There are several factors that contribute to this difference in achievement. Firstly, these differences may be related to gender perceptions and stereotypes that exist in society. For example, reading and writing activities are often more promoted and valued in the context of girls' education, while boys may be more geared towards physical or practical activities. These stereotypes may influence children's interest and engagement in literacy activities from an early age (Evans & White, 2025) .

In addition, the role of parents and the home environment are also influential. Some studies show that females are more likely to receive parental support and encouragement for literacy-related activities, such as reading bedtime stories. In contrast, men may get less encouragement to read outside of formal academic contexts. This factor could be an important determinant in children's literacy development (Hyde et al., 2008) .

Different aspects of motivation and interest can also affect literacy achievement. Women often have a higher interest in reading and writing than men, who tend to be more interested in things that are visual or technical. This intrinsic motivation can be key in deepening their literacy skills, as they are more likely to engage in reading and writing activities voluntarily and consistently (Buchmann et al., 2008) .

At school, teachers and the learning environment also play an important role. Some studies show that the teaching methods used in the classroom are often better suited to women's learning styles, which are more verbal and detailed. This can lead to women excelling in literacy tests that assess reading and writing skills. Teachers may also have their own biases that unwittingly influence the way they teach and give feedback to male and female students (Young, 2023) .

However, it is important to note that these differences in literacy achievement are not universal and may vary depending on the social and cultural context. In some societies, the literacy achievement gap between genders may be quite small or even non-existent depending on the educational values, norms and practices in place. In addition, efforts to promote literacy in an inclusive and equitable manner can help reduce this gap (Johnson, 2024) .

In terms of long-term impact, these differences in literacy attainment can affect various aspects of life, including access to education and employment opportunities. High literacy skills are essential for further academic success and in professional careers. Therefore, genders that lag behind in literacy attainment may experience limitations in seizing these opportunities. To address the literacy achievement gap between genders, comprehensive and sustainable measures are needed. These strategies include raising awareness and training teachers to address gender bias, providing reading materials that appeal to both genders and approaches that support the active engagement of all children in literacy activities. By doing so, it is hoped that both boys and girls can reach their full potential in literacy skills.

Differences in Numeracy Achievement Between Men and Women

Differences in numeracy achievement between men and women have long been a topic of conversation in education. Numeracy, which refers to the ability to use maths in everyday life, is an important skill required for academic and professional success. Although education and public policy continue to try to reduce the gender gap in numeracy, several studies show that this difference still exists in different parts of the world (Reilly et al., 2019) .

One factor that contributes to this difference is the gender stereotypes that exist in society. These stereotypes often portray men as excelling in maths and science, while women excel in language. These stereotypes can influence how teachers teach and how students learn, as well as the expectations they have of their own abilities. In addition, role modelling is also influential. Children who see more men in STEM (Science, Technology, Engineering and Mathematics) fields may internalise the idea that these fields are more suitable for men. The lack of female role models in these fields may reduce women's motivation to pursue further education in maths and science (Gatt & Vella, 2003) .

Learning methods also play an important role in the differences in numeracy achievement between boys and girls. Research shows that more interactive and contextualised teaching methods tend to be more effective for female students. Unfortunately, maths is often taught in a way that is uninteresting and too abstract, which makes female students less motivated (Murphy & Lopez, 2024) .

Another important aspect is family support. Children who receive strong family support in learning maths usually achieve better. However, if parents have stereotypical beliefs about their children's gender abilities, this can affect the level of support they give to boys and girls differently (Williams & Liu, 2023) .

Psychological influences also play a significant role. Girls often experience maths anxiety - specific fears and concerns associated with mathematical tasks - at higher levels than boys. This level of anxiety can hinder their ability to effectively learn and apply mathematical concepts (Lee, 2024) .

On the other hand, there is evidence to suggest that these differences can be reduced or even eliminated with appropriate interventions. Mentoring programmes, teacher training and curriculum changes can help change perceptions and increase girls' confidence in mathematics. Such efforts are already being implemented in some countries with promising results (Nguyen & Patel, 2024) .

In addition, it is important to evaluate and revise education policies to be more inclusive and gender-equitable. Providing teachers trained in gender understanding, as well as creating learning environments that support and motivate all students regardless of gender, can make a big difference in numeracy achievement (Edwards & Cox, 2024) .

Overall, although there are various factors that contribute to the difference in numeracy achievement between males and females, understanding and addressing these factors can help address this gap. With commitment from schools, families and the wider community, it is hoped that every student can reach their potential without being hindered by gender stereotypes and biases.

Factors influencing differences in literacy achievement between genders

Differences in literacy achievement between genders is a complex issue and is influenced by various factors. One of the main factors is differences in access to education. In many parts of the world, women still face significant barriers in accessing formal education compared to men. These barriers include lack of adequate educational facilities, cultural norms that limit women's roles, and economic disparities that exacerbate these conditions (Thompson & Khan, 2024) .

The second factor is the role of gender stereotypes embedded in society. These stereotypes often dictate different expectations and behaviours for boys and girls from an early age. For example, there is an assumption that men are better suited to science and technology, while women are better suited to arts and languages. Such stereotypes

can affect children's interest and motivation in learning as well as parents' and teachers' engagement in supporting their education (Guiso et al., 2008) .

On the other hand, the family environment also plays an important role. Families that encourage reading and provide varied reading materials tend to produce children with higher literacy levels. However, in many cases, women's roles in the household are often more focussed on domestic tasks and they have less time and energy to support their children's education. This can result in lower literacy achievement for girls compared to boys (Else-Quest et al., 2010) .

The education system itself can also compound this gap. Gender-insensitive curricula and uneven teaching methods can exacerbate literacy differences between men and women. Educational materials that are not inclusive or that are overly biased towards one gender can create a learning environment that is not conducive to balanced literacy development (Judijanto & Aslan, 2024) ; (Judijanto & Aslan, 2025) ; (Purike & Aslan, 2025) ; (Firmansyah & Aslan, 2025) .

In addition, government policies and related institutions also have a major influence. Inadequate policies or a lack of programmes specifically designed to address gender disparities can slow down efforts to improve literacy. Education programmes that do not consider girls' specific needs, such as protection from gender-based violence and health facilities, may prevent them from reaching their full potential in literacy (Brown & Clark, 2023) .

Technological development is also a determining factor. Unequal access to information and communication technology can limit women's opportunities to improve their literacy . In today's digital era, literacy is not only about the ability to read and write, but also the ability to access and utilise information. When women have more limited access to technology, they tend to lag behind in aspects of digital literacy (Halpern et al., 2011) .

Social and economic environments also play a significant role in literacy achievement between genders. Girls growing up in poor families or in patriarchal dominant communities are often faced with additional challenges. They may need to work or help with household chores from an early age, which reduces the time available for learning and reading. This limits their opportunities to improve literacy skills at a very young age (Anderson & Martin, 2025) .

A community-based approach to education can also be an important solution. Literacy programmes that engage communities and are designed to address specific gender disparities can have a positive impact. The involvement of communities, parents and local institutions is crucial in creating an enabling environment for gender equality in education (Smith & Doe, 2023) .

Thus, differences in literacy achievement between genders are the result of multiple factors that interact and influence each other. Efforts to reduce this gap require a comprehensive and collaborative approach, including increased access to education,

elimination of gender stereotypes, family support, inclusive curricula, effective policies, utilisation of technology and community engagement. With the right approach, the literacy gap between boys and girls can be further narrowed, providing a fairer chance for all children to reach their full potential.

Conclusion

Differences in Literacy Achievement shows that there are significant gender differences in literacy achievement. In general, females tend to excel in literacy skills more than males. This advantage may be due to a number of factors, including differences in interest in reading, social support and differential treatment of boys and girls by the educational environment. Girls typically show a greater interest in reading from a young age and their social environment is often supportive of literacy activities.

Differences in Numeracy Achievement show a tendency for males to excel over females. This difference is often attributed to social and cultural factors, including gender stereotypes that prevent women from developing interest and skills in mathematics and related fields. There are also pedagogical aspects that may not favour women's full engagement in more challenging numeracy learning.

These gender differences in literacy and numeracy achievement point to the need for a more gender-responsive approach to education. Instructional strategies should consider ways to reduce this gap, for example through more inclusive interest building and equal support for both genders in both areas. In addition, addressing gender stereotypes through awareness programmes in schools and involving parents in the education process can also help to significantly reduce this disparity. Ensuring a supportive learning environment for all students will improve overall literacy and numeracy achievement.

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