The Influence of Culturally Responsive Mathematics Instruction and Students' Sense of Belonging on their Attitude towards Mathematics

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ABSTRACT

This study investigated the relationship between culturally responsive mathematics instruction (CRMI), students' sense of belonging, and their attitude towards mathematics among junior high school students at San Nicolas National High School. Utilizing a descriptive correlational research design, the study examined how CRMI and students' sense of belonging influence students' attitudes towards mathematics. Data was collected using a survey questionnaire developed by the researcher, consisting of 30 items on a 5-point Likert scale for each variable, with Cronbach's Alpha values of 0.96, 0.95, and 0.89 respectively. Participants included 200 junior high school students, selected through random sampling to ensure representation across grades and backgrounds. The results of the study indicated that students perceived the mathematics instruction as effectively incorporating culturally relevant practices, with an overall mean score of 4.06. Students also reported a strong sense of belonging in their mathematics classrooms, with an overall mean score of 3.93. Furthermore, the study found significant positive correlations between CRMI and students' attitude towards mathematics ($r = 0.42$, $p = 0.00$), and between students' sense of belonging and attitude towards mathematics ($r = 0.57$, $p = 0.00$). These findings highlight the importance of culturally relevant teaching practices and fostering a sense of belonging in enhancing students' attitudes towards mathematics. The study recommends strengthening specific CRMI practices, enhancing the perception of safety and support, promoting greater participation and inclusion, emphasizing the creative dimensions of mathematics, and continuing to foster a positive learning environment to further improve students' experiences and attitudes in mathematics education.

Keywords: Culturally Responsive Mathematics Instruction, Sense of Belonging in Mathematics, Attitude towards Mathematics

INTRODUCTION

The educational landscape has increasingly recognized the significance of culturally responsive teaching (CRT) as a powerful strategy to enhance student engagement and improve learning outcomes. This approach is particularly vital in mathematics instruction, which often presents unique challenges for students from diverse cultural backgrounds. Culturally Responsive Mathematics Instruction (CRMI) aims to bridge the gap between students' cultural experiences and academic content, creating a more inclusive learning environment. By integrating students' cultural identities into the mathematics curriculum, CRMI not only fosters a sense of belonging among learners but also positively influences their attitudes toward mathematics. Understanding the interplay between culturally responsive practices and students' sense of belonging is essential for cultivating a more positive disposition toward mathematics, ultimately leading to improved academic success.

Studies shows that students often face challenges in mathematics due to a lack of culturally relevant instructional practices. Research indicates that many students experience anxiety and disengagement in mathematics, particularly those from marginalized communities (Jackson, 2021). This disengagement is exacerbated by educational practices that do not acknowledge or integrate students' cultural identities, leading to feelings of alienation and reduced academic performance (Shultz, et. al 2023). Furthermore, studies have shown that a strong sense of belonging is crucial for students' motivation and success in academic settings (Will & Najarro,

2022). Thus, there is a pressing need to explore how culturally responsive mathematics instruction and students' sense of belonging can positively influence their attitudes towards mathematics.

Culturally responsive mathematics instruction aims to connect mathematical concepts with students' cultural experiences, making the subject more relatable and engaging. A positive sense of belonging has been linked to higher academic performance and greater motivation, as students who feel valued and included are more likely to engage actively in their learning. Additionally, students' attitudes toward mathematics, which encompass their beliefs and feelings about the subject, significantly influence their academic engagement and persistence. Understanding the interconnectedness of these variables is essential for addressing the challenges faced by students in mathematics education.

Culturally responsive teaching has been shown to enhance student engagement and achievement by connecting academic content to students' cultural experiences (Rubio, 2016; University of the Philippines, 2017). Studies have highlighted the importance of culturally responsive pedagogy in mathematics education, emphasizing the use of local materials and contexts to make learning more accessible and meaningful (Rubio, 2016). Additionally, research supports the idea that culturally responsive mathematics teaching not only improves academic outcomes but also builds students' confidence and sense of belonging in mathematics (Yu et al., 2021)

This study investigates the influence of culturally responsive mathematics instruction and students' sense of belonging on their attitudes toward mathematics. This research will be conducted at San Nicolas National High School during the School Year 2024-2025, allowing for a comprehensive examination of the influence of culturally responsive mathematics instruction and students' sense of belonging on their attitude towards mathematics.

Objectives:

This study examines the relationship between culturally responsive mathematics instruction on students' sense of belonging and attitude towards mathematics at San Nicolas National High School during the School Year 2024 – 2025. Specifically, it sought to:

1. identify the perceived level of culturally responsive mathematics instruction;
2. determine the perceived level of students' sense of belonging;
3. determine the level of students' attitude towards mathematics;
4. ascertain if there is a significant relationship between the level of culturally responsive mathematics instruction to the level of students' attitude towards mathematics; and
5. ascertain if there is a significant relationship in the level of students' sense of belonging to the level students' attitude towards mathematics.

Review Of Related Literature

Culturally Responsive Mathematics Instruction (CRMI)

The diversification of student demographics underscores the need for inclusive teaching methods that recognize and value students' different cultural backgrounds, experiences, and identities to bridge the gap between home and academic cultures, particularly for those from marginalized communities (Martin & Campbell, 2024). This approach not only focuses on what is being taught but also on how it is taught. It makes mathematics accessible by relating mathematical concepts to students' lived experiences (Harding-DeKam, 2014). Integrating culture into mathematics classrooms improves students' problem-solving skills and encourages participation and engagement in mathematics (Shumate et al., 2012).

The foundation of culturally responsive mathematics education is the understanding that mathematics is not neutral but is influenced by cultural contexts. Teachers can use this concept to highlight the wide-ranging nature of mathematical practices and recognize the different mathematical knowledge students bring from their homes and communities (Martin & Campbell, 2024). By integrating culturally relevant content and adapting teaching methods to support students' cultural learning styles, teachers can create inclusive environments that value

diverse cognitive and communicative approaches (Harding-DeKam, 2014). This not only helps students relate better to mathematical concepts but also nurtures a sense of belonging and respect in the classroom (Shumate et al., 2012).

Culturally responsive teaching is a transformative approach that aims to make mathematics education more inclusive and relevant for all students. By valuing cultural backgrounds, integrating culturally relevant content, and promoting critical awareness, this method challenges the traditional, exclusive practices of mathematics education (Harding-DeKam, 2014). It encourages deeper interaction with mathematical learning and helps students see themselves as mathematicians, boosting their confidence and academic performance (Shumate et al., 2012). However, effectively implementing culturally responsive teaching requires teachers to continuously learn and self-reflect. They must recognize their biases and actively work to remove any perspectives that may undervalue students from marginalized backgrounds (Martin & Campbell, 2024). This method involves changing traditional teaching methods to include new strategies that are more culturally aware (Comstock et al., 2022).

Teachers improve mathematics education by connecting classroom learning with students' cultural backgrounds (Harding-DeKam, 2014). This strategy identifies and utilizes the cultural strengths students bring into the classroom, making teaching more relevant and accessible (Martin & Campbell, 2024). Emphasizing cultural responsiveness helps to create an equitable learning atmosphere where all students feel valued, understand the material, and are motivated to succeed (Shumate et al., 2012).

Aguirre et al. (2019) demonstrated that mathematics teachers who integrated students' cultural backgrounds into their lessons observed increased student engagement and deeper conceptual understanding. Their study, conducted in diverse urban classrooms in the United States, found that culturally relevant tasks not only enhanced mathematical reasoning but also fostered positive teacher-student relationships. Similarly, Reyes and Castillo (2021) explored the impact of localized mathematical problems and found that students showed greater interest and improved problem-solving skills when lessons reflected their cultural experiences and community contexts. Internationally, research by de Araujo et al. (2017) emphasized the importance of professional development for teachers in adopting culturally responsive practices, noting that ongoing support and reflection are key to sustaining these instructional changes. These findings collectively underscore that CRMI is a dynamic and evolving approach that requires both systemic support and teacher commitment to effectively bridge cultural gaps in mathematics education.

Moreover, culturally responsive mathematics education is crucial in today's diverse classrooms. It enhances academic success, promotes inclusivity, and prepares students to use mathematics to understand and improve their communities. As classrooms continue to diversify, the importance of these culturally responsive methods will only increase.

Sense of Belonging

The sense of belonging is a critical factor in educational settings, significantly influencing student engagement and academic success. Strayhorn (2019) emphasizes that a strong sense of belonging can enhance students' motivation, leading to better academic performance and lower dropout rates. This is particularly important in mathematics education, where students often experience anxiety and feelings of isolation. Research indicates that students who perceive themselves as part of a supportive educational community are more likely to take risks in their learning and actively engage in classroom discussions (Osterman, 2000; Allen et al., 2021). The integration of culturally responsive teaching practices can further foster this sense of belonging by making mathematics more relatable and relevant to students from diverse backgrounds, thus creating an inclusive environment that nurtures their identity.

Recent studies have explored the nuances of belonging in both online and conventional learning environments. Lahdenperä and Nieminen (2020) found that students generally reported a stronger sense of belonging in face-to-face settings compared to online platforms. This discrepancy can lead to increased feelings of isolation in virtual learning environments. However, when educators implement community-building activities and establish supportive relationships, they can mitigate these feelings of disconnection (Peacock & Cowan, 2019). The

findings suggest that a strong sense of belonging not only enhances students' attitudes toward mathematics but also plays a crucial role in their overall academic experience.

The sense of belonging remains a pivotal variable influencing student outcomes in mathematics education. Studies have reinforced the idea that a strong sense of belonging can mitigate mathematics anxiety and improve academic persistence. For instance, Good et al. (2022) found that students who felt a strong sense of community in their mathematics classrooms were more likely to participate in discussions and seek help when needed, leading to higher achievement. In a local study, Dela Cruz and Santos (2020) investigated Filipino high school students and reported that inclusive classroom practices, such as collaborative group work and culturally sensitive teaching, significantly contributed to students' feelings of acceptance and belonging. Moreover, a large-scale study by Allen et al. (2018) across several countries highlighted that the presence of supportive peer networks and positive teacher-student interactions were strong predictors of students' sense of belonging, which in turn positively influenced their attitudes towards mathematics. These studies affirm that fostering a sense of belonging is essential for creating equitable and supportive mathematics learning environments.

Moreover, the role of interpersonal relationships in fostering a sense of belonging has been emphasized in the literature. Research indicates that positive interactions with teachers and peers significantly contribute to students' feelings of connectedness within the educational community (Goodenow & Grady, 1993; Juvonen, 2006). Students who feel supported and valued by their peers and instructors are more likely to engage in the learning process, thereby improving their performance in subjects like mathematics. As such, fostering a positive classroom climate through culturally responsive methods can help ensure that all students feel included and empowered to succeed in their mathematical endeavors.

Attitude towards Mathematics

Students' attitudes towards mathematics play a crucial role in their academic success and long-term engagement with the subject. Research has consistently shown that positive attitudes are associated with higher achievement levels, while negative attitudes can lead to anxiety and disengagement (Naushad & Valliani, 2025). For instance, a study by Quane (2024) highlighted that students who perceive mathematics as enjoyable and valuable tend to perform better academically. This relationship underscores the need for educators to foster positive attitudes through culturally responsive teaching practices that resonate with students' diverse backgrounds and experiences.

The impact of gender and socioeconomic factors on students' attitudes towards mathematics has also been a significant focus in recent literature. Naushad and Valliani (2025) found that female students often exhibit different attitudes compared to their male counterparts, with various factors influencing these perceptions. Moreover, the study revealed that students from private schools generally hold more positive attitudes towards mathematics than those from government schools, indicating that the educational environment significantly affects students' feelings towards the subject. This suggests that creating supportive and inclusive learning environments can enhance students' attitudes, ultimately improving their performance and persistence in mathematics (Meehan, Howard, & Ni Shuilleabhain, 2018).

Recent literature continues to emphasize the complex interplay between students' attitudes towards mathematics and their academic performance. A study by Wang and Degol (2017) found that students' attitudes are shaped by a combination of classroom climate, teacher expectations, and culturally responsive pedagogy. Their research suggested that when students perceive mathematics as relevant to their lives and identities, their attitudes become more positive, leading to increased motivation and achievement. Mendoza and Javier (2023) discovered that students exposed to contextualized and culturally relevant mathematics instruction reported higher levels of enjoyment and reduced anxiety towards the subject. Internationally, Lee and Kim (2021) highlighted the role of growth mindset interventions in improving students' attitudes, noting that culturally tailored messaging was particularly effective for students from underrepresented backgrounds. These findings suggest that positive attitudes towards mathematics are not only a product of individual disposition but are also shaped by instructional practices and the cultural relevance of the curriculum.

Furthermore, the integration of innovative teaching methods, such as collaborative and participatory pedagogies,

has been shown to promote better attitudes towards mathematics among students (Hannula, 2020). Such methods encourage active engagement and foster a sense of belonging, which is vital for students to feel comfortable and confident in their mathematical abilities. As educators strive to make mathematics more accessible and relatable, understanding the multifaceted nature of students' attitudes becomes essential for developing effective instructional strategies that cater to the needs of all learners.

METHODOLOGY

Research Design

This study utilized a descriptive correlational research design to investigate the relationship between culturally responsive mathematics instruction, students' sense of belonging, and their attitudes toward mathematics. This methodology facilitates a precise analysis of how these variables interact and influence one another among junior high school students at San Nicolas National High School.

Research Setting

The study was conducted at San Nicolas National High School, a public school under the Department of Education located in Purok 8, San Nicolas, Don Carlos, Bukidnon. This setting offers a variety of experiences that truly mirror the educational landscape in the area, making it a fitting choice for this study.

Research Instrument

The researcher developed a survey questionnaire to assess culturally responsive mathematics instruction, students' sense of belonging, and attitudes toward mathematics. Each questionnaire consists of 30 items on a 5-point Likert scale, which achieved Cronbach's Alpha of 0.96, 0.95, and 0.89 during the pilot testing.

Participants of the Study

The study involved 200 Junior High School students from San Nicolas National High School who are officially enrolled in the school year 2024-2025. The participant breakdown was as follows: Gender (112 females, 88 males), Grade Level (35 in Grade 7, 47 in Grade 8, 56 in Grade 9, and 62 in Grade 10), and Ethnicity (131 Manobo, 45 Bukidnon, 24 Hiligaynon/Illonggo). Participants were chosen randomly from different grades and backgrounds, which helps provide a well-rounded view of the factors that shape students' attitudes toward mathematics across various demographics in the school.

Sampling Procedure

A random sampling technique was employed to select participants, ensuring that every student had an equal chance of being included in the study. This approach improves how well the sample represents the population by using systematic selection methods to ensure that participants are distributed fairly and without bias.

Data Gathering Procedure

Before conducting the research with junior high school students, permission was obtained from the administration of San Nicolas National High School (SNNHS). The process started with formal communication to the school principal detailing the study's purpose and significance regarding culturally responsive mathematics instruction, students' sense of belonging, and its effects on attitudes towards mathematics.

Once approval was secured, selected participants were notified of their involvement through letters and classroom announcements. An Informed Consent for Participation form was provided to each participant, outlining the study's objectives, procedures, and rights, including confidentiality assurances. Data collection involved a structured questionnaire to evaluate culturally responsive mathematics instruction, students' sense of belonging, and attitudes toward mathematics. Participants were given adequate time to complete the questionnaires during designated class periods to ensure a thorough understanding of their experiences.

Furthermore, structured data from the questionnaires was quantitatively analyzed to explore relationships and correlations among the variables. Participant confidentiality was strictly upheld throughout the data collection process, as detailed in the Informed Consent Form, ensuring that all ethical considerations were addressed.

Data Analysis

The analysis utilized both descriptive and inferential statistical methods. Descriptive statistics was applied to calculate the means among the variables. Correlation analysis (using Pearson's correlation coefficient) was performed to explore the relationships between culturally responsive mathematics instruction and students' sense of belonging in their attitude toward mathematics. A significance level of $p < 0.01$ was established to determine the strength and relevance of the identified relationships.

This methodology offers a structured framework for understanding how culturally responsive mathematics instruction and a sense of belonging impact students' attitudes toward mathematics, providing valuable insights for educators.

RESULTS AND DISCUSSIONS

Culturally Relevant Mathematics Instruction as Perceived by Students

Table 1: Level of Culturally Relevant Mathematics Instruction

CRMI	Mean	QD	QI
My mathematics teacher uses real-world examples that relate to diverse cultures.	4.33	A	Effective CRMI
My teacher helps me see the connections between mathematics and social justice issues.	4.30	A	Effective CRMI
I feel that my cultural perspectives are valued in mathematics class.	4.27	A	Effective CRMI
I see that my teacher tries to understand students' different learning styles.	4.27	A	Effective CRMI
I feel that mathematics class is a place where I can be myself.	4.27	A	Effective CRMI
My teacher creates a welcoming and inclusive environment in mathematics class.	4.23	A	Effective CRMI
Our mathematics lessons include examples of how mathematics is used in different cultures.	4.19	A	Effective CRMI
My teacher encourages us to learn from each other's diverse experiences in mathematics class.	4.19	A	Effective CRMI
My teacher respects different ways of solving math problems.	4.17	A	Effective CRMI
I feel that my teacher believes that all students can succeed in mathematics	4.15	A	Effective CRMI
My teacher makes an effort to learn about my cultural background.	4.15	A	Effective CRMI
Our mathematics class discussions include different perspectives on mathematical concepts.	4.13	A	Effective CRMI
Our mathematics lessons sometimes include stories or histories from different cultures.	4.12	A	Effective CRMI
The resources used in mathematics class reflect the diversity of our students.	4.09	A	Effective CRMI

I feel comfortable asking questions in mathematics class, regardless of my background.	4.06	A	Effective CRMI
My teacher uses language that is respectful of all cultures.	4.06	A	Effective CRMI
My teacher helps me connect mathematics to my own experiences.	4.03	A	Effective CRMI
Our mathematics lessons include discussions about the contributions of diverse cultures to mathematics.	4.00	A	Effective CRMI
My teacher provides extra support to students who need it in mathematics.	3.99	A	Effective CRMI
I feel that my teacher tries to make mathematics meaningful for all students.	3.99	A	Effective CRMI
I feel that my teacher celebrates the diversity of our class.	3.98	A	Effective CRMI
In mathematics class, I see examples that reflect people from various backgrounds.	3.95	A	Effective CRMI
My teacher encourages students to share how their cultural backgrounds relate to mathematics.	3.93	A	Effective CRMI
The mathematics problems we solve are relevant to my life and community.	3.91	A	Effective CRMI
My teacher avoids using stereotypes in mathematics class.	3.91	A	Effective CRMI
I feel that my teacher is open to learning about different cultures.	3.91	A	Effective CRMI
My teacher makes sure that everyone has an equal chance to participate in mathematics class.	3.86	A	Effective CRMI
I feel that my teacher is committed to creating a fair and equitable mathematics classroom.	3.82	A	Effective CRMI
My teacher uses teaching methods that are effective for students from diverse backgrounds.	3.76	A	Effective CRMI
I feel that my teacher is aware of the challenges that students from different backgrounds may face in mathematics.	3.76	A	Effective CRMI
Culturally Relevant Instruction Overall Mean	*4.06*	*A*	*Effective CRMI*

Legend:

Scale	*Range*	*Qualitative Description (QD)*	*Qualitative Interpretation*
5	4.51-5.00	Strongly Agree (SA)	Highly Effective CRMI
4	3.51-4.50	Agree (A)	Effective CRMI
3	2.51-3.50	Neutral (N)	Neither Effective nor Ineffective CRMI
2	1.51-2.50	Disagree (D)	Ineffective CRMI
1	1.00-1.50	Strongly Disagree (SD)	Very Ineffective CRMI

Table 1 presents the students' perceptions on the level of Culturally Relevant Mathematics Instruction (CRMI) they experience. The overall mean score for CRMI was 4.06, which corresponds to a qualitative description of "Agree" and an interpretation of "Effective CRMI". This indicates that, on average, students perceive the mathematics instruction at San Nicolas National High School as effectively incorporating culturally relevant practices. This aligns with the goal of CRMI to make mathematics more accessible and engaging by connecting it to students' cultural backgrounds and lived experiences. Research suggests that such practices can help mitigate

the anxiety and disengagement often associated with mathematics, especially for students from diverse backgrounds.

Students rated several aspects of CRMI particularly effective. The statement "My mathematics teacher uses real-world examples that relate to diverse cultures" received the highest mean score (4.33). This finding underscores the importance students place on seeing mathematical concepts applied in contexts relevant to various cultural backgrounds, making the subject matter more relatable. Similarly, "My teacher helps me see the connections between mathematics and social justice issues" has a mean score of (4.30), suggesting students value instruction that links mathematics to broader societal concerns and promotes critical awareness, a key aspect of rehumanizing mathematics education (Velasco, 2022).

Other highly-rated items include feeling that cultural perspectives are valued (4.27), perceiving that the teacher tries to understand different learning styles (4.27), and feeling that the mathematics class is a place where they can be themselves (4.27). These aspects point to the significance of a supportive and inclusive classroom environment where students feel their identities are respected and understood. Creating such an environment is crucial for fostering a sense of belonging, which is linked to increased motivation and academic success. The effective implementation of CRMI often involves teachers creating welcoming spaces and acknowledging diverse ways of knowing and solving problems.

While the overall perception was positive, some items received slightly lower mean scores, although still falling within the "Effective CRMI" range. For instance, "My teacher uses teaching methods that are effective for students from diverse backgrounds" and "I feel that my teacher is aware of the challenges that students from different backgrounds may face in mathematics" both scored 3.76. This might suggest that while students generally feel the instruction is culturally responsive, they perceive areas for potential growth in the specific tailoring of teaching methods and the explicit acknowledgment of diverse student challenges. Effective CRMI implementation often requires teachers to engage in ongoing learning and self-reflection to adapt their strategies and address diverse student needs (Comstock et al., 2022), aligning with educational goals that emphasize inclusive methods for diverse learners. Integrating culturally relevant content and adapting teaching methods are seen as vital for creating equitable learning atmospheres.

Hence, the results from Table 1 indicate that students perceive the mathematics instruction as effectively culturally responsive. The high ratings for the use of real-world examples, connections to social justice, and the valuing of cultural perspectives highlight the importance of these elements in students' experiences. While generally positive, the slightly lower scores on items related to specific teaching methods for diverse backgrounds suggest potential areas for further development in instructional practice.

Sense of Belonging in Mathematics (SBM)

Table 2: Level of Students' Sense of Belonging

SENSE OF BELONGING IN MATHEMATICS	Mean	QD	QI
I feel connected to my classmates during mathematics lessons.	4.32	A	Strong SBM
I feel like I belong in my mathematics class.	4.25	A	Strong SBM
I feel accepted by my classmates in mathematics class.	4.14	A	Strong SBM
I feel like I am making a difference in mathematics class.	4.13	A	Strong SBM
I feel like I am learning from my classmates in mathematics class.	4.13	A	Strong SBM
I feel like I can trust my teacher and classmates in mathematics class.	4.08	A	Strong SBM
I feel like a valued member of my mathematics class.	4.07	A	Strong SBM
I feel like I have friends in my mathematics class.	4.07	A	Strong SBM

I feel motivated to learn mathematics in this class.	4.07	A	Strong SBM
I feel like my teacher understands me in mathematics class.	4.05	A	Strong SBM
I feel like I am making progress in mathematics class.	4.03	A	Strong SBM
I feel like I am an important part of my mathematics class.	4.03	A	Strong SBM
I feel like I am part of a team in mathematics class.	4.01	A	Strong SBM
I feel like my ideas are respected in mathematics class.	3.99	A	Strong SBM
I feel like I am supported by my teacher in mathematics class.	3.99	A	Strong SBM
I feel like I can be myself in mathematics class.	3.97	A	Strong SBM
I feel like I fit in with the other students in mathematics class.	3.92	A	Strong SBM
I feel comfortable participating in mathematics class discussions.	3.91	A	Strong SBM
I feel like I am growing as a mathematics student in this class.	3.90	A	Strong SBM
I feel like I am successful in mathematics class.	3.89	A	Strong SBM
I feel like I can get help from my classmates in mathematics class.	3.88	A	Strong SBM
I look forward to attending mathematics class.	3.88	A	Strong SBM
I feel like my classmates are learning from me in mathematics class.	3.87	A	Strong SBM
I feel like I am part of a community in my mathematics class.	3.85	A	Strong SBM
I feel comfortable asking questions in mathematics class.	3.84	A	Strong SBM
I feel like I contribute to the learning environment in mathematics class.	3.81	A	Strong SBM
I feel included in group activities during mathematics class.	3.77	A	Strong SBM
I feel like I am developing my mathematical abilities in this class.	3.70	A	Strong SBM
I feel like I am in a safe and supportive learning environment in mathematics class.	3.32	N	Neither Strong nor Weak SBM
I feel like my teacher cares about me in mathematics class.	3.25	N	Neither Strong nor Weak SBM
Sense of Belonging Overall Mean	*3.93*	*A*	*Strong SBM*

Legend:

Scale	*Range*	*Qualitative Description (QD)*	*Qualitative Interpretation*
5	4.51-5.00	Strongly Agree (SA)	Very Strong SBM
4	3.51-4.50	Agree (A)	Strong SBM
3	2.51-3.50	Neutral (N)	Neither Strong nor Weak SBM
2	1.51-2.50	Disagree (D)	Weak SBM
1	1.00-1.50	Strongly Disagree (SD)	Very Weak SBM

Table 2 outlines the students' perceived level of Sense of Belonging in Mathematics (SBM). The overall mean score for SBM was 3.93, corresponding to the qualitative description "Agree" and indicating a "Strong SBM". This result suggests that students generally feel a positive sense of belonging within their mathematics classroom environment at San Nicolas National High School. This is a significant finding, as a strong sense of belonging is widely recognized as crucial for enhancing student motivation, engagement, and academic success, especially in mathematics (Strayhorn, 2019; Will & Najarro, 2022).

Further analysis reveals high levels of agreement on specific aspects contributing to belonging. The items "I feel

connected to my classmates during mathematics lessons" (4.32), "I feel like I belong in my mathematics class" (4.25), and "I feel accepted by my classmates in mathematics class" (4.14) received the highest mean scores. These findings highlight the importance of peer relationships and acceptance in establishing a sense of belonging. When students feel connected to and accepted by their peers, they are more likely to feel part of a supportive community, which can encourage active participation and academic risk-taking. The strong SBM observed likely connects to the effective Culturally Relevant Mathematics Instruction (CRMI) identified in (Table 1). CRMI practices that create inclusive environments and value diverse student perspectives inherently foster belonging (Martin & Campbell, 2024; Yu et al., 2021).

Despite the overall positive SBM, two items received lower, "Neutral" ratings: "I feel like I am in a safe and supportive learning environment in mathematics class" (3.32) and "I feel like my teacher cares about me in mathematics class" (3.25). The neutral ratings for safety, support, and teacher care need careful attention. Students may perceive that while teachers are using culturally responsive strategies, they may not feel a strong sense of emotional support or safety. This could be due to factors such as classroom management issues, lack of individual attention, or implicit biases that students perceive. Addressing these issues is essential for creating a truly inclusive and supportive learning environment that maximizes the benefits of CRMI. This nuance is important, as positive teacher-student relationships and a supportive classroom climate are foundational for students feeling valued and included (Allen et al., 2021; Peacock & Cowan, 2019). These neutral findings could indicate areas needing further attention to ensure all students consistently perceive the classroom as a safe, caring, and supportive space where they can thrive.

Additionally, items such as "I feel comfortable asking questions in mathematics class" (3.84) and "I feel included in group activities during mathematics class" (3.77), while still indicating "Strong SBM", were among the lower-rated items within that category. This might point towards subtle classroom dynamics where some students may still hesitate to participate fully or feel less integrated during collaborative work.

Thus, the findings indicate a strong overall sense of belonging among students in their mathematics classes, particularly concerning peer connections and acceptance. This positive SBM is likely supported by the effective CRMI practices reported (Yu et al., 2021). However, the neutral perceptions regarding the safety and supportiveness of the learning environment and teacher care, along with slightly lower agreement on comfort in participation, highlight specific areas where targeted efforts could further enhance students' sense of belonging and ensure a consistently positive experience for everyone.

Students' Attitude towards Mathematics

Table 3: Level of Students' Attitude towards Mathematics

ATTITUDE TOWARDS MATHEMATICS (ATM)	Mean	QD	QI
I think mathematics is a subject that I will continue to use throughout my life.	4.67	SA	Very Positive ATM
I believe that everyone can learn mathematics.	4.45	A	Positive ATM
I enjoy doing mathematics.	4.32	A	Positive ATM
I am curious about mathematics.	4.25	A	Positive ATM
I believe that mathematics is important.	4.21	A	Positive ATM
I like solving mathematics problems.	4.21	A	Positive ATM
I think mathematics helps me develop my thinking skills.	4.15	A	Positive ATM
I think mathematics is a valuable subject to study.	4.13	A	Positive ATM
Mathematics is one of my favorite subjects	4.10	A	Positive ATM
I am not afraid to make mistakes in mathematics.	4.09	A	Positive ATM

I am motivated to learn mathematics.	4.08	A	Positive ATM
I feel satisfied when I solve a mathematics problem.	4.08	A	Positive ATM
I find satisfaction in understanding mathematical concepts.	4.08	A	Positive ATM
I find mathematics interesting.	4.07	A	Positive ATM
I look forward to mathematics class.	4.07	A	Positive ATM
I think mathematics is useful in everyday life.	4.06	A	Positive ATM
I like to explore different ways to solve mathematics problems.	4.05	A	Positive ATM
I enjoy discussing mathematics with others.	4.04	A	Positive ATM
I find mathematics challenging in a good way.	4.01	A	Positive ATM
I am proud of my mathematics achievements.	4.01	A	Positive ATM
I think mathematics can be fun.	4.00	A	Positive ATM
I believe that I can succeed in mathematics.	3.99	A	Positive ATM
I am confident in my ability to do mathematics.	3.98	A	Positive ATM
I am interested in learning more about mathematics.	3.98	A	Positive ATM
I feel that mathematics helps me understand the world around me.	3.92	A	Positive ATM
I think mathematics is relevant to my future.	3.90	A	Positive ATM
I am willing to put in effort to learn mathematics.	3.87	A	Positive ATM
I learn a lot from doing mathematics.	3.82	A	Positive ATM
I think mathematics is creative.	3.81	A	Positive ATM
I enjoy discovering new things in mathematics.	3.67	A	Positive ATM
Attiude towards Mathematics Overall Mean	*4.07*	*A*	*Positive ATM*

Legend:

Scale	*Range*	*Qualitative Description (QD)*	*Qualitative Interpretation*
5	4.51-5.00	Strongly Agree (SA)	Very Positive ATM
4	3.51-4.50	Agree (A)	Positive ATM
3	2.51-3.50	Neutral (N)	Neither Positive nor Negative ATM
2	1.51-2.50	Disagree (D)	Negative ATM
1	1.00-1.50	Strongly Disagree (SD)	Very Negative ATM

Table 3 presents the findings regarding the students' Attitude towards Mathematics (ATM). The overall mean score was 4.07, which falls within the "Agree" range and indicates a "Positive ATM". This overall positive attitude is a favorable outcome, as research consistently demonstrates a link between positive attitudes towards mathematics and higher academic achievement, increased engagement, and greater persistence in the subject (Naushad & Valliani, 2025; Quane, 2024). This positive disposition may be influenced by the effective Culturally Relevant Mathematics Instruction (CRMI) (Table 1 Overall M=4.06) and the strong Sense of Belonging in Mathematics (SBM) (Table 2 Overall M=3.93) reported by the students. An inclusive, culturally responsive environment where students feel they belong can significantly enhance their disposition towards mathematics (Shultz et al., 2023; Martin & Campbell, 2024).

Students expressed the strongest agreement with the statement, "I think mathematics is a subject that I will continue to use throughout my life" (4.67), which corresponds to "Strongly Agree" and a "Very Positive ATM". This highlights a strong perception of the subject's utility and relevance beyond the classroom. Recognizing the value and importance of mathematics is a key component of a positive attitude and correlates with better

performance (Quane, 2024). High agreement was also found for "I believe that everyone can learn mathematics" (4.45) and "I enjoy doing mathematics" (4.32). This suggests students generally possess a growth mindset regarding mathematical ability and find the process of engaging with mathematics enjoyable.

Many indicators reflecting positive affect and cognitive engagement scored highly within the "Positive ATM" range. Students reported finding mathematics interesting (4.07), feeling motivated (4.08), feeling satisfied when solving problems (4.08), and finding satisfaction in understanding concepts (4.08). These feelings align with the definition of attitude as encompassing beliefs and feelings about the subject. Furthermore, students reported not being afraid to make mistakes (4.09) and feeling confident in their abilities (3.98). This lack of fear and sense of confidence may stem from the supportive and inclusive environment fostered by CRMI and a strong SBM, potentially mitigating the math anxiety often reported in literature (Jackson, 2021; Naushad & Valliani, 2025). The use of engaging and participatory pedagogies, often part of CRMI, can promote better attitudes (Hannula, 2020; Meehan, Howard, & Ni Shuilleabhain, 2018).

While the overall attitude was positive, some aspects received slightly lower agreement, though still within the "Positive ATM" range. Statements such as "I think mathematics is creative" (3.81) and "I enjoy discovering new things in mathematics" (3.67) had lower means compared to items about utility or enjoyment of problem-solving. This might indicate that the creative and exploratory dimensions of mathematics are less prominent in students' current perceptions or experiences. Enhancing these aspects could be a potential area for enriching mathematics instruction further.

Hence, students demonstrate a positive attitude towards mathematics, characterized by a strong belief in its utility, enjoyment in engaging with the subject, and confidence in their ability. This positive disposition is likely fostered by the effective culturally relevant instruction and the strong sense of belonging experienced by the students. While the perception of mathematics as useful and enjoyable is strong, highlighting its creative aspects could further enhance students' attitudes.

Table 4. Correlation between culturally responsive mathematics instruction and students' attitude towards mathematics

Independent Variable	Pearson Correlation (r-value)	Probability (P-value)
Culturally Responsive Mathematics Instruction	0.42**	0.00

** Correlation is significant at the 0.01 level (2-tailed).

Table 4 presents the correlation between culturally responsive mathematics instruction and students' attitude towards mathematics. The results indicate a Pearson correlation coefficient (r-value) of 0.42 and a probability (p-value) of 0.00. This shows a statistically significant positive correlation at the 0.01 level (2-tailed) between culturally responsive mathematics instruction and students' attitude towards mathematics.

The significant positive correlation ($r = 0.42$, $p = 0.00$) between culturally responsive mathematics instruction and students' attitude towards mathematics suggests that as culturally responsive practices are implemented in the classroom, students tend to develop a more positive attitude towards mathematics. This finding aligns with previous research that emphasizes the importance of culturally relevant teaching in fostering positive attitudes and engagement in mathematics (Martin & Campbell, 2024; Shultz et al., 2023). Culturally responsive instruction, by connecting mathematical concepts to students' cultural experiences and promoting an inclusive learning environment, can enhance students' beliefs and feelings about mathematics.

This result is consistent with the idea that when students see mathematics as relevant to their lives and cultures, they are more likely to appreciate and engage with the subject (Martin & Campbell, 2024). The correlation also supports the notion that addressing the diverse needs of learners through culturally responsive teaching can reduce math anxiety and increase students' confidence, which are important components of a positive attitude towards mathematics (Jackson, 2021; Yu et al., 2021). Furthermore, this finding underscores the potential of culturally responsive mathematics instruction to create a more equitable and engaging learning environment,

ultimately leading to improved academic outcomes.

Table 5. Correlation between students' sense of belonging and attitude towards mathematics

Independent Variable	Pearson Correlation (r-value)	Probability (P-value)
Students' Sense of Belonging in Mathematics	0.57**	0.00

** Correlation is significant at the 0.01 level (2-tailed).

Table 5 shows the correlation between students' sense of belonging and their attitude towards mathematics. The data reveals a Pearson correlation coefficient (r-value) of 0.57 and a probability (p-value) of 0.00. This indicates a statistically significant positive correlation at the 0.01 level (2-tailed) between students' sense of belonging in mathematics and their attitude towards the subject.

The significant positive correlation ($r = 0.57$, $p = 0.00$) between students' sense of belonging and their attitude towards mathematics highlights the critical role of belonging in shaping students' disposition towards mathematics. This finding supports the existing literature that emphasizes the link between a strong sense of belonging and positive academic outcomes, including attitudes towards specific subjects (Strayhorn, 2019; Will & Najarro, 2022). When students feel connected, accepted, and supported in their mathematics classroom, they are more likely to develop a positive attitude towards mathematics (Allen et al., 2021).

A strong sense of belonging can create a safe and inclusive learning environment where students feel valued and motivated to engage with mathematics (Peacock & Cowan, 2019). This positive emotional connection can reduce anxiety and increase students' willingness to participate in mathematical activities, ultimately fostering a more favorable attitude (Naushad & Valliani, 2025). Moreover, this result aligns with the idea that when students perceive themselves as integral members of the mathematics learning community, their belief in their ability to succeed in mathematics is strengthened, further enhancing their attitude towards the subject.

CONCLUSIONS

The findings of this study indicate that students perceive Culturally Relevant Mathematics Instruction (CRMI) as being implemented effectively in their classrooms. The overall mean score of 4.06 demonstrates that students generally agree that their mathematics instruction incorporates culturally relevant practices. This perception aligns with the goals of CRMI, which aims to enhance the accessibility and engagement of mathematics by connecting it with students' cultural backgrounds and lived experiences.

Moreover, students reported a strong sense of belonging in their mathematics classrooms, with an overall mean score of 3.93. This suggests that students generally feel a sense of connection, acceptance, and support within their mathematics learning environment. This is a critical aspect of their educational experience as a strong sense of belonging has been associated with increased motivation, engagement, and academic success in mathematics.

In addition, the study revealed a generally positive attitude towards mathematics among the students, with an overall mean score of 4.07. This positive disposition is important because it is often linked to higher academic achievement, greater involvement in the subject, and increased persistence when faced with challenges in mathematics.

The statistical analysis revealed significant positive correlations between CRMI and students' attitude towards mathematics ($r = 0.42$, $p = 0.00$) and between students' sense of belonging and their attitude towards mathematics ($r = 0.57$, $p = 0.00$). These correlations emphasize the important roles that culturally relevant teaching and fostering a sense of belonging play in developing a positive attitude towards mathematics.

RECOMMENDATIONS

Following the analysis and conclusions of this study, the ensuing recommendations are given:

Firstly, while the overall perception of CRMI is positive, there is a need to strengthen specific instructional practices. The results suggest that students feel there is room for improvement in tailoring teaching methods to meet the diverse needs of learners and in explicitly acknowledging the challenges faced by students from different backgrounds, and improve specific strategies to create even more inclusive and engaging learning environments. To further support teachers in developing CRMI, it is recommended that educators intentionally integrate local cultural artifacts and contexts into mathematics lessons. For instance, teachers can use traditional weaving patterns from the students' community to teach geometric concepts like symmetry, tessellations, and transformations. Similarly, exploring the mathematics involved in local games or sports, such as calculating scores or probabilities, or incorporating traditional measurement systems used in the community before introducing the metric system, can make mathematics more relevant and accessible. Therefore, it is recommended that teachers participate in ongoing professional development and engage in self-reflection to continuously adapt their instructional strategies to better support all students.

Secondly, although students reported a strong sense of belonging, some aspects, such as feeling safe, supported, and cared for by their teacher, received neutral ratings. To address this, it is recommended that efforts be made to build stronger teacher-student relationships and create a more consistently supportive and safe classroom environment. Strategies to achieve this could include providing more opportunities for individual interaction, demonstrating care and support in explicit ways, and implementing practices that promote a sense of safety and trust.

Thirdly, it is important to promote greater participation and inclusion in the classroom. The findings suggest that some students may still feel hesitant to participate fully or feel less included in group activities. To counter this, teachers should actively work to create inclusive classroom dynamics and provide various opportunities for all students to engage and contribute. This could involve using diverse grouping strategies, establishing clear participation guidelines, and designing activities that explicitly value the contributions of each student.

Fourthly, there should be an increased emphasis on the creative and exploratory dimensions of mathematics. The study indicates that these aspects may not be sufficiently highlighted in the students' experience of mathematics. To enhance students' attitudes towards mathematics, instruction should be designed to showcase the creative and exploratory nature of the subject. This could involve incorporating open-ended problems, inquiry-based projects, and activities that encourage students to explore multiple solution pathways and make connections between mathematical concepts.

Lastly, given the significant positive correlations observed in this study, it is crucial to continue fostering a positive learning environment by sustaining and enhancing CRMI practices, sense of belonging, and positive attitudes towards mathematics. Schools should provide ongoing support for the implementation of CRMI, prioritize the development of a strong sense of belonging, and promote strategies that cultivate positive attitudes towards mathematics. This can be achieved through sustained professional development for teachers, the cultivation of a positive school culture, and the provision of adequate resources and support for both teachers and students.

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Culturally Responsive Mathematics Instruction (CRMI) Scale

Instruction: For each statement, please check the box that represents the extent to which you agree or disagree by selecting a number from 1 to 5 based on the following scale:

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; and 5 = Strongly Agree

No.	Indicators	1	2	3	4	5
1.	My mathematics teacher uses real-world examples that relate to diverse cultures.					
2.	In mathematics class, I see examples that reflect people from various backgrounds.					
3.	My teacher encourages students to share how their cultural backgrounds relate to mathematics.					
4.	I feel that my cultural perspectives are valued in mathematics class.					
5.	My teacher respects different ways of solving math problems.					
6.	Our mathematics lessons include discussions about the contributions of diverse cultures to mathematics.					
7.	My teacher makes sure that everyone has an equal chance to participate in mathematics class.					
8.	I feel that my teacher believes that all students can succeed in mathematics					
9.	My teacher uses teaching methods that are effective for students from diverse backgrounds.					
10.	The mathematics problems we solve are relevant to my life and community.					
11.	My teacher helps me connect mathematics to my own experiences.					

12.	I feel comfortable asking questions in mathematics class, regardless of my background.					
13.	My teacher creates a welcoming and inclusive environment in mathematics class.					
14.	I see that my teacher tries to understand students' different learning styles.					
15.	Our mathematics lessons include examples of how mathematics is used in different cultures.					
16.	My teacher avoids using stereotypes in mathematics class.					
17.	I feel that my teacher is aware of the challenges that students from different backgrounds may face in mathematics.					
18.	My teacher provides extra support to students who need it in mathematics.					
19.	I feel that my teacher celebrates the diversity of our class.					
20.	Our mathematics class discussions include different perspectives on mathematical concepts.					
21.	The resources used in mathematics class reflect the diversity of our students.					
22.	My teacher uses language that is respectful of all cultures.					
23.	I feel that my teacher tries to make mathematics meaningful for all students.					
24.	My teacher helps me see the connections between mathematics and social justice issues.					
25.	I feel that my teacher is committed to creating a fair and equitable mathematics classroom.					
26.	Our mathematics lessons sometimes include stories or histories from different cultures.					
27.	My teacher encourages us to learn from each other's diverse experiences in mathematics class.					
28.	I feel that my teacher is open to learning about different cultures.					
29.	My teacher makes an effort to learn about my cultural background.					
30.	I feel that mathematics class is a place where I can be myself.					

Sense of Belonging in Mathematics (SBM) Scale

No.	Indicators	1	2	3	4	5
1.	I feel like I belong in my mathematics class.					
2.	I feel accepted by my classmates in mathematics class.					
3.	I feel like a valued member of my mathematics class.					
4.	I feel comfortable participating in mathematics class discussions.					
5.	I feel like I fit in with the other students in mathematics class.					
6.	I feel included in group activities during mathematics class.					
7.	I feel like my ideas are respected in mathematics class.					

8.	I feel like my teacher cares about me in mathematics class.					
9.	I feel like I can be myself in mathematics class.					
10.	I feel connected to my classmates during mathematics lessons.					
11.	I feel like I have friends in my mathematics class.					
12.	I feel like I am part of a community in my mathematics class.					
13.	I feel comfortable asking questions in mathematics class.					
14.	I feel like I can get help from my classmates in mathematics class.					
15.	I feel like my teacher understands me in mathematics class.					
16.	I feel like I am supported by my teacher in mathematics class.					
17.	I feel like I contribute to the learning environment in mathematics class.					
18.	I feel like I am making a difference in mathematics class.					
19.	I feel like I am learning from my classmates in mathematics class.					
20.	I feel like my classmates are learning from me in mathematics class.					
21.	I feel like I am growing as a mathematics student in this class.					
22.	I feel like I am developing my mathematical abilities in this class.					
23.	I feel like I am making progress in mathematics class.					
24.	I feel like I am successful in mathematics class.					
25.	I look forward to attending mathematics class.					
26.	I feel motivated to learn mathematics in this class.					
27.	I feel like I am part of a team in mathematics class.					
28.	I feel like I am in a safe and supportive learning environment in mathematics class.					
29.	I feel like I can trust my teacher and classmates in mathematics class.					
30.	I feel like I am an important part of my mathematics class.					

Attitude towards Mathematics Scale

No.	Indicators	1	2	3	4	5
1.	I enjoy doing mathematics.					
2.	I find mathematics interesting.					
3.	Mathematics is one of my favorite subjects					
4.	I look forward to mathematics class.					
5.	I think mathematics is useful in everyday life.					
6.	I believe that mathematics is important.					
7.	I am confident in my ability to do mathematics.					
8.	I am motivated to learn mathematics.					
9.	I like solving mathematics problems.					
10.	I am curious about mathematics.					

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11.	I am willing to put in effort to learn mathematics.					
12.	I find mathematics challenging in a good way.					
13.	I think mathematics is creative.					
14.	I enjoy discovering new things in mathematics.					
15.	I think mathematics can be fun.					
16.	I believe that everyone can learn mathematics.					
17.	I am not afraid to make mistakes in mathematics.					
18.	I learn a lot from doing mathematics.					
19.	I feel satisfied when I solve a mathematics problem.					
20.	I am proud of my mathematics achievements.					
21.	I like to explore different ways to solve mathematics problems.					
22.	I think mathematics is relevant to my future.					
23.	I am interested in learning more about mathematics.					
24.	I think mathematics helps me develop my thinking skills.					
25.	I enjoy discussing mathematics with others.					
26.	I think mathematics is a valuable subject to study.					
27.	I feel that mathematics helps me understand the world around me.					
28.	I believe that I can succeed in mathematics.					
29.	I find satisfaction in understanding mathematical concepts.					
30.	I think mathematics is a subject that I will continue to use throughout my life.					