

Research Article

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A Qualitative Exploration of the Sources of Mathematics Self-Efficacy Among Saudi Middle School Students

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Abstract

Background/purpose. Over the past few decades, there has been a growing scholarly interest in mathematical self-efficacy, given its significant impact on students' motivation, persistence, and achievement. However, there is still a limited understanding of how these beliefs develop in culturally specific, non-Western settings, particularly in Arab educational systems. This study aims to address this gap by exploring the sources that shape mathematical self-efficacy among Saudi middle school students. Grounded in Bandura's (1997) social cognitive theory, this research examines how students' beliefs are shaped by personal experiences, social interactions, and emotional contexts.

Materials/methods. The study employed a qualitative design that utilized semi-structured interviews and focus group discussions. Data were collected from a total of 48 male students, 12 mathematics teachers, 12 fathers, and 12 peers drawn from six middle schools in Al-Ahsa Governorate, Saudi Arabia, during the first semester of the 2025 academic year. A thematic analysis approach was applied to identify patterns and generate core themes that explain the development of mathematical self-efficacy.

Results. Four key themes emerged, reflecting how students' beliefs are constructed: mastery experiences, vicarious learning through observation, verbal encouragement and feedback, and emotional regulation alongside the cultural framing of mathematical self-efficacy. These findings reveal the complex and culturally situated nature of self-efficacy development among Saudi students.

Conclusion. The study emphasizes the importance of situating educational research within specific cultural and social contexts. It provides practical recommendations for designing culturally responsive instructional practices that foster mathematical self-efficacy, motivation, and support sustained engagement in mathematics classrooms.

1. Introduction

Self-efficacy is a foundational construct in motivational psychology. It is widely recognized for influencing academic outcomes, effort regulation, and students' emotional responses to learning challenges (Bandura, 1997; Herianto et al., 2024). Among various academic domains, mathematics emerges as a domain where self-efficacy is notably impactful, due to its reputation for being both cognitively demanding and anxiety-inducing. Mathematics self-efficacy refers to students' confidence in their ability to perform mathematical tasks effectively (Pajares & Graham, 1999). Its development is influenced by a complex interplay of personal, social, and emotional experiences (Street et al., 2024). Recent systematic reviews have further confirmed that mathematics self-efficacy is a decisive factor in shaping performance across diverse contexts (Zakariya, 2022).

Bandura's social cognitive theory provides a well-established framework for understanding how individuals develop and apply self-efficacy beliefs. Such beliefs influence students' task selection, sustained effort, and responses to both failure and success (Bandura, 1997). In mathematics education, high self-efficacy has been consistently associated with persistence in problem-solving, engagement with challenging material, and overall academic achievement. Recent empirical studies provide further nuance: Zhang and Zhang (2022) demonstrated that classroom interactions have a significant impact on students' mathematics self-efficacy in large-scale educational settings. Zhou and Brown (2023) further showed that the emotional aspects of teacher–student interaction are central in shaping self-belief. Together, these findings highlight the multifaceted nature of mathematics self-efficacy.

Usher's (2009) qualitative study on American middle school students represents one of the most comprehensive studies in this field. Her findings emphasize that self-efficacy beliefs are shaped not only by academic achievement but also by students' interpretations of their social, emotional, and classroom experiences. However, Usher highlighted the need for culturally grounded replications of her work to better reflect the diversity of educational systems. The current study addresses this empirical gap by examining the Saudi context. Recent research likewise emphasizes the importance of contextualized inquiries. For example, Yang et al. (2024) examined how sociodemographic factors intersect with mathematics self-efficacy, whereas Liang et al. (2025) highlighted the limitations of universal interventions in addressing students' motivational needs. These perspectives underscore the importance of culturally responsive research, particularly in underrepresented regions such as the Middle East.

In Saudi Arabia, student academic motivation is shaped by a distinctive blend of cultural, religious, and institutional norms. These differ significantly from Western frameworks. However, few qualitative studies have explored how students perceive and internalize their academic confidence. Accordingly, this study contributes to both regional and international literature by offering a culturally grounded, student-centered investigation into the formation of mathematics self-efficacy.

Therefore, this research aims to investigate how Saudi middle school students form beliefs about their mathematical competence, drawing on their experiences within their homes, classrooms, and peer groups. By identifying the personal, social, emotional, and cultural factors that influence these beliefs, this study aims to deepen our theoretical understanding of self-efficacy. It also seeks to offer culturally responsive insights into mathematics instruction, particularly in Arab and comparable educational systems.

Accordingly, this study addresses the following research questions:

1. How do middle school students in Saudi Arabia describe the experiences that influence their beliefs about mathematics self-efficacy?

2. What roles do teachers, peers (classmates), and family members play in shaping the mathematics self-efficacy of middle school students in Saudi Arabia?

3. What additional contextual or cultural factors (e.g., emotions, religious motivation, and school environment) contribute to shaping mathematics self-efficacy among middle school students in Saudi Arabia?

2. Literature Review

Bandura (1997) identified four primary sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states. These sources interact dynamically to shape individuals' beliefs about their capabilities and influence their persistence when engaging in learning tasks. In the context of mathematics education, these dimensions are particularly significant, as they affect how students approach cognitive challenges and evaluate their academic progress (Pajares & Miller, 1994).

Building on Bandura's framework, Usher and Pajares (2006, 2009) validated these sources within academic settings, highlighting the central role of mastery experiences, followed by verbal persuasion and emotional regulation. Additionally, Usher's (2009) qualitative work revealed the importance of classroom interactions, peer modeling, and family involvement in cultivating students' self-efficacy in mathematics. Recent systematic reviews have reinforced this view, showing that mathematics self-efficacy is a decisive predictor of students' achievement across multiple cultural contexts (Zakariya, 2022). These studies highlight the contextual complexity of developing mathematics self-efficacy.

A growing body of research has explored how social and cultural factors mediate the effects of these sources. For instance, Liang et al. (2025) observed that classroom emotional safety and familial expectations influence how students internalize efficacy beliefs. Similarly, Yang et al. (2024) demonstrated that demographic factors significantly influence the relationship between self-efficacy and mathematics performance, underscoring the importance of avoiding overgeneralization across diverse populations. Zhang and Zhang (2022) further demonstrated, through a large-scale classroom study, that the clarity of teacher communication and instructional interactions strongly predicts students' mathematics self-efficacy. Likewise, Zhou and Brown (2023) emphasized the emotional dimension of teacher–student interaction, revealing that supportive classroom climates enhance self-efficacy by reducing mathematics anxiety. Other researchers have examined how negative peer comparisons or heightened academic anxiety can undermine, rather than support, the development of self-efficacy. Ahn et al. (2017) and Putwain et al. (2013) argued that certain social models or performance pressures may diminish students' confidence. Similarly, Ramey-Gassert et al. (1996) found that early educational experiences and teacher modeling had a significant impact on pre-service teachers' self-efficacy in science, thereby illustrating the enduring effects of formative learning environments. Recent evidence from non-Western contexts further highlights the strong connection between mathematics anxiety and self-efficacy, demonstrating that cultural factors significantly influence how students experience and regulate their confidence in mathematics (Yamani, 2025).

Despite a substantial body of empirical evidence in the Western context, research exploring self-efficacy within the Arab educational system remains relatively scarce. Nonetheless, emerging studies in Saudi Arabia have provided valuable, context-specific insights. Alharthi (2023) identified a positive relationship between mastery experiences and student attitudes toward mathematics. Almohaimeed (2023) validated an Arabic version of the Mathematics Self-Efficacy and Anxiety Questionnaire, emphasizing the role of emotional and physiological states in shaping students' mathematics self-concepts. Similarly, Algarni and Lortie-Forgues (2023) demonstrated that flipped classroom environments promote self-efficacy by facilitating vicarious learning. Alnaimi et al. (2023) developed and validated culturally grounded tools to assess verbal persuasion and mathematical confidence.

Collectively, these Saudi studies have confirmed the applicability of Bandura's sources of self-efficacy within the local educational context. However, the majority relied on quantitative methodologies, thereby leaving several critical gaps unexplored. Limited attention has been given to how peer dynamics influence self-efficacy, and longitudinal studies examining developmental changes are notably lacking. These limitations highlight the need for in-depth, context-sensitive, and qualitative research that can capture the underexplored dimensions of students' educational experiences.

To address these gaps, the present study employs a qualitative approach to explore how mathematics self-efficacy develops through culturally situated interactions with teachers, peers, families, and religious practices. This framework enables a more in-depth examination of the personal and social factors that impact students' academic self-confidence within the Saudi middle school context.

3. Methodology

This study employed a qualitative research design to explore the sources of mathematics self-efficacy among Saudi middle school students. Grounded in Bandura's (1997) theoretical model of self-efficacy, this study examines four key sources: mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states. This framework was informed by Usher's (2009) qualitative methodology and was adapted to reflect the cultural and educational context of Saudi Arabia.

3.1. Research Design

A basic interpretive qualitative design was employed to explore how students perceive and make sense of their mathematics self-efficacy. This design, as described by Merriam (2002) and Creswell and Poth (2018), emphasizes understanding participants' experiences and the meanings they construct, without adopting the deeper philosophical commitments of phenomenology. Therefore, although the study involved an in-depth exploration of lived experiences, it is more accurately defined as a basic interpretive qualitative design rather than a phenomenological study. This design facilitated an in-depth exploration of how students' academic and personal experiences influence their beliefs about their mathematical abilities.

3.2. Setting and Participants

The data for this study were collected during the first semester of the 2025 academic year across six public middle schools located in urban and semi-urban regions of Al-Ahsa Governorate, Saudi Arabia. These schools were intentionally selected to represent diverse socioeconomic backgrounds, school sizes, and educational environments, based on academic performance, student demographics, and geographical distribution, thereby ensuring the inclusion of varied educational experiences.

Al-Ahsa is one of the largest and most culturally diverse regions in Saudi Arabia, encompassing both urban centers and rural communities. The region includes populations engaged in agriculture, commerce, and public sector employment, offering a comprehensive representation of socioeconomic conditions. It is also characterized by strong family ties, religious traditions, and educational aspirations, making it an ideal context for exploring how cultural and familial influences shape students' beliefs. This diversity enabled the inclusion of students from different cultural and economic backgrounds, thereby enhancing the applicability of the findings to comparable educational contexts.

The participants comprised 48 male middle school students aged 12–15 years. The study focused exclusively on male students due to cultural and institutional norms governing school access in Saudi

Arabia. A purposive sampling method was employed to identify students with varying academic achievement levels and motivational profiles. Selection criteria included school records, teacher recommendations, and observed classroom behaviors. The students represented a range of academic performance levels, from high to low, and demonstrated varying levels of intrinsic motivation, as assessed by their engagement, persistence, and self-initiated participation in mathematical tasks.

In addition, 12 mathematics teachers and 12 fathers were interviewed individually to provide broader perspectives on the development of student self-efficacy. To capture the influence of peer dynamics on students' mathematics self-efficacy beliefs, small focus group discussions were conducted among 12 peers (classmates). These peer groups were structured to reflect diverse interpersonal relationships and academic interactions among the students.

3.3. Data Collection

Data were collected during the first semester of the Saudi academic calendar (September–December 2025) through a combination of semi-structured interviews and small peer-group discussions. Semi-structured interviews were conducted with students, teachers, and fathers, using an interview protocol that comprised 8–10 open-ended core questions tailored to each participant group. For students, questions explored their experiences in learning mathematics, sources of encouragement or discouragement, and emotional responses to success or failure (e.g., “Can you describe a time when you felt confident solving a mathematics problem?”). Teachers were asked about their strategies for supporting students' confidence and perceptions of classroom dynamics (e.g., “How do you encourage students who struggle with mathematics?”). Fathers were asked about their involvement in supporting their children's learning (e.g., “What do you usually say or do to motivate your child in mathematics?”). These guiding questions provided rich narratives and ensured consistency across interviews while allowing participants to elaborate freely.

The interview questions were grounded in Usher's (2009) framework and adapted to the Saudi educational and cultural context. They were designed to capture participants' personal experiences with learning mathematics, sources of encouragement and discouragement, emotional responses to mathematics-related tasks, and interpretations of both success and failure.

Student interviews lasted approximately 30–45 minutes, while interviews with teachers and fathers lasted 25–35 minutes. Peer focus groups, each comprising three to four students, were conducted in four separate sessions, lasting approximately 40 minutes each. All interviews and discussions were conducted in Arabic, recorded with participants' consent, transcribed verbatim, and then translated into English. Field notes were taken during interviews to document contextual details and nonverbal cues, enriching the dataset. To preserve cultural meaning and participant intent, translations were reviewed and validated by bilingual experts familiar with qualitative research conventions.

3.4. Data Analysis

Thematic analysis was conducted using a combined inductive and deductive approach. While Bandura's (1997) four sources of self-efficacy initially served as a sensitizing framework, the coding process began with an open, line-by-line approach to allow the emergence of context-specific themes not fully captured by the original model, such as religious motivations, collective identity, and culturally situated perspectives on authority.

The research team intentionally delayed aligning the codes with Bandura's constructs until the preliminary rounds of open coding were completed. This strategy ensured that participants' voices were prioritized and that culturally unique patterns—such as perceptions of communal pride and the moral authority of teachers—could emerge without being constrained by theoretical frameworks.

Data organization and coding were facilitated using NVivo 14 qualitative analysis software. Two researchers independently coded the data to ensure intercoder reliability; after discrepancies were identified, they were discussed and resolved collaboratively. This iterative process strengthened the trustworthiness and contextual sensitivity of the findings. In summary, the analysis integrated both theoretical constructs and data-driven insights, thereby deepening the richness and contextual relevance of the findings.

3.5. Trustworthiness and Rigor

To ensure the study's trustworthiness, the criteria of credibility, transferability, dependability, and conformability were systematically addressed in line with Lincoln and Guba's (1985) framework. Credibility was reinforced through data triangulation, incorporating multiple sources of data, including students, teachers, fathers, and peers. Member checking was carried out by inviting participants to review and confirm the accuracy of their transcribed interviews and synthesized summaries. Peer debriefing sessions were conducted with qualitative research experts to validate coding procedures and thematic interpretations. Both peer debriefing and external audits were performed iteratively throughout the coding and thematic development stages to ensure continuous validation of the findings.

Transferability was enhanced by providing rich, detailed descriptions of the research context, participant characteristics, and educational environment, enabling readers to assess the applicability of the findings to other settings. Dependability was supported through a comprehensive audit trail documenting each step of the research process, including methodological decisions, coding processes, and modifications made during analysis. An external qualitative researcher independently audited selected data segments to verify procedural consistency and logical coherence.

Conformability was strengthened through reflexive journaling, which minimized personal biases, and by securely archiving all research materials to promote transparency. The high level of trustworthiness was further affirmed through expert peer debriefing, which validated both the methodological integrity and thematic coherence of the analyses.

3.6. Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of King Faisal University (Approval No. KFU-2025-ETICS3599) and the Saudi Ministry of Education. Informed consent from parents and assent from student participants were secured prior to participation. Participants' anonymity and confidentiality were strictly maintained through the use of pseudonyms, and they were informed of their right to withdraw from the study at any time without penalty. All collected data were stored securely and used exclusively for research purposes.

4. Results

The following findings are organized into four key themes that emerged from a detailed analysis of interviews and focus group discussions conducted with middle school students, teachers, parents, and peers. Each theme corresponds to key elements of the research questions, thus offering a culturally grounded understanding of how mathematics self-efficacy beliefs develop among Saudi students. Thematic analysis revealed recurring patterns and underlying meanings in the participants' narratives, providing valuable insights into the complex interaction of personal, social, emotional, and contextual factors that influence self-efficacy.

4.1. Theme 1: Mastery Experiences and Academic Confidence

Mastery experiences consistently emerged as the most influential factor shaping students' beliefs about their mathematical competence. Most students emphasized that completing

mathematical tasks—particularly challenging ones—boosted their confidence and encouraged persistence in learning.

The participants frequently reflected on academic achievements as pivotal in building self-efficacy. One student (S.39) said, *“When I solved a hard geometry question that my classmates couldn’t, I felt more confident and capable of doing math.”* Similarly, another student (S.24) stated, *“The first time I got full marks in a math test, I believed I could be good at it.”* Participants commonly associated such experiences with pride, relief, and renewed motivation.

However, not all experiences were initially successful. Some students reported that repeated failures or receiving low scores temporarily diminished their confidence. One student (S.11) said, *“I used to fail many math quizzes, and it made me think I was just bad at math.”* Nevertheless, he later explained that gradually mastering a topic after multiple attempts helped rebuild his belief in his abilities. For many students, these moments served as both academic and emotional turning points, often supported by family reassurance or religious motivation. One student stated, *“I used to feel hopeless, but my father kept telling me, ‘Allah rewards persistence,’ and that helped me keep trying”* (S.6). These breakthroughs carried deep emotional significance and left a lasting motivational influence.

The teachers played a crucial role in fostering mastery experiences by structuring learning activities to achieve early successes. A mathematics teacher (T.5) said, *“I start with basic exercises and then gradually increase difficulty so students taste success before hitting challenges.”* Another teacher (T.11) added, *“Students thrive when they feel they are progressing. I make sure they know it’s their effort that made the difference.”*

Parents also highlighted the importance of celebrating academic accomplishments at home. One parent (P.1) said, *“Whenever my child solves a math problem alone, we clap for him. It becomes a big thing at home.”* Another parent (P.3) remarked, *“Even if my son gets just one extra mark than before, we tell him we’re proud. It shows him [that] improvement matters.”*

Peer interactions also occasionally played a role in improving self-efficacy. One peer (Pe . 2) said, *“When my friend got a prize in math, I thought maybe I could do it too.”* Another (Pe . 3) stated, *“My classmates encourage me when I get an answer right. It makes me want to try more.”*

Overall, mastery experiences not only boosted immediate confidence but also built emotional momentum that supported sustained engagement in mathematics. These align with Bandura’s (1997) framework, which emphasizes direct success as the most influential source of self-efficacy. In the Saudi context, such mastery experiences carry added significance, as academic success is often closely tied to family honor and personal virtue. This cultural framing intensifies both the rewards and the pressures of achievement, reinforcing the emotional salience of success and creating a self-reinforcing cycle of confidence and academic engagement. Figure 1 presents a thematic map that illustrates the interrelationships among codes such as “early academic success,” “teacher scaffolding,” “family recognition,” and “emotional outcomes” within the broader theme of mastery experiences.

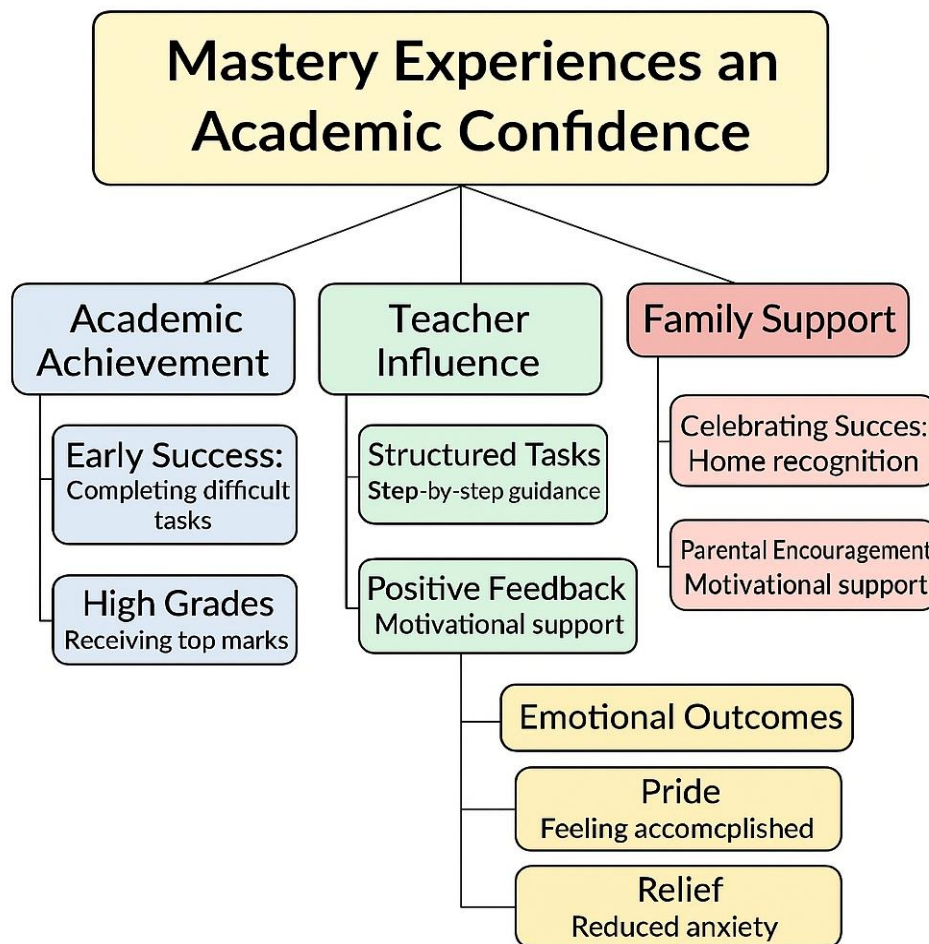


Figure 1. Theme 1: Mastery Experiences and Academic Confidence

4.2. Theme 2: Vicarious Learning through Observation

Vicarious experiences—the observation of others’ successes and strategies—emerged as a significant factor influencing students’ mathematics self-efficacy. Watching peers, teachers, and family members overcome challenges or demonstrate competence strengthened students’ belief in their own ability to succeed.

Many students described instances where observing classmates who excelled in math provided both inspiration and practical models. One student (S.2) said, “*When I saw my friend solving problems faster than anyone, I told myself maybe I can do it like him if I study harder.*” Another (S.17) stated, “*I used to think I was weak in math, but when I noticed my cousin, who wasn’t a top student, improve after practice, I felt I could improve too.*”

However, not all social comparisons had positive effects. A few students reported feeling discouraged or inadequate when comparing themselves to more capable peers. One student (S.12) said, “*Sometimes, when I see others finishing fast and getting praise, I feel slow and not smart enough.*” Another (S.13) stated, “*I avoid asking questions because I don’t want to look weak in front of the class, especially when others get it quickly.*” These reflections show that while vicarious learning can inspire confidence, it may also provoke self-doubt, performance anxiety, and disengagement in highly competitive environments.

The teachers’ modeling behaviors were also identified as important sources of vicarious learning. Some students mentioned that when their teachers demonstrated problem-solving with clarity and confidence, it made the process appear more approachable and attainable. One teacher (T.8) said, “*I make sure to solve problems step by step on the board so students can see that it’s not magic—it’s*

method.” Another teacher (T.4) stated, “When students see me struggle a bit and then solve the problem, they realize that making mistakes is normal.”

When actively participating in their children’s learning activities, parents often act as informal role models within the home environment. One parent (P.2) said, “When I sit with my son and solve math problems together, I try to show him how I think—not just the answer.” Another (P.3) stated, “My son watches his older brother study math. He imitates his study habits and asks the same questions he asked.”

Peers also played a subtle but impactful role. One peer (Pe . 12) said, “When my friend showed me how she understood the fractions, it suddenly made sense. I learned it her way, not from the book.” Another (Pe . 3) stated, “Sometimes we compete on who finishes the worksheet first. That makes me try harder, and I learn more.”

In summary, vicarious experiences provided students with both cognitive strategies and emotional reassurance. Observing relatable role models—whether peers, teachers, or family members—not only reduced fear of failure but also encouraged confidence in their ability to succeed. At the same time, negative social comparisons could trigger self-doubt, particularly in environments where speed and performance were highly valued. These findings highlight the complex, dual role of vicarious learning and emphasize the importance of a classroom climate that fosters both inspiration and psychological security. The thematic map in Figure 2 illustrates how codes such as “peer modeling,” “teacher demonstration,” and “family role models” contribute to the broader theme of vicarious learning through observation.

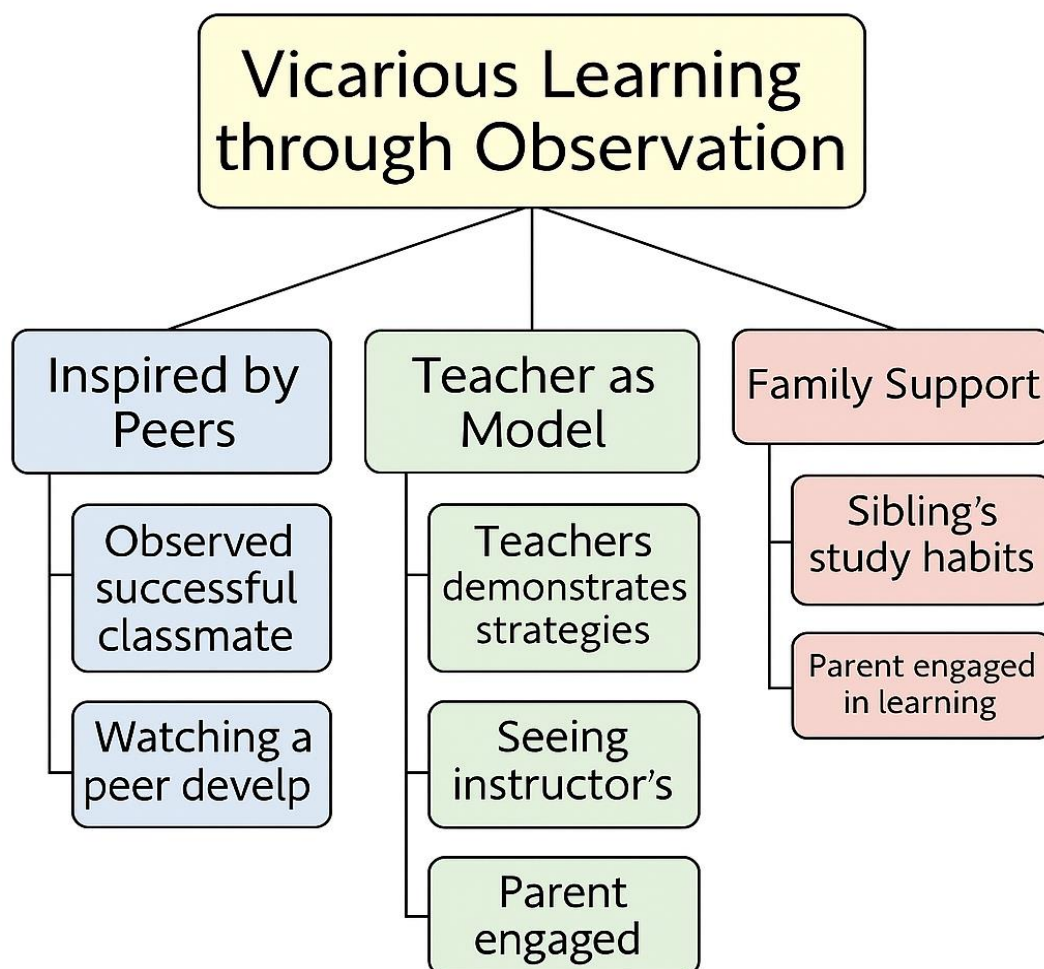


Figure 2. Theme 2: Vicarious Learning through Observation

4.3. Theme 3: Verbal Encouragement and Supportive Feedback

Verbal persuasion and emotional encouragement played crucial roles in shaping students' mathematics self-efficacy. Supportive messages from teachers, parents, and peers had a significant influence on students' beliefs about their own capabilities, particularly during moments of challenge or self-doubt.

Many students recounted how encouragement from their teachers inspired them to persist through difficulties. One student (S.28) stated, *"When my teacher told me, 'I believe you can solve it if you try,' it pushed me to keep working until I got it right."* Another (S.13) said, *"Even when I made mistakes, my teacher kept saying, 'You're smart; you just need more practice.' It made me believe I could do better."*

However, some students described instances where verbal feedback diminished their confidence. One student (S.22) said, *"Sometimes the teacher ignores my answer or only praises the top students. It makes me feel invisible."* Another (S.15) stated, *"When I get things wrong and no one says anything encouraging, I start thinking I'll never be good at math."* Although less frequent, these moments had a profound emotional impact, particularly among students who were already grappling with self-doubt. For some, silence or selective praise evoked feelings of exclusion, self-blame, and disengagement.

Additionally, teachers employed verbal encouragement as a deliberate strategy to foster students' self-confidence. One teacher (T.3) said, *"Students need to hear they are capable. I always emphasize their effort before their results."* Another (T.5) stated, *"Even a struggling student can grow if you remind them they have potential."*

Several parents echoed this approach at home. One parent (P.2) said, *"I always tell my son that mistakes are part of learning. We focus on his efforts, not his score."* Another parent (P.4) stated, *"After every exam, whether good or bad, we say, 'You can improve. You're capable.' It helps overcome his fear of math."*

Peer encouragement also emerged as a meaningful source of motivation. One peer (Pe . 2) said, *"When my friend told me, 'You're close, just think again,' it made me try harder instead of giving up."* Similarly, another (Pe . 10) stated, *"We usually cheer each other during quizzes. It helps when you know others believe you can do it."*

Collectively, these forms of verbal persuasion and emotional support contributed to the development of a resilient mathematical identity among students. This finding supports Bandura's (1997) claim that social persuasion is particularly effective when delivered by credible and supportive figures. Conversely, the absence of such encouragement—or the presence of unbalanced, one-sided praise—can lead to discouragement and anxiety, especially in performance-oriented classrooms. These findings suggest that encouragement is not merely a motivational tool, but also a social signal that conveys inclusion, value, and confidence in one's potential. In the Saudi context, where family and teacher voices hold cultural authority, the tone and balance of feedback carry substantial psychological weight and shape students' emotional engagement with learning. Figure 3 presents a thematic map illustrating how both affirming and discouraging messages from teachers, parents, and peers contribute to shaping students' mathematics self-efficacy through the broader construct of verbal persuasion and supportive feedback.

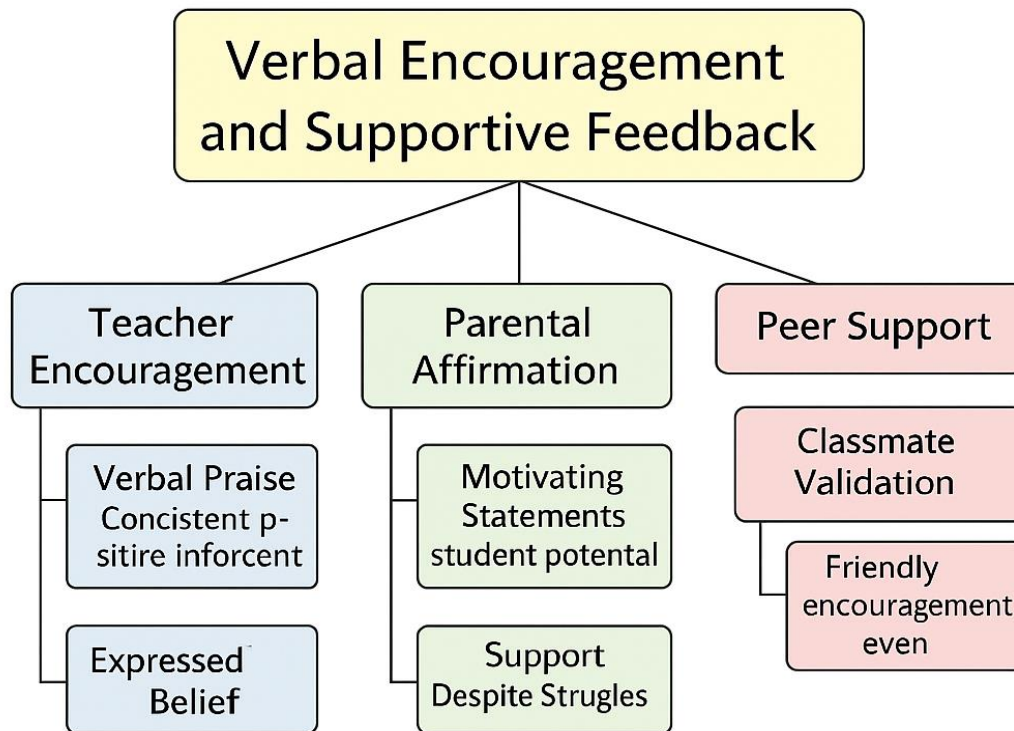


Figure 3. Theme 3: Verbal Encouragement and Supportive Feedback

4.4. Theme 4: Emotional Regulation and Cultural Framing of Mathematics Self-Efficacy

Emotional experiences and cultural values played a pivotal role in shaping the students' mathematics self-efficacy beliefs. Feelings of anxiety, pride, motivation, and religious trust were deeply intertwined with students' engagement in mathematics and their perceptions of their capabilities.

Most students indicated that emotions played a central role in their mathematical experiences. One student (S.27) said, *"Before exams, I get very nervous, but when I remember my hard work and trust God, I feel calmer."* Another (S.19) stated, *"When I finally solve a hard problem, I feel proud and want to learn more."*

Teachers also recognized the importance of emotional regulation in cultivating students' confidence. One teacher (T.12) said, *"If a student is anxious, no matter how good they are, they may freeze. We have to make math feel safe."* Another (T.9) stated, *"I remind students that making mistakes is normal. Reducing fear is the first step to confidence."*

Parents also helped reframe emotional responses using religious and cultural narratives. One parent (P.2) said, *"We teach our children to trust that success comes from effort and prayer. This helps them approach tests with greater calm and focus."* Another (P.5) stated, *"We always tell them: 'Do your best, and leave the rest to God.' It relieves a lot of pressure."*

Peers also played a meaningful role in shaping emotional responses. One peer (Pe . 2) said, *"When my friend tells me, 'Don't worry, you're good at this,' I feel less afraid."* Another (Pe . 5) stated, *"Sometimes competing with classmates makes me nervous, but it also makes me want to do better."*

Several students reported feeling anxious before math tasks and described experiencing physical symptoms such as restlessness or mental blocks. In response, they employed a range of emotion-regulation strategies, including deep breathing, positive self-talk, recalling past successes, and engaging in faith-based routines. One student (S.33) said, *"Before math tests, I always recite Al-Fatiha*

and ask Allah to give me calm and focus.” Another (S.41) stated, *“When I feel anxious, I remember that success comes from both effort and trusting God. That helps me feel less pressure.”*

In contrast, pride emerged as a powerful emotional reward. Students associated pride not only with academic success but also with fulfilling familial and spiritual duties. As one participant said, *“When I solve something hard, I feel proud because I know I’m making my parents and even God happy with my effort”* (S.7). These emotional highs frequently served as strong motivators for continued engagement, reinforcing students’ appreciation for persistence.

These emotional responses are deeply embedded in Saudi cultural and religious norms. In this study, emotion regulation was not merely a psychological process but also a spiritual one. The students often referred to *sabr* (patience) and *tawakkul* (trust in God) as values that helped them cope with academic stress and turn negative experiences into sources of strength and resilience.

These frameworks offered a culturally grounded lens through which students could reinterpret failure, normalize struggles, and maintain hope; they functioned both as coping strategies and as sources of existential reassurance.

Moreover, achievement was often perceived as a collective reflection rather than a purely individual triumph. Students frequently linked their sense of self-worth to how family members or teachers perceived their successes. In this collectivist context, emotional well-being and confidence were closely tied to social validation. This contrasts with many Western models of self-efficacy, where autonomy and internal control are dominant in the narrative (Bandura, 1997; Schunk & DiBenedetto, 2020).

These findings underscore the importance of reconceptualizing Bandura’s four sources of self-efficacy through a culturally situated lens. In Saudi Arabia, emotional and cultural influences are not peripheral considerations; they are central to the formation, protection, and restoration of confidence. The thematic map in Figure 4 illustrates the interplay of emotional states, such as anxiety, pride, and motivation, alongside culturally situated mechanisms, including religious trust (*tawakkul*), patience (*sabr*), and social validation. These components collectively shaped the regulation and formation of the students’ mathematics self-efficacy within the broader cultural context.

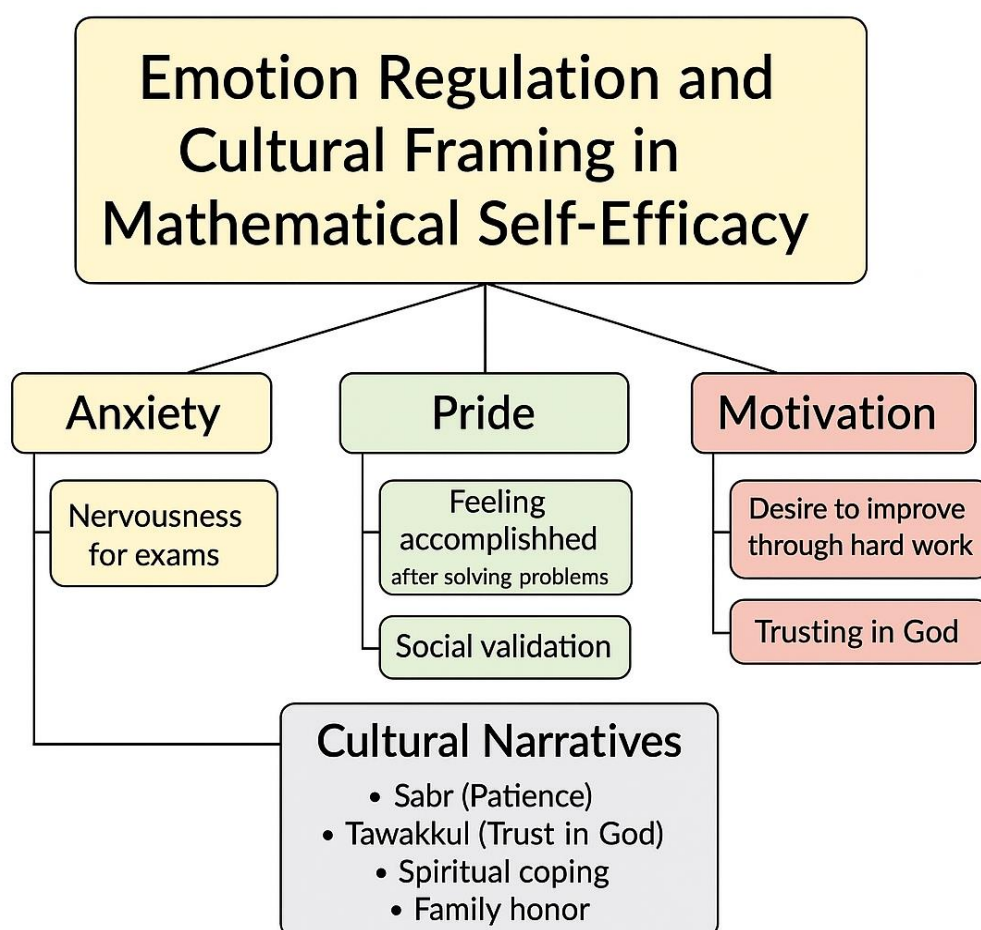


Figure 4. Theme 4: Emotional Regulation and Cultural Framing of Mathematics Self-Efficacy

5. Discussion

This study explored the sources of middle school students' mathematics self-efficacy within the cultural and educational context of Saudi Arabia. Drawing on Bandura's (1997) social cognitive theory, the analysis examined students' personal experiences in conjunction with the social and emotional factors that influence their self-beliefs. The findings, organized into four key themes, provide insights into how students develop confidence in mathematics through mastery experiences, vicarious learning, verbal encouragement, and a range of emotional and cultural influences.

The first research question examined how students' personal experiences shape their mathematics self-efficacy. The results confirmed that mastery experiences—particularly those involving successful task completion and recognition—were the most influential contributors to confidence. This outcome directly supports Bandura's (1997) claim that mastery is the strongest source of self-efficacy. This aligns with Herianto et al. (2024), who emphasized that self-efficacy consistently predicts students' academic persistence and achievement across learning domains, including mathematics. Students' recollections of prior academic success indicated that such experiences reinforced their persistence and willingness to engage with mathematics, a finding consistent with Pajares and Graham (1999), Street et al. (2024), and Schunk and DiBenedetto (2020).

Educators were also shown to play a central role in shaping mastery experiences through structured instructional support. Teachers who gradually increased task difficulty and provided appropriate scaffolding fostered competence and motivation in their students. This aligns with Klassen and Usher's (2010) emphasis that learning environments designed to promote mastery encourage resilience and autonomy. In the Saudi context, these effects were reinforced by strong social validation from families and peers, creating a continuous cycle of confidence-building. Thus,

while mastery experiences appear universally influential, they gain unique cultural depth when supported by societal values that prioritize academic achievement.

The second research question addressed the influence of social interactions and observational learning on students' self-efficacy beliefs. The findings revealed that vicarious learning and verbal persuasion were especially powerful in shaping perceptions of competence. Observing peers, teachers, or family members succeed in mathematical tasks often increased students' belief in their own capabilities. This reflects Bandura's (1997) notion of vicarious experience, wherein individuals develop confidence by comparing themselves to similar others (Schunk & Meece, 2006; Usher, 2009).

However, not all social comparisons were positive. Some students described feeling discouraged when comparing themselves to peers who consistently performed better or received praise more quickly. Although these accounts highlight the double-edged nature of vicarious learning, they also underscore the importance of fostering supportive rather than competitive classroom climates. Encouragement from siblings or peers who had overcome academic struggles often provided an alternative source of motivation, illustrating that observational learning can inspire perseverance when students perceive improvement as attainable. Teachers' modeling of problem-solving strategies further contributed to this dynamic, as their transparency in explaining thought processes and framing mistakes as learning opportunities helped reduce students' fear of failure. These findings highlight the pedagogical value of modeling and demonstrate that vicarious learning can be most effective when embedded in supportive environments. This finding is consistent with Liang et al. (2025), who found that classroom emotional safety and familial expectations significantly mediate the internalization of self-efficacy beliefs among students.

Verbal persuasion also emerged as a significant factor in building mathematics self-efficacy. Supportive comments from teachers, parents, and peers reinforced students' belief in their potential, particularly when encouragement was delivered consistently and credibly. This echoes the conclusions of Lent et al. (1991) and Talsma et al. (2018), who noted that social persuasion is most effective when realistic, timely, and contextualized. Teachers' encouragement strategies, especially when coupled with constructive feedback, shifted students' focus from fixed ability to effort-based growth. Similarly, affirmations provided in the home environment played a crucial role in motivating students to persevere with challenging tasks, consistent with the findings of Putwain et al. (2013). Recent Saudi research further supports this point, showing that parental involvement significantly enhances students' mathematics self-efficacy by reinforcing persistence and confidence (Al-Qahtani & Alghamdi, 2025).

The third research question investigated the influence of emotional responses and cultural values on mathematics self-efficacy. The results highlighted the significance of affective states such as anxiety, pride, and motivation, which intersected with cultural and religious values to shape students' beliefs. These findings align with prior research linking sociocultural factors to motivation (Bong & Skaalvik, 2003; Putwain et al., 2013; Yang et al., 2024). Students reported that positive emotions, such as relief and pride after overcoming mathematical challenges, reinforced their confidence. Conversely, anxiety often undermined their sense of efficacy. However, strategies for managing these emotions—including self-talk, deep breathing, and reliance on religious practices—helped students reframe challenges and sustain engagement. These results suggest that emotion regulation is both psychological and spiritual in this context, drawing on religious values and collective encouragement to reinterpret academic stress as a purposeful experience.

In Saudi Arabia, academic performance is often intertwined with religious and familial expectations. This cultural backdrop enabled students to view persistence in mathematics not only as an academic goal but also as an act tied to moral and spiritual responsibility. Such interpretations align with the findings of Liem and Nie (2008) and King and McInerney (2014), who have emphasized

the role of cultural identity in shaping motivational beliefs. Furthermore, communal validation of success reinforced self-efficacy by linking individual achievement with family and community pride, reflecting characteristics of collectivist cultures (Triandis, 1995). These cultural and emotional dimensions extend Bandura's framework by showing how local values and spiritual practices serve as integral sources of motivation.

Although the study primarily highlighted positive influences such as mastery, encouragement, and moral support, it also revealed that negative feedback, excessive competition, and academic setbacks challenged students' confidence. Nevertheless, resilience was often demonstrated through strategies such as seeking guidance from trusted adults, drawing strength from one's religious beliefs, and reframing failure as a temporary setback. These insights highlight the dual nature of self-efficacy development: it is shaped not only by affirming experiences but also by the ability to recover from discouragement. This finding expands the theoretical contribution of the study by illustrating that culturally grounded coping strategies can transform setbacks into catalysts for growth.

Another notable finding was the role of teachers as moral exemplars, whose approval carried significant social and spiritual weight in addition to their academic authority. This perspective suggests that self-efficacy in the Saudi context is shaped by moral and communal forces, in addition to Bandura's four sources. Teachers were not merely transmitters of knowledge but were perceived as role models whose guidance reinforced both competence and moral responsibility.

Taken together, these findings reveal the multifaceted and culturally situated nature of mathematics self-efficacy among Saudi middle school students. The study demonstrates that while Bandura's framework provides a strong foundation, the Saudi context adds distinctive layers of religious and cultural meaning. Through mastery experiences, social validation, and spiritual reinterpretations of stress, students develop confidence in mathematics that is deeply embedded in their sociocultural environment.

In conclusion, this study contributes to the literature on mathematics self-efficacy by offering a qualitative, culturally contextualized analysis of Saudi students' experiences. The voices of learners, educators, and parents demonstrated that confidence in mathematics arises from the interplay of academic success, social influence, and cultural identity. These insights underscore the importance of designing instructional practices that are both academically rigorous and culturally responsive. Professional development programs for teachers should emphasize strategies that combine scaffolding, encouragement, and cultural sensitivity to support students' resilience and engagement.

Overall, these findings extend Bandura's framework by situating mathematics self-efficacy within a distinctively Saudi cultural context. This contextualization not only refines the theoretical understanding of self-efficacy but also provides practical implications for educational psychology at the global level. By highlighting the interplay between mastery, social validation, and spiritual interpretations, the study demonstrates that a dynamic interplay of academic, social, and cultural forces shapes mathematics self-efficacy.

Nevertheless, the study's exclusive focus on male students represents a limitation. While cultural and institutional norms influenced this sampling decision, they also restrict the generalizability of the findings. Gendered differences in educational experiences may lead to distinct sources of self-efficacy among female students. Future research should therefore incorporate female perspectives or adopt co-educational settings to capture a more comprehensive understanding of mathematics self-efficacy development across genders and guide the design of more inclusive educational interventions.

6. Conclusion

This study examined how mathematics self-efficacy beliefs among Saudi middle school students are shaped through distinct yet interrelated formative experiences. First, mastery experiences emerged as the most influential and culturally resonant source of self-efficacy, especially when reinforced by familial recognition and validated within the broader community. Second, social dynamics, including modeling by teachers, peers, and family members, played a central role in shaping students' perceptions of competence. Third, emotional support and culturally embedded narratives that emphasize perseverance, effort, and faith were essential for cultivating students' resilience and confidence in mathematics.

These findings highlight the complex nature of mathematics self-efficacy, emphasizing the importance of culturally responsive educational practices. By integrating mastery, social validation, and spiritual meaning-making, Saudi students construct their academic identities within a deeply rooted cultural framework. This perspective contributes to wider theoretical discussions by illustrating how self-efficacy is shaped not only by psychological mechanisms but also by socioreligious and communal values that are unique to non-Western settings. To the best of our knowledge, this is the first qualitative study to explore mathematics self-efficacy among Saudi middle school students, offering original insights that extend beyond existing Western-based research.

Despite its contributions, this study had several limitations. The exclusive focus on male students, a decision dictated by cultural and institutional constraints, limits the generalizability of the findings. In the context of Saudi Arabia, gender-based educational differences may result in unique self-efficacy experiences for female students, a dimension that remains largely unexplored. Additionally, the qualitative design, while offering valuable in-depth narratives, inherently carries the risk of researcher interpretation bias despite efforts to ensure rigor. Future research should therefore include gender-diverse samples, adopt longitudinal or mixed-methods approaches, and explore broader systemic and institutional influences shaping the development of mathematics self-efficacy.

7. Suggestion

For Educational Practice

- Strengthen mastery experiences: Design mathematics lessons that provide early, credible successes for students (e.g., sequenced tasks that progress from simple to more complex with clear success criteria). This aligns with the study's finding that even small, recognized achievements increased confidence and persistence.
- Promote peer and family modeling: Incorporate structured peer-mentoring and collaborative problem-solving in class, and encourage families—particularly fathers (as highlighted in this study)—to share positive mathematics routines at home. The findings showed that observing competent peers and close family members increased students' confidence in their own capabilities.
- Enhance verbal encouragement: Provide specific, effort-focused feedback and consistent encouragement from teachers and families, as the study indicated these messages were pivotal for resilience. Emphasize improvement over fixed ability, and pair praise with actionable guidance.
- Support emotional and cultural resilience: Integrate brief classroom routines for emotion regulation (e.g., positive self-talk, calm-focus rituals) and culturally resonant framing (e.g., linking perseverance to values of *sabr* and *tawakkul*) to help students reinterpret stress and sustain engagement, as emphasized in the study's emotional/cultural theme.

For Policy and Teacher Training

- Prioritize professional development: Focus teacher training on mastery-oriented instruction, effective peer-collaboration structures, and culturally grounded motivation and feedback, directly reflecting the needs identified in this study.
- Align curriculum design: Ensure mathematics curricula address emotional and motivational components alongside cognition, consistent with the social and cultural realities that shape students' self-efficacy in Saudi schools.

For Future Research

- Include female students: Extend these findings by examining potential gender-based differences in sources of self-efficacy.
- Adopt longitudinal and mixed-methods designs: Track how mastery, vicarious learning, verbal persuasion, and cultural-emotional factors interact over time.
- Conduct comparative studies across Arab contexts: Distinguish shared regional influences from country-specific patterns to inform more inclusive and scalable interventions.

Declarations

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