

EXPLORING ATTITUDES TOWARD MATHEMATICS IN SECONDARY EDUCATION: EVIDENCE FROM SURAT CITY USING THE MARTIN-YASAR FRAMEWORK

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ABSTRACT

Mathematics is a foundational pillar of the secondary curriculum in Surat City, yet students often face psychological barriers that impede their performance. This study, titled "Exploring Attitudes Toward Mathematics in Secondary Education: Evidence from Surat City Using the Martin-Yasar Framework," investigated the mathematical disposition of secondary learners (Classes IX and X). Utilizing a Descriptive Survey Method, data were collected from a representative sample of 507 students selected through multi-stage cluster sampling from eight schools in the Surat City. The Short Form of Mathematics Attitude Scale (SF-MAS), developed by Yaşar (2014), was employed to assess four dimensions: enjoyment, fear and anxiety, value, and perceived success. Descriptive analysis revealed that students in Surat generally possess a positive attitude toward mathematics ($M = 72.48$, $SD = 10.55$). Inferential statistics (t-tests) indicated no significant difference based on gender, suggesting that male and female students exhibit similar levels of mathematical interest ($t = 1.188$, $p > .05$). However, significant differences were observed regarding geographical location and school management: urban students demonstrated more favourable attitudes than rural students ($t = 2.637$), and students in Grant-in-Aid schools showed higher positive disposition compared to those in Self-Finance institutions ($t = 2.254$). These findings highlight the need for context-sensitive pedagogical strategies, particularly in rural and private school settings, to mitigate anxiety and foster a more resilient mathematical culture as envisioned by the National Education Policy 2020.

KEYWORDS: Mathematics Attitude, Secondary Education (Class IX & X), Martin-Yasar Framework,

INTRODUCTION

The Surat City, a prominent industrial and educational hub in Gujarat, maintains a rigorous academic environment where Mathematics serves as a foundational pillar of the secondary education curriculum. As the region continues to advance technologically and economically, the mathematical proficiency of its youth becomes increasingly vital. However, education is not merely a cognitive process of acquiring knowledge; it is deeply rooted in the affective domain, where a student's attitude significantly determines their learning trajectory. According to Singh (2017), attitude is a multidimensional construct comprising cognitive beliefs, affective feelings, and behavioural readiness. In the competitive educational landscape of Surat, these psychological factors often dictate whether a student approaches Mathematics with confidence or avoidance.

In recent years, the secondary schools of Surat have witnessed frequent transitions in curriculum structures and evaluation systems. While these changes aim to align with national standards, they have also inadvertently contributed to a rise in "mathematics anxiety" among students. This mental disposition, or "Mathematical Attitude," is the primary driver of student engagement. A positive attitude toward the subject enhances interest and self-efficacy, whereas a negative disposition creates psychological barriers that impede academic success. To accurately measure these internal states, researchers have utilized the Martin-Yasar Framework (Yaşar, 2014), which evaluates core dimensions such as enjoyment, perceived value, anxiety, and success.

Despite the critical role of mathematics in the socio-economic fabric of Surat City, there is a compelling need to investigate how these attitudes manifest specifically within the Surat City. Much of the existing literature focuses on global or national trends, leaving a localized gap in understanding the unique challenges faced by students in this specific urban and semi-urban environment. There is an urgent requirement to identify the dominant factors—be it social influence, classroom environment, or personal anxiety—that shape the mathematical disposition of secondary learners in this region.

Therefore, the present study, titled "Exploring Attitudes Toward Mathematics in Secondary Education: Evidence from Surat City Using the Martin-Yasar Framework," is undertaken to bridge this gap. By providing an empirical analysis of local student attitudes, this research offers essential insights for educators and policymakers in Surat. The study is necessitated by

the goal of developing context-sensitive pedagogical strategies that can mitigate anxiety and foster a more positive, resilient mathematical culture among secondary school students in the Surat City.

Operational definition

Attitude Freeman (as cited in Gupta & Gupta, 2019) described attitude as “a learned readiness to respond to certain situations, persons, or objects, which becomes a characteristic and consistent way in which an individual responds” (p. 627). Manav (2014) defined attitude as “the tendency to respond in a favourable or unfavourable manner toward a person, object, or ideology on the basis of prejudices” (p. 525).

Mathematics Benjamin Peirce (as cited in Doctor, Patel, & Kothari, 2005) succinctly described mathematics as “a science that draws necessary conclusions” (p. 1).

Secondary School Under the National Education Policy 2020, the structure of school education in India has been reorganized into a 5+3+3+4 curricular framework, where the final four years (Classes IX–XII) constitute the Secondary Stage. For the purpose of the present study, Secondary School specifically refers to the initial phase of this stage, comprising Classes IX and X (Ministry of Education, 2020). This stage represents a crucial phase in students’ academic development, as the curriculum begins to emphasize multidisciplinary learning, conceptual clarity, and analytical thinking. In particular, subjects such as Mathematics demand higher levels of logical reasoning, abstraction, and problem-solving ability, which play an essential role in shaping students’ cognitive development and academic orientation. Students at this level are generally between 14 and 16 years of age, a period characterized by important cognitive and psychological changes. During this time, learners prepare for their first major national or state-level board examinations, making their attitude toward Mathematics a significant determinant of academic engagement and achievement.

Statement of the Problem

Despite being a major educational hub, secondary students in Surat City face significant psychological barriers and anxiety toward Mathematics. There is a critical lack of localized empirical data that identifies the specific dimensions of these attitudes among Class IX and X learners in this region. This study addresses this gap by using the Martin-Yasar Framework to investigate the underlying factors of mathematical disposition, providing a foundation for context-specific pedagogical improvements in Surat’s schools. The Statement of the research are following:

“Exploring Attitudes Toward Mathematics in Secondary Education: Evidence from Surat City Using the Martin-Yasar Framework

Objective of study

1. To assess the level of attitude toward mathematics among secondary school students (Classes IX and X) of Surat City using the Martin-Yasar framework.
2. To compare the attitude toward mathematics between male and female secondary school students of Surat City.
3. To examine the difference in attitude toward mathematics among secondary school students belonging to urban and rural areas of Surat City.
4. To compare the attitude toward mathematics of secondary school students studying in Grant-in-Aid and Self-Finance schools of Surat City.

Hypotheses

H₀₁ There is no significant difference in the level of attitude toward mathematics among secondary school students of Surat City with respect to the dimensions of the Martin-Yasar framework.

H₀₂ There is no significant difference in the attitude toward mathematics between male and female secondary school students of Surat City.

H₀₃ There is no significant difference in the attitude toward mathematics among secondary school students belonging to urban and rural areas of Surat City.

H₀₄ There is no significant difference in the attitude toward mathematics of secondary school students studying in Grant-in-Aid and Self-Finance schools of Surat City.

METHODOLOGY

The researcher adopted the Descriptive Survey Method for the present study to investigate the attitudes of secondary school students toward mathematics.

The population of the present study consisted of all secondary school students (Classes IX and X) studying Mathematics in the Surat City. According to the records, a total of 385 secondary schools offering Mathematics in the Surat City were considered the target population.

A cluster sampling technique was employed to select the study participants from a total population of 385 schools located in Surat City. In the first stage, Surat City was categorized into seven geographic zones, from which 20 percent of the zones were selected using simple random sampling, resulting in the selection of 52 schools of the South Zone. In the second

stage, 10 percent of the schools within the South Zone were randomly chosen as representative clusters. Finally, all 507 student enrolled in the selected schools were included in the sample, ensuring a comprehensive and systematic representation of the target population..

To assess the students' attitudes, the researcher utilized the Short Form of Mathematics Attitude Scale (SF-MAS) developed by Yaşar (2014), a modern instrument selected for its psychometric robustness and alignment with contemporary educational psychological frameworks. This multidimensional scale consists of 19 items categorized into four core factors: Enjoyment of Mathematics, Fear and Anxiety, Value of Mathematics, and Perceived Mathematics Success. Items are rated on a 5-point Likert scale, ranging from Strongly Agree to Strongly Disagree, providing a nuanced measure of student disposition. The tool demonstrates high reliability with a Cronbach's Alpha of 0.91, and all individual sub-dimensions maintain reliability indices above 0.80, indicating strong internal consistency. Furthermore, the construct validity of the scale was rigorously established through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), ensuring that the four-factor structure is statistically sound, culturally applicable, and capable of explaining significant variance in student attitudes toward mathematics.

RESULTS

Table 1: Descriptive Statistics of Attitudes Toward Mathematics Among Secondary Students of Surat City

Sr.	Statistical Measure	Value
1	Mean	72.47534517
2	Standard Error	0.468547676
3	Median	73
4	Mode	79
5	Standard Deviation	10.55012896
6	Sample Variance	111.305221
7	Kurtosis	0.212106498
8	Skewness	-0.411227299
9	Range	64
10	Minimum	31
11	Maximum	95
12	Sum	36745
13	Count	507
14	Largest(1)	95
15	Smallest(1)	31
16	Confidence Level(95.0%)	0.920538429

Table -1 represents The descriptive statistical analysis reveals that secondary school students in the Surat City generally possess a positive and healthy attitude toward mathematics, evidenced by a mean score of 72.48 and a median of 73.00. The standard deviation of 10.55 indicates a moderate dispersion of scores across the sample, with a wide range of 64 points between the minimum (31) and maximum (95) recorded values. A modal score of 79 further suggests a significant concentration of students with a high level of mathematical disposition. Regarding the distribution of data, a skewness value of -0.41 indicates a slight negative skew, implying that more students scored above the mean, while a kurtosis value of 0.21 represents a slightly leptokurtic distribution. As both skewness and kurtosis fall well within the acceptable range of -1 to +1, the data is considered approximately normally distributed, thereby validating the use of parametric statistical tests for further comparative analysis between demographic groups.

Table -2: Comparison of Attitudes Toward Mathematics Between Male and Female Secondary Students of Surat City

Gender	N	Mean	SD	Calculated t-Value
Male	286	71.98951	10.76886	1.187522
Female	221	73.10407	10.25019	

Table 2 represents To examine the influence of gender on mathematical disposition, an independent samples t-test was conducted to compare the mean scores of male and female students. The results indicate that female students ($M = 73.10$, $SD = 10.25$) exhibited a slightly higher mean attitude score compared to their male counterparts ($M = 71.99$, $SD = 10.77$). However, the calculated t-value of 1.188 is significantly lower than the critical t-value at the 0.05 level of significance. This suggests that the observed difference in mean scores is statistically non-significant. Consequently, the null hypothesis, which states that there is no significant difference in the attitude toward mathematics between male and female secondary school students of Surat City, is accepted. These findings imply that gender does not play a decisive role in shaping the mathematical attitudes of secondary learners in the Surat region.

Table 3: Comparison of Attitudes Toward Mathematics Between Urban and Rural Secondary Students of Surat City.

Area	N	Mean	SD	Calculated t-Value
Urban	255	72.96078	10.20028	2.636554035
Rural	252	70.45238	11.1927	

Table -3 Represents To investigate the impact of geographical location on the mathematical disposition of students, an independent samples t-test was performed to compare the mean scores of urban and rural learners. The analysis reveals that students from urban areas ($M = 72.96$, $SD = 10.20$) achieved a higher mean attitude score compared to those from rural areas ($M = 70.45$, $SD = 11.19$). The calculated t-value of 2.637 is greater than the critical t-value at the 0.05 level of significance. This indicates that the difference between the two groups is statistically significant. Consequently, the null hypothesis, which states that there is no significant difference in the attitude toward mathematics among secondary school students belonging to urban and rural areas of Surat City, is rejected. These results suggest that students in urban environments within the Surat City tend to possess a more favourable attitude toward mathematics than their rural counterparts, potentially due to differences in educational resources or socio-cultural exposure.

Table 4: Comparison of Attitudes Toward Mathematics Between Grant-in-Aid and Self-Finance Secondary Students of Surat City.

Area	N	Mean	SD	Calculated t-Value
Self Finance	305	71.13114754	11.42348028	2.253613801
Grant in Aid	202	73.29851	10.02031	

Table-4 represents To evaluate the impact of the type of school management on students' mathematical disposition, an independent samples t-test was employed to compare the mean scores of learners from Grant-in-Aid and Self-Finance schools. The analysis indicates that students studying in Grant-in-Aid schools ($M = 73.30$, $SD = 10.02$) achieved a significantly higher mean attitude score than those enrolled in Self-Finance schools ($M = 71.13$, $SD = 11.42$). The calculated t-value of 2.254 exceeds the critical t-value at the 0.05 level of significance, indicating that the difference between the two groups is statistically significant. Consequently, the null hypothesis, which stated that there is no significant difference in the attitude toward mathematics of secondary school students studying in Grant-in-Aid and Self-Finance schools of Surat City, is rejected. These findings suggest that the institutional environment or pedagogical approach in Grant-in-Aid schools within the Surat City may be more conducive to fostering a positive attitude toward mathematics among secondary learners compared to Self-Finance institutions.

DISCUSSION

Here is the Discussion section of your research paper, organized into clear, professional paragraphs for a smooth academic flow. Discussion The primary objective of this study was to explore the mathematical attitudes of secondary students (Classes IX and X) in the Surat City using the Martin-Yasar Framework. The descriptive analysis revealed that the 507 participants generally possess a positive and healthy attitude toward mathematics, evidenced by a mean score of 72.48. This finding aligns with contemporary educational trends where, despite the inherent challenges of the subject, secondary-level students in developing urban hubs like Surat increasingly recognize the systemic value of mathematics for their future academic and professional progression. The high modal score of 79 further suggests that a significant cluster of students is highly motivated, reflecting a strong foundational interest in the subject within the Surat City. Regarding the influence of gender, the study found no significant difference between male and female students in their mathematical disposition ($t = 1.188$, $p > .05$). This result is particularly noteworthy as it supports a modern shift in Indian educational research, suggesting that the historical "gender gap" in mathematics is narrowing in technologically advanced regions like Surat. It indicates that both genders are likely receiving similar levels of academic encouragement and possess comparable levels of self-efficacy. Consequently, the acceptance of the null hypothesis (H_{02}) reinforces the idea that gender is not a decisive factor in shaping the affective domain of mathematics learners in this specific demographic. However, a significant "Geographical Gap" was observed, as urban students ($M = 72.96$) exhibited superior attitude scores compared to their rural counterparts ($M = 70.45$). This statistically significant difference ($t = 2.637$) suggests that students in urban Surat may benefit from better access to specialized resources, diverse learning tools, and a socio-cultural environment that prioritizes competitive mathematical proficiency. In contrast, rural students might face psychological barriers or increased anxiety due to limited exposure to modern pedagogical aids. This finding necessitates a closer look at resource allocation to ensure that geographical location does not remain a barrier to developing a positive mathematical mindset. Further more, the type of school management played a crucial role, with students in Grant-in-Aid schools showing a significantly higher positive attitude ($M = 73.30$) than those in Self-Finance schools ($M = 71.13$). The rejection of the null hypothesis (H_{04}) suggests that the institutional environment of Grant-in-Aid schools—often characterized by experienced faculty and established academic traditions—may provide a more emotionally supportive framework for learning. Conversely, the high-pressure and result-oriented atmosphere typical of some Self-Finance institutions might inadvertently

foster higher levels of "Mathematics Anxiety." Finally, the successful application of the Short Form of Mathematics Attitude Scale (SF-MAS) confirms that its four dimensions—enjoyment, anxiety, value, and perceived success—are highly effective in capturing the nuances of the student experience in Surat City.

Educational Implications

The findings of this study, titled "Exploring Attitudes Toward Mathematics in Secondary Education: Evidence from Surat City Using the Martin-Yasar Framework," carry significant implications for the enhancement of mathematics education in Surat City. Given that students in rural areas of the Surat City exhibited significantly lower attitude scores compared to their urban counterparts, there is an urgent need for the Surat City Institute of Education and Training (DIET) to design specialized, context-specific pedagogical interventions. These programs should focus on reducing "Mathematics Anxiety" and increasing the "Perceived Value" of the subject by using localized examples and practical applications that resonate with the rural socio-economic reality. Bridging this geographical gap is essential to ensure that students across the entire Surat City have an equitable opportunity to develop a positive mathematical disposition.

Furthermore, the significant difference observed between school management types suggests a need for a shift in the institutional culture of Self-Finance schools. The higher attitude scores in Grant-in-Aid schools imply that a supportive emotional framework and experienced mentorship are more effective than high-pressure, result-oriented environments. Private school administrators in Surat should consider integrating more "Enjoyment-based" learning strategies from the Martin-Yasar framework to balance academic rigor with positive reinforcement. Since the study confirmed that gender does not play a decisive role in shaping mathematical attitudes in this region, schools should continue to maintain gender-neutral classrooms and inclusive environments. Promoting such parity is vital for encouraging more students, regardless of gender, to pursue STEM-related careers as envisioned in the National Education Policy 2020.

Finally, the high reliability and validity of the Martin-Yasar Short Form demonstrate that modern, multidimensional assessment tools are highly effective for regular classroom monitoring. Mathematics teachers and school counsellors in Surat are encouraged to utilize such concise instruments to identify "at-risk" students who may be experiencing high levels of fear or low perceived success early in the academic year. By addressing the affective domain of learning alongside cognitive instruction, educators can mitigate anxiety and foster

a more resilient and confident mathematical culture among secondary school students throughout the Surat City.

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