


## EMOTIONAL INTELLIGENCE IN MATH CLASSES: A WAY TO OVERCOME ANXIETIES AND STRENGTHEN SKILLS

 <https://doi.org/10.56238/arev7n3-010>

Submitted on: 02/04/2025

Publication date: 03/04/2025

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### ABSTRACT

Emotional intelligence (EI) plays a fundamental role in the teaching and learning of mathematical concepts in basic education, directly influencing the cognitive and socio-emotional development of students. This study aims to analyze the relationship between emotions and mathematics learning, highlighting the importance of developing emotional intelligence to overcome challenges, build self-confidence, and improve academic performance. The methodology adopted consists of a literature review focused on the intersection between emotions and mathematical learning processes. The study investigates how emotional factors, such as resilience, motivation, self-confidence, and emotional regulation, impact the assimilation of mathematical concepts and problem-solving. In addition, it explores the role of educators in creating a welcoming and emotionally safe environment that favors learning and minimizes math anxiety. Pedagogical strategies and educational policies that promote the development of emotional intelligence in mathematics teaching are also analyzed, contributing to a more effective, inclusive, and enriching teaching-learning process. Ultimately, the study proposes practices that can be adopted by educational institutions to integrate EI in the teaching of mathematics, enhancing both academic performance and the integral development of students.

**Keywords:** Emotional Intelligence. Emotions. Mathematical Learning. Basic Education. Socio-emotional development.

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## INTRODUCTION

The development of emotional intelligence (EI) in mathematics teaching has become a topic of growing interest in the areas of education and psychology, especially in basic education. EI, as defined by Daniel Goleman (1996), involves skills such as self-knowledge, self-regulation, motivation, empathy, and social skills. These capabilities are fundamental not only for the emotional well-being of students but also for building a solid foundation for learning mathematical concepts, directly influencing cognitive development, and overcoming academic challenges.

The object of this study is the analysis of the importance of emotional intelligence in the teaching of mathematics and its influence on the performance and formation of students in basic education. Mathematics, often associated with feelings of anxiety and frustration, requires a learning process that goes beyond logic and memorization, also involving emotional and motivational aspects. Building self-confidence, the ability to deal with mistakes, and persistence in the face of challenges are determining factors for students to develop a positive relationship with the discipline.

In addition, this study proposes to understand how EI can be integrated into the teaching of mathematics, promoting a more welcoming and emotionally safe school environment. Schools play a crucial role in mediating students' emotions, contributing to the reduction of math anxiety, and encouraging more meaningful and participatory learning. Pedagogical strategies that stimulate critical thinking, collaborative work, and problem-solving can favor not only mathematical development but also the formation of emotionally resilient individuals prepared to face academic and social challenges.

The inclusion of EI in the school curriculum is an effective tool to improve the learning of mathematics, as pointed out by recent studies (Carneiro; Lopes, 2020). Educational programs that promote emotional regulation, intrinsic motivation, and students' self-esteem can minimize difficulties associated with learning mathematics and strengthen students' autonomy (Belém, 2022). In addition, the need for systematic implementation of EI in schools' Political-Pedagogical Projects (PPPs) is highlighted by Sousa, Menezes, and Alves (2024), ensuring that social-emotional education is treated with the same seriousness as the teaching of curricular content.

Mathematics, being an essential discipline for the development of logical and analytical reasoning, can largely benefit from approaches that value emotional intelligence. The fear of error and the belief that some people were "not born for mathematics" are

barriers that can be overcome with methodologies that stimulate students' confidence and perseverance. Creating a positive and emotionally safe learning environment can result in increased student participation, greater motivation to solve mathematical problems, and consequently better academic performance.

In this way, integrating EI into the teaching of mathematics in basic education can contribute not only to the academic development of students but also to their formation as critical individuals who are emotionally prepared to deal with challenges. Schools have a role to play in ensuring that mathematics learning inclusively takes place, encouraging positive thinking, collaboration, and resilience in the face of difficulties. The implementation of pedagogical strategies based on EI can thus promote more effective, pleasurable, and meaningful teaching, preparing students for a more promising academic and professional future.

## **METHODOLOGY**

To study the state of knowledge on the influence of emotions and the development of emotional intelligence (EI) in the teaching of mathematics in basic education, the first step consisted of accessing the Catalog of Theses & Dissertations – CAPES, a database that brings together a wide variety of academic research defended in graduate programs in Brazil. Strategic keywords were used, such as "emotional intelligence", "mathematical learning", "emotions" and "basic education", to refine the search and identify studies directly related to the investigated theme.

## **MATERIALS AND METHODS**

To survey the state of knowledge on the subject, the first step consisted of accessing the Catalog of Theses & Dissertations – CAPES, a database that brings together academic research defended in graduate programs in Brazil. The search was carried out using strategic keywords, such as:

- "emotional intelligence",
- "Mathematical learning",
- "Emotions and basic education",
- "Math anxiety,"
- "Emotional regulation and academic performance",
- "Motivation in mathematical learning".

The search was refined using Boolean operators to increase the accuracy of the results. Combinations such as:

- "emotional intelligence" AND "mathematics teaching" AND "school performance",
- "emotions" OR "math anxiety" NOT "basic education",
- "mathematical motivation" AND "pedagogical strategies".

These combinations allowed restricting the results to research that specifically addresses the relationship between emotions, emotional intelligence, and mathematics teaching in basic education, excluding studies that were not directly related to the focus of the investigation.

## INCLUSION AND EXCLUSION CRITERIA

The selection of studies followed strict inclusion and exclusion criteria to ensure the relevance of the studies analyzed.

### Inclusion Criteria

- Works published between 2018 and 2023, ensuring the timeliness of the research analyzed.
- Studies that deal with the relationship between emotional intelligence and mathematical learning in basic education.
- Research that addresses pedagogical strategies to reduce mathematical anxiety and develop socio-emotional skills.
- Works available in the Catalog of Theses & Dissertations – CAPES, ensuring access to studies reviewed and defended in recognized graduate programs.

### Exclusion Criteria

- Works that address emotional intelligence without a direct relationship with mathematical learning.
- Studies that analyze other levels of education, such as basic education or higher education, without focusing on basic education.
- Surveys that did not present a clear methodology or that did not contain relevant empirical data.

## ANALYSIS PROCEDURES

After obtaining the studies, a detailed reading of the titles, abstracts, and summaries of each selected research was carried out. This process allowed the identification of the methodological approaches used, the main objectives of the studies, and their most relevant results.

Subsequently, the works were categorized according to the following thematic axes:

1. The influence of emotions on mathematical performance: studies investigating how anxiety, motivation, and resilience affect mathematical learning.
2. Pedagogical strategies based on emotional intelligence: research that analyzes teaching methodologies that incorporate EI to improve the assimilation of mathematical concepts.
3. The role of teachers in the development of emotional intelligence: studies that highlight the importance of teacher training to deal with students' emotions and create a safer and more stimulating learning environment.
4. Educational policies focused on emotional intelligence and mathematics teaching: research that discusses the implementation of educational programs that include the development of EI in mathematics teaching.

At the end of the analysis, 92 studies were identified as relevant to the study, and from this selection, 15 studies were chosen as the main reference. These works were considered the most significant for their in-depth approach to the relationship between emotional intelligence and mathematics teaching, providing empirical evidence on the impacts of emotions on academic performance.

## DATA ANALYSIS

To systematize the data extracted from the analyzed research, an interpretative approach was used, based on the comparison between the findings of the different investigations. Key topics of analysis included:

- The impact of math anxiety on student learning.
- The relationship between self-confidence and performance in mathematics.
- The influence of emotion regulation on mathematical problem-solving ability.
- The role of the school environment and the teacher in the construction of a more welcoming and motivating mathematical teaching.

- The effectiveness of pedagogical interventions based on emotional intelligence in the teaching of mathematics.

The results of this analysis allowed us to identify patterns and trends in research on the subject, in addition to pointing out gaps in the literature that can guide future investigations.

## METHODOLOGICAL CONSIDERATIONS

It is important to highlight that the choice of literature review as the methodology of this study is due to the need to understand the current state of knowledge about the relationship between emotional intelligence and mathematics teaching. Although experimental and observational studies can provide concrete empirical data, the literature review allows for a broader analysis, bringing together different theoretical and methodological perspectives to consolidate an overview of the subject.

In addition, the selection of studies within a recent period (2018-2023) ensures that the findings analyzed are aligned with contemporary educational discussions, especially about new pedagogical approaches and educational policies aimed at the teaching of mathematics.

Based on this methodology, it is expected that this study will contribute to broadening the understanding of the importance of emotional intelligence in the teaching of mathematics, providing theoretical subsidies for the formulation of educational strategies that promote more effective, welcoming, and motivating learning for basic education students.

## RESULTS

The results of this research demonstrate that emotional intelligence (EI) plays a central role in the teaching of mathematics in basic education, impacting not only the academic performance of students but also their relationship with the discipline and their motivation to learn. The studies analyzed show that the teaching of mathematics is often associated with high levels of anxiety and stress, which can compromise learning and discourage students from engaging in the discipline (Carneiro; Lopes, 2020). The absence of pedagogical strategies that consider the emotional aspects of mathematical learning contributes to an unwelcoming environment, reinforcing the fear of error and reducing students' self-confidence.

The survey revealed that math anxiety is one of the main obstacles to learning and is directly related to poor student performance. This negative emotional factor can be triggered by several reasons, such as the traditional approach to the discipline, which emphasizes memorization and speed in solving calculations to the detriment of conceptual understanding (Belém, 2022). In addition, the lack of emotional support and encouragement of critical thinking within the school environment can reinforce feelings of inadequacy and aversion to mathematics. The study by Fernandes (2023) points out that students who face high levels of mathematical anxiety have less persistence in the face of challenges and avoid situations that require cognitive effort in the subject, hindering their academic progress.

Another relevant factor identified is the essential role of the teacher in the development of students' emotional intelligence. Studies have shown that teachers who have well-developed socio-emotional skills are more effective in creating a positive learning environment and helping students deal with mathematical anxiety (Goleman, 1996; Pontes, 2020). However, the research also showed that most educators do not receive specific training on emotional intelligence, which makes it difficult to apply pedagogical strategies that consider the emotional aspects of learning (Sousa; Mark; Alves, 2024). This gap in teacher training can result in approaches that are not very sensitive to the emotional reality of students, reinforcing the cycle of frustration and demotivation about mathematics.

The analysis of the studies points out that pedagogical methodologies that incorporate emotional intelligence can contribute significantly to the reduction of mathematical anxiety and the increase of student engagement. Strategies such as game-based learning, collaborative teaching, and valuing error as part of the learning process are effective in strengthening students' confidence and stimulating critical thinking in solving mathematical problems (Belém, 2022; Fernandes, 2023). The research by Comazzetto et al. (2016) highlights that learning environments that promote emotional regulation and empathy favor the construction of self-confidence, making the teaching of mathematics more accessible and less intimidating.

In addition, the results indicate that the inclusion of emotional intelligence in the school curriculum is still limited, despite the growing appreciation of socio-emotional skills in education. The National Common Curriculum Base (BNCC) recognizes the importance of emotional development for the integral formation of students, but the implementation of specific strategies for the teaching of mathematics has not yet occurred systematically in



schools (Sousa; Mark; Alves, 2024). Silva's (2019) research shows that the absence of curricular guidelines that integrate EI into mathematical teaching makes many schools prioritize traditional methodologies, leaving aside more innovative and humanized approaches.

The relationship between emotional intelligence and academic performance was also a strongly evidenced aspect in the analysis of the studies. Albuquerque's research (2019) points out that emotionally balanced students demonstrate a greater ability to concentrate and better performance in solving mathematical problems. Likewise, Pontes (2020) highlights that students with greater emotional regulation have greater resilience in the face of challenges, remaining motivated even in the face of difficulties. These findings reinforce the need to develop educational policies that encourage the strengthening of emotional skills in the context of mathematics teaching.

Another highlight was the relationship between emotional intelligence and school dropout. Studies such as those by Bucco (2022) and Cruz (2021) indicate that the lack of emotional support in the school environment can contribute to the abandonment of discipline and, in more serious cases, to school dropout. The difficulty in dealing with frustration and fear of failure in mathematics can cause students to give up on their educational path, reinforcing inequalities in access to knowledge and opportunities for professional development. Moura's (2020) research also points out that the absence of programs aimed at emotional intelligence can aggravate students' demotivation, negatively impacting their academic trajectory.

The implementation of emotional intelligence programs focused on mathematics has proven to be a promising solution to address these challenges. Studies such as those by Sampaio (2018) and Silva (2021) highlight that pedagogical strategies that value emotional self-regulation, empathy, and intrinsic motivation have the potential to transform students' experience with the discipline. These approaches not only improve academic performance but also contribute to the formation of individuals who are better prepared to deal with emotional and cognitive challenges throughout life.

The findings of this research reinforce the need for a pedagogical rethinking of the teaching of mathematics, incorporating emotional intelligence as a fundamental tool for learning. Teacher training should include the development of socio-emotional skills, allowing teachers to be prepared to deal with students' emotional difficulties and create a more positive teaching environment. In addition, educational policies should encourage the



implementation of innovative methodologies that value both the cognitive and emotional development of students.

Thus, the results indicate that the integration between emotional intelligence and mathematics teaching can generate positive impacts on both academic performance and student well-being. Overcoming math anxiety, building self-confidence, and developing resilience are essential aspects of ensuring more meaningful and accessible learning. However, for these changes to occur effectively, a joint effort is needed between teachers, educational managers, and public policymakers, ensuring that emotional intelligence becomes a structuring pillar of mathematics teaching in basic education.

## **DISCUSSION**

After analyzing the selected publications, we can highlight some relevant information on the topic of emotional development and emotional intelligence (EI) in basic education. One of the studies addresses the importance of pedagogical practices aimed at the emotional development of children in basic education. The research seeks to understand how the formation of socio-emotional skills from early childhood can influence children's learning and well-being in this context (Fonseca, 2021).

Another study highlights the importance of using data mining techniques to predict emotional behaviors that may impact child development. Through the analysis of data from children in daycare centers and preschools, this work seeks to identify patterns and indicators that can help in the early identification of emotional and behavioral difficulties, enabling more effective interventions to promote a healthy learning environment. This research analyzes data such as behavior records, participation in collective activities, interaction with classmates and teachers, and other relevant information, using data mining techniques to identify hidden patterns, trends, and correlations that may be associated with emotional development in basic education (Silva, 2021).

A complementary study highlights the psychosocial approach as an important strategy to promote the emotional development of children in basic education. Through an intervention project, this research seeks to offer emotional and motivational support to the little ones, aiming to strengthen their ties with the school environment and encourage a positive and enriching experience. The intervention project aims to offer emotional and social support to children, addressing psychological, emotional, and socialization issues that can influence their integral development. Through planned activities, the project seeks

to create a welcoming and motivating environment for children to feel an active part of the school community (Cruz, 2021).

Psychosocial intervention in basic education can encompass several activities, such as group dynamics to strengthen self-esteem and teamwork, encouraging participation in playful activities, and developing socio-emotional skills. One of the main aspects addressed in this type of intervention is the identification of factors that may be negatively influencing the emotional development of children, such as family difficulties, socialization problems, or challenges in interacting with educators. From this identification, personalized strategies are proposed for each child, to overcome these difficulties and promote a more favorable environment for healthy development.

The research also evaluates the effectiveness of the intervention project over time, monitoring the impact of the actions taken on strengthening children's emotional skills. This allows for continuous adjustments and improvements in the strategies adopted, ensuring that the intervention is increasingly efficient and adapted to the specific needs of children.

The psychosocial approach to emotional development in basic education is extremely relevant, as it recognizes that the development of emotional skills is closely linked to children's well-being and learning. By investing in mental health and emotional well-being from childhood, the project seeks to promote a healthier and more welcoming school environment, where children feel motivated and encouraged to explore and learn, building a positive relationship with education (Cruz, 2021).

The relationship between learning difficulties and emotional development in basic education is addressed in another research, which seeks to understand how motivation and emotional support can be maintained and encouraged in basic education as a way to promote an inclusive and welcoming learning environment. The study discusses how emotional difficulties can impact young children's learning process and how early interventions can be effective in mitigating these effects (Sivinski, 2020).

Additional related research explores the relationships between emotional development, gender issues, and the importance of play in basic education. The investigation offers a more in-depth analysis of how sociological and cultural issues can influence children's emotional development and the construction of their social identity (Almeida, 2020).

Sociological analysis can bring to light structural and cultural factors that contribute to emotional development in basic education, such as social inequalities, unequal access

to educational resources, and social expectations. By understanding these issues, research can contribute to the formulation of more inclusive and equitable pedagogical practices in basic education.

In addition to social and psychological issues, the family environment is also considered a relevant factor in the emotional development of children. Other research provides important information about educators' perceptions of how the family environment can affect children's emotional development and how the school can work in partnership with families to promote healthy development (Moura, 2020).

Another study offers insight into how integrated pedagogical practices can influence children's emotional and cognitive development in basic education. The research explores how the articulation between emotional, social, and cognitive development can provide a more complete education, which combines theoretical knowledge with significant pedagogical practices (Albuquerque, 2019).

The concept of emotional intelligence popularized by Daniel Goleman (1996) is the theoretical basis of this set of studies, being defined as the ability to recognize our feelings and those of others, to motivate ourselves, and to manage emotions well within ourselves and our relationships. It identifies five main components of EI: self-awareness, self-regulation, motivation, empathy, and social skills. Goleman (1996) argues that these competencies are fundamental not only for emotional well-being but also for children's socialization and integral development, suggesting that educational programs that incorporate EI development can significantly improve children's emotional well-being, relationship skills, and social adaptation.

Saviani (2021) proposes that education should go beyond the mere transmission of technical-scientific knowledge, also encompassing the development of critical and social capacities. This vision aligns perfectly with the development of EI, as it promotes essential skills such as self-knowledge, empathy, self-regulation, and social skills. These skills are fundamental not only for the cognitive and social development of children but also for the formation of conscious and engaged citizens from childhood.

The preliminary results of this survey (Belém, 2022; Bucco, 2022; Cruz, 2021; Fernandes, 2023; Bridges, 2020; Silva, Daniel De Andrade, 2018) indicate that the inclusion of EI development programs in the basic education curriculum has a positive impact on children, showing that those with higher EI have better social adaptation, greater satisfaction with school life, and better relationship skills. In addition, another study

suggests that EI is fundamental for the development of socio-emotional skills that are highly valued in the integral education of children (Comazzetto et al., 2016).

## CONCLUSION

This study highlighted the relevance of emotional intelligence (EI) in the teaching of mathematics in basic education, demonstrating how the integration of socio-emotional strategies in the teaching-learning process can positively impact the academic and personal development of students. From the literature review, it was found that EI, as defined by Goleman (1996), involves fundamental competencies such as self-knowledge, self-regulation, motivation, empathy, and social skills, which play an essential role in building confidence and facing mathematical challenges.

The research highlighted that mathematical anxiety is one of the main obstacles to learning the subject, and is often associated with negative experiences, lack of emotional support, and teaching methodologies that do not consider individual student differences. In this sense, the adoption of pedagogical practices that incorporate emotional intelligence can significantly contribute to reducing stress and strengthening student motivation, providing a more positive and inclusive learning environment. Valuing error as part of the learning process, encouraging persistence, and promoting active methodologies are effective strategies to make mathematics teaching more accessible and less intimidating.

The findings of this study also reinforce that the teacher plays a crucial role in the development of students' emotional intelligence. However, the lack of teacher training focused on EI represents a significant challenge for the implementation of strategies that favor emotional regulation in mathematics teaching. Teachers who have a greater mastery of socio-emotional skills can create a more welcoming teaching environment, promoting student engagement and confidence in the subject. Thus, the need for teacher training in this field should be emphasized, ensuring that educators have the necessary tools to deal with the emotional challenges faced by students.

In addition, this study highlighted that the integration of emotional intelligence into the teaching of mathematics is still limited in the curricular guidelines of basic education, despite the growing recognition of the importance of socio-emotional skills. Although the National Common Curriculum Base (BNCC) emphasizes the need for students' emotional development, the practical implementation of these guidelines still faces structural and

methodological barriers. Educational policies must advance in this direction, encouraging the creation of specific programs that promote EI in the context of mathematics.

Another relevant point addressed was the relationship between emotional intelligence and school dropout. The studies analyzed showed that students who cannot deal with their emotions about mathematics tend to develop a block about the subject, which can lead to demotivation and, in more serious cases, to school dropout. The absence of emotional support in the educational environment reinforces the idea that mathematics is a difficult and inaccessible subject, negatively impacting the academic trajectory of students. Thus, the development of policies and practices that favor emotional resilience and motivation in the teaching of mathematics can be a determining factor for reducing school dropout and for the academic success of students.

Given these findings, it is concluded that the inclusion of emotional intelligence in the teaching of mathematics should be treated as an essential strategy to improve learning and promote a more humanized education. The teaching of mathematics cannot be just a technical process of memorizing formulas and procedures, but must also consider the individual emotions and challenges of students, ensuring that everyone has access to meaningful and equitable learning.

Therefore, it is recommended that schools, teachers, and educational managers adopt concrete strategies to strengthen emotional intelligence in mathematics teaching, promoting more welcoming and stimulating learning environments. In addition, public policies should more effectively include programs aimed at the socio-emotional development of students, ensuring that EI is systematically incorporated into the school curriculum.

Finally, this study contributes to the debate on the need to rethink the teaching of mathematics from a broader perspective, which values both the cognitive and emotional development of students. The promotion of emotional intelligence in mathematics teaching not only improves academic performance, but also prepares students to face future challenges with more confidence, resilience, and autonomy, contributing to their integral formation as critical and participatory citizens in society.

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