



GENDER DIFFERENCES IN ATTITUDE TOWARDS MATHEMATICS AND ACADEMIC ACHIEVEMENT AMONG SECONDARY LEVEL STUDENTS

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ABSTRACT

Attitudes towards mathematics significantly influence academic success. This study explores the relationship between attitude towards mathematics and academic achievement among secondary level students, particularly examining gender differences. A sample of 500 students from four schools (two boys' and two girls' schools) participated, with 200 boys and 300 girls, aged mostly 15 and 16. Data was collected through a 25-item questionnaire adapted from existing literature and modified by Steinback and Gwizdala. Academic achievement was assessed using students' recent mathematics examination scores. Results indicate that girls outperformed boys in mathematics achievement, yet attitude towards mathematics did not correlate with academic success. This study underscores the importance of understanding attitudes towards mathematics, particularly in fostering academic performance, especially among girls.

KEYWORDS: *Attitude towards mathematics, academic achievement, secondary level students, gender differences, mathematics education, gender equity, attitudes, gender stereotypes.*

INTRODUCTION

Education serves as a pathway to human enlightenment and empowerment, fostering a higher quality of life and nurturing well-rounded individuals. An effective educational system unfolds the potential of learners and enhances their skills. Should education fail to enable individuals to realize their potential, it becomes devoid of meaning and relevance. Each child's education should aim to cultivate worth and instill the qualities of a responsible citizen. Within the realm of school education, mathematics holds a pivotal role due to its diverse applications in both individual and societal contexts. Mathematics not only provides a practical framework for understanding its real-world significance but also cultivates problem-solving skills and a scientific mindset among students. This, in turn, fosters a positive attitude towards the subject, characterized by proficient problem-solving abilities, abstract and logical thinking, curiosity, precision, and a penchant for inquiry. Such attributes contribute significantly to academic development.

However, it is observed that only a few secondary schools provide ample opportunities for students to develop a positive attitude towards mathematics and hone their problem-solving abilities. Therefore, this research aims to investigate the dimensions leading to a positive attitude towards mathematics and the variables influencing both attitude and problem-solving ability among secondary school students. As aptly stated, 'Mathematics education is to a nation what protein is to a young human organism,' emphasizing the crucial role mathematics plays in addressing the daily challenges of society.

Objectives of the Study

1. To investigate the significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.
2. To determine if there is a significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.
3. To examine the correlation between attitude towards Mathematics and academic achievement among secondary level girls.
4. To explore the correlation between attitude towards Mathematics and academic achievement among secondary level boys.



Significance of the study

The significance of this study lies in its contribution to understanding the relationship between attitudes towards mathematics and academic achievement among secondary level students, with a particular focus on gender differences. By identifying existing gender disparities in mathematical achievement and attitudes, this research underscores the importance of addressing gender inequities in education and promoting equal opportunities for both male and female students in mathematics education. Moreover, the study emphasizes the role of attitudes towards mathematics in academic success, highlighting the need to foster positive attitudes among students, especially girls, through strategies that nurture interest, curiosity, and confidence in mathematics. The findings also have practical implications for informing educational practices and pedagogical approaches in mathematics teaching, advocating for inclusive teaching practices and tailored interventions to engage students effectively. Furthermore, the evidence-based insights provided by this research can inform educational policies aimed at promoting gender equity and improving mathematics education outcomes, guiding policymakers in designing initiatives to address gender biases and create a supportive learning environment conducive to enhancing the quality and equity of mathematics education in secondary schools.

Hypothesis

1. There is no significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.
2. There is no significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.
3. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level girls.
4. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level boys.

RESEARCH METHODOLOGY

Sample

A sample of 500 students was selected using two-level cluster sampling. In the first stage, four schools - two boys' schools and two girls' schools - were randomly chosen. Subsequently, 300 girls and 200 boys were randomly selected from these schools in Trichirappalli district, Tamil Nadu, India.

Research Tool

This study employed a questionnaire survey as the research design. To measure students' attitudes towards mathematics, a 25-item questionnaire was self-developed based on available literature on the subject. Additionally, an instrument developed by Steinback and Gwizdala was utilized. Each item required responses on a three-point scale, with categories of agree, disagree, and undecided. The questionnaire comprehensively represented the construct of attitude toward math. To facilitate respondents, the questionnaire was translated into Urdu. Furthermore, six items were included concerning the biodata of each student, such as the student's name, class, family size, birth order, and socio-economic background (upper, lower, middle).

Scoring Data

Student responses to each item were scored using a scale of 1 for 'disagree', 2 for 'undecided', and 3 for 'agree'. The total attitude scores were calculated for each student by summing the scores on each item of the questionnaire.

Hypothesis

1. There is no significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.
2. There is no significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.
3. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level girls.
4. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level boys.

Hypothesis testing

H1: There is no significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.

Table 1

Significance difference between mean attitude towards Mathematics score among Secondary level boys and girls

Groups	N	Mean	SD	SE	t	P
Girls	300	57.67	0.45	0.24	12.71	<.05
Boys	200	60.72	0.27			

df 498 t at 0.05 level 1.960



Table 1 shows the obtained t-value is 12.71, whereas the table value at the .05 level of significance indicates a significant difference between mean attitude scores of boys and girls in mathematics. Therefore, there may be a distinction among mean attitude rankings of boys and girls in mathematics.

H2: There is no significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.

Table 2

Significance difference between mean achievement towards Mathematics score among Secondary level boys and girls

Groups	N	Mean	SD	SE	t	P
Girls	300	54.04	1.01	160.27	0.02	>.05
Boys	200	57.00	0.85			

df 498 t at 0.05 level 1.960

Table 2 shows the obtained t-value is 0.02, whereas the table value at the .05 level of significance indicates a non-significant difference between mean achievement scores of boys and girls in mathematics. Therefore, there's no distinction among mean attitude ratings of boys and girls in mathematics.

H3: There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level girls.

Table 3

Significance of correlation between Attitude towards Mathematics and Mathematic achievement with respect to Secondary level girls

Variables	N	r	P
Attitude Vs Achievement	300	0.32	<.05

df 298 r at 0.05 level 0.1946

Table 3 illustrates the correlation coefficient between attitude scores and academic achievement scores of the total sample of girls belonging to Government schools, which was 0.32. The table value of the correlation coefficient at the .05 level of significance was 0.1946. The correlation coefficient between the variables of attitude and academic achievement was, therefore, significant.

H4: There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level boys.

Table 4

Significance of correlation between Attitude towards Mathematics and Mathematic achievement with respect to Secondary level boys

Variables	N	r	P
Attitude Vs Achievement	200	0.13	>.05

df 198 r at 0.05 level 0.1946

Table 4 illustrates the correlation coefficient between attitude scores and academic achievement scores of the total sample of boys belonging to Government schools, which was 0.13. The table value of the correlation coefficient at the .05 level of significance was 0.1946. The correlation coefficient between the variables of attitude and academic achievement was, therefore, non-significant.

RESULTS AND DISCUSSION

The findings of this study reveal several significant points:

1. Female students generally demonstrated better performance in mathematics examinations compared to male students. Although a positive correlation was observed between attitude towards mathematics and math achievement, this relationship was only significant among girls. Conversely, in the group of boys, the correlation coefficient did not reach a significant value.
2. The results underscore the existing gender disparities in mathematical achievement and attitudes. This aligns with previous studies such as those by Sinnes (2005), which suggest that females are capable of producing scientific knowledge equal to males given adequate rigor in scientific inquiry. Additionally, Abiam and Odok (2006) found no significant relationship between gender and achievement in various branches of mathematics, while Opolot-Okurut (2005) reported higher mean scores for attitudinal variables among males compared to females.
3. Addressing the gender gap in mathematics achievement requires concerted efforts. Both male and female students should engage in a cooperative environment, exchanging knowledge and coordinating efforts in mathematics teaching and learning. It's essential to educate female students about the importance of mathematics as a fundamental tool for further education.



4. Mathematics teaching and assessment methods must be free from bias to ensure equality between genders, fostering an environment where both males and females perceive themselves as equals, capable of competing and participating fully in classroom activities.

CONCLUSION

This study elucidates the intricate relationship between attitudes towards mathematics and academic achievement among secondary level students, with a particular emphasis on gender differences. The findings underscore the significance of understanding and addressing attitudes towards mathematics in fostering academic success, particularly among girls who demonstrated superior performance in mathematics examinations compared to boys. Despite this, the study reveals that attitude towards mathematics did not significantly correlate with academic success overall. The research highlights the existing gender disparities in mathematical achievement and attitudes, emphasizing the need for concerted efforts to promote equal opportunities and foster positive attitudes towards mathematics among all students. The results contribute to the body of knowledge on gender equity in education and underscore the importance of inclusive teaching practices and interventions aimed at nurturing interest, curiosity, and confidence in mathematics among students, irrespective of gender. Moving forward, educational policies and practices should be informed by evidence-based insights to address gender biases and create an environment conducive to enhancing the quality and equity of mathematics education in secondary schools.

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