

The Role of Teachers in Shaping the Emotions, Beliefs, and Self-Efficacy of High School Students Who Dislike Mathematics

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Abstract:

Negative attitudes toward mathematics remain widespread among secondary school students and are consistently linked to lower achievement, reduced course-taking, and narrowed career aspirations. This paper synthesizes recent empirical research on the emotional, motivational, and self-efficacy-related factors that contribute to student's dislike of mathematics, with particular attention to the role that teachers play in shaping these attitudes. Drawing primarily on a mixed-methods study of high school students stated reasons for disliking mathematics, alongside complementary findings from action research, structural equation modeling, and literature review studies, this paper argues that student's negative orientation toward mathematics is best understood as an interaction among perceived content knowledge confidence, motivation and interest, teacher encouragement, and general self perception. Findings indicate that a substantial majority of students form negative impressions of mathematics well before high school and that teacher support meaningfully predicts whether those impressions persist or change. Implications for classroom practice, including scaffolder autonomy, formative feedback, and motivational strategies grounded in self-determination theory, are discussed.

Received: 25 August 2026

Accepted: 10 September 2026

Published: 25 September 2026

Keywords: Mathematics attitudes, self-efficacy, mathematics anxiety, teacher motivation, self determination theory

1. Introduction

Mathematics occupies a paradoxical place in secondary education: it is widely regarded as essential for future academic and professional success, yet it is also one of the subject's students most frequently report disliking (Aguilar, 2021). This dislike is not a trivial preference. Students' attitudes toward mathematics are entangled with their emotional responses, their beliefs about their own ability, and their confidence in approaching mathematical tasks, and each of these dimensions has been shown to influence engagement, persistence, and ultimately achievement (Samuelsson, 2023; Suren & Kandemir, 2020). Understanding why students come to dislike mathematics, and identifying the point at which that dislike can be interrupted or reversed, is therefore a matter of practical importance for classroom teachers and curriculum designers alike.

A growing body of research suggests that the reasons behind students' negative orientation toward mathematics are rarely reducible to a single cause such as low ability or poor grades. Instead, researchers increasingly describe mathematics-related affect as a layered construct composed of emotions, beliefs, attitudes, and self-confidence, each of which is shaped over years of classroom experience (Aguilar, 2021). Within this layered construct, the classroom teacher emerges repeatedly as a pivotal figure: teachers who encourage, scaffold, and motivate students appear able to shift

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<https://doi.org/10.5281/zenodo.23468238>

students' perceptions of mathematics even when those students report weak content knowledge or a history of poor performance (Aguilar, 2021; Samuelsson, 2023).

This paper reviews and synthesizes findings from four recent studies examining students' relationships with mathematics: a mixed-methods investigation of high school students' stated reasons for disliking mathematics (Aguilar, 2021); an action research project examining how teacher-supported activities shape students' motivation, self-efficacy, and anxiety over three years of secondary schooling (Samuelsson, 2023); a structural equation modeling study of mathematics anxiety and motivation as predictors of achievement (Suren & Kandemir, 2020); and a broader literature review of the factors, including academic stressors, that contribute to psychological strain among students (Liu et al., 2022). Together, these studies point toward a consistent picture: students' dislike of mathematics is rooted in perceived competence, is intensified or alleviated by teacher behaviour, and carries consequences for motivation, anxiety, and broader well-being.

2. Theoretical Framework

Affect toward mathematics has been conceptualized as encompassing several interacting components, most commonly identified as emotions, beliefs, attitudes, and self-confidence (Aguilar, 2021). Emotions toward mathematics, whether positive or negative, influence attention, memory, and the willingness to persist through difficulty; longitudinal research indicates that positive emotions and achievement tend to reinforce one another over time, just as negative emotions and low achievement can become mutually reinforcing (Aguilar, 2021). Beliefs, by contrast, refer to the assumptions students hold about what it means to "do" mathematics and about their own capacity to do it, assumptions that are shaped by past learning experiences, comparisons with other school subjects, and repeated exposure to material students do not feel equipped to master (Aguilar, 2021).

Self-efficacy, drawn originally from Bandura's (1977, as cited in Samuelsson, 2023) work on perceived competence, refers specifically to a student's confidence in their ability to complete mathematical tasks and achieve specific goals. Self-efficacy is considered one of the strongest non-cognitive predictors of mathematics performance because perceived competence affects the effort students are willing to invest and the strategies they are willing to attempt (Samuelsson, 2023). A related but distinct construct is mathematics anxiety, defined as the tension, worry, and apprehension that some students experience specifically in situations requiring mathematical performance (Suren & Kandemir, 2020). Anxiety and self-efficacy are typically negatively associated: students with lower confidence in their mathematical ability tend to report higher levels of anxiety, and this relationship appears to hold across middle school and high school populations (Suren & Kandemir, 2020).

Self-determination theory offers a complementary framework for understanding how these emotional and motivational states develop within the classroom. According to this theory, student's intrinsic and extrinsic motivation toward a subject develops as basic psychological needs for autonomy, competence, and relatedness are met or frustrated (Samuelsson, 2023). Classrooms that allow students to make choices, that offer tasks calibrated to a reasonable level of challenge, and that create a sense of belonging among peers and with the teacher tend to support the internalization of motivation, whereas classrooms that emphasize rote practice and expose student's inabilities tend to erode it (Samuelsson, 2023).

3. The Role of the Teacher

Across the reviewed studies, the teacher consistently appears as a central, though not always sufficient, factor in shaping students' relationship with mathematics. Aguilar (2021) found that when

high school students were asked directly why they disliked mathematics, teacher-related explanations, such as insufficient motivation, unclear explanations, or an unsupportive teaching style, were mentioned less frequently than students' own self-doubt or disinterest, yet statistical analysis showed that the encouragement students perceived from their teacher was significantly associated with whether they reported liking mathematics overall. This suggests that even when students do not spontaneously name the teacher as the source of their dislike, teacher behaviour still meaningfully shapes the attitude they eventually report.

Samuelsson (2023) extends this finding through a three-year classroom-based action research project in which teachers deliberately restructured their practice to support students' autonomy, competence, and sense of relatedness. In the first year of the study, before any deliberate intervention, students' intrinsic motivation and self-efficacy declined over the school year, consistent with patterns reported elsewhere in the literature. In the second and third years, however, teachers introduced activities such as student choice over tasks, curriculum plans calibrated to appropriate difficulty, and explicit encouragement of every student's contribution during class discussion. These changes were associated with measurable improvements in students' intrinsic motivation and self-efficacy, and the improvements were strongest in the third year, when teachers not only offered students choices but actively scaffolded those choices rather than leaving students to select tasks entirely on their own (Samuelsson, 2023). This finding is notable because it suggests that autonomy alone is not sufficient to shift students' relationship with mathematics; autonomy paired with teacher guidance appears to matter more than autonomy in isolation.

Similarly, Aguilar (2021) reported that a teacher's capacity to motivate is closely tied to students' willingness to persist through difficulty. Teachers who use praise not only for correct answers but also for genuine effort, and who normalize struggle as a productive part of problem-solving rather than a sign of failure, appear better positioned to prevent the erosion of student confidence that often begins in the earliest years of schooling. Because most students in that study reported forming a negative impression of mathematics in elementary or middle school, well before reaching high school, the implication is that early and sustained teacher support may be more effective than later remediation.

4. Reasons Students Report Disliking Mathematics

When high school students were asked to explain, in their own words, why mathematics was not among their preferred subjects, their responses clustered into several broad categories (Aguilar, 2021). The most frequently cited category concerned students' confidence in their own content knowledge: many students indicated that mathematics felt confusing, that they did not understand the material, or that they lacked the ability to succeed in it. A second, closely related category concerned motivation and interest, with students describing mathematics as boring, tedious, or requiring excessive amounts of practice and memorization. A third category referenced teacher-related factors directly, including a perceived absence of encouragement or an instructional style that did not support understanding. A smaller number of responses referenced students' general self-perception, exemplified by statements framing mathematical weakness as a fixed personal trait rather than a skill that could be developed.

These self-reported reasons align closely with quantitative findings from other studies. Suren and Kandemir (2020) found that among middle school students preparing for a national placement examination, mathematics anxiety was a stronger predictor of achievement than motivation, although both were significant predictors, and that self-efficacy was the motivational dimension most strongly correlated with nearly every facet of mathematics anxiety they measured. In other words, students who doubted their own competence tended to report the highest levels of anxiety around mathematics tasks, a pattern that mirrors the self-doubt described qualitatively by the high school students in Aguilar's (2021) sample.

Notably, Aguilar (2021) found that students' self-reported confidence in mathematics was not significantly associated with gender or academic program, but was significantly associated with their overall liking of the subject and with the degree of encouragement they perceived from their teacher. This pattern indicates that dislike of mathematics is less a fixed characteristic tied to demographic background and more a product of classroom experience, which in turn suggests that the trajectory of students' attitudes remains open to change well into secondary school, provided that instructional conditions shift accordingly.

5. Emotional and Psychological Consequences

The consequences of persistent mathematics anxiety and low self-efficacy extend beyond performance on a single test or course. Suren and Kandemir (2020) reported that students with elevated mathematics anxiety were more likely to avoid advanced coursework and to underperform relative to their less anxious peers, a pattern consistent with broader findings that anxious students allocate fewer cognitive resources to problem-solving because those resources are consumed by worry and self-monitoring. At the same time, the same study found that moderate levels of anxiety, when paired with high intrinsic motivation, were not necessarily harmful and in some cases coincided with greater effort and engagement, suggesting that the relationship between anxiety and performance is not simply linear.

These patterns are also relevant to students' broader psychological well-being. Liu et al. (2022), in a review of factors contributing to depression among college-aged students, identified academic stress and poor academic performance as recurring risk factors for depressive symptoms, alongside low self-efficacy and insufficient social or institutional support. While that review focuses on the college transition rather than secondary mathematics specifically, its findings underscore that the kind of chronic self-doubt and stress documented in mathematics classrooms does not remain confined to a single subject; when a pattern of low confidence and high anxiety becomes entrenched, it can compound broader academic stress and, by extension, contribute to the kind of psychological strain associated with poorer mental health outcomes (Liu et al., 2022). This connection reinforces the argument that addressing student's relationship with mathematics early is not only an academic concern but also a component of supporting students' overall well-being.

6. Implications for Practice

Taken together, these findings suggest several concrete directions for classroom practice. First, because students' negative attitudes toward mathematics often form early and are closely tied to perceived competence, teachers at the elementary and middle school levels have a particularly important opportunity to prevent the entrenchment of anxiety and low self-efficacy before students reach high school (Aguilar, 2021). Second, offering students autonomy over tasks appears most effective when it is paired with active teacher scaffolding rather than left entirely to student discretion; students who were supported in making choices about their learning showed stronger gains in self-regulation than students who were simply given the freedom to choose (Samuelsson, 2023). Third, connecting mathematical content to students' own interests and to real-world applications, along with structuring opportunities for collaborative rather than purely individual practice, appears to support both competence and a sense of relatedness, both of which are associated with more autonomous and durable forms of motivation (Samuelsson, 2023).

Finally, given the strong association between self-efficacy and anxiety documented by Suren and Kandemir (2020), interventions that explicitly target students' confidence, such as low-stakes formative assessment, visible tracking of incremental progress, and teacher feedback that separates

effort from ability, may be especially useful for reducing anxiety without requiring a reduction in academic rigor. Because moderate anxiety paired with strong motivation is not inherently harmful, the goal of such interventions should not be to eliminate all discomfort with mathematics but rather to ensure that students retain enough confidence and interest to engage productively with challenging material.

7. Conclusion

Student's dislike of mathematics is rarely the product of a single cause. Instead, it emerges from an ongoing interaction between students' beliefs about their own competence, their emotional responses to mathematical tasks, and the support, or lack of support, they perceive from their teachers. Across a mixed-methods study of high school students' stated reasons for disliking mathematics, a multi-year action research project grounded in self-determination theory, and a structural equation modelling study of anxiety and motivation, one theme recurs consistently: teachers who scaffold student choice, offer genuine encouragement, and calibrate challenge to students' current ability are able to shift students' relationship with mathematics in a positive direction, even among students who report a long history of negative attitudes toward the subject. Because these negative attitudes often take root well before high school and carry consequences that extend into students' broader psychological well-being, sustained and early teacher support represents one of the most promising avenues for changing how students experience mathematics.

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