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## **Factors Influencing Students' Interest in Mathematics: A Systematic Literature Review**

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### **ABSTRACT**

*Students' interest in mathematics is a key predictor of academic success. The guiding research question is: "What factors influence students' interest in mathematics?" A comprehensive search of Google Scholar, ERIC, Scopus, and ProQuest identified 101 records, of which 41 empirical studies met the inclusion criteria following PRISMA guidelines. Findings show that students' interest is influenced by interacting psychological, teacher-related, curriculum-related, internal, and external factors. Psychological factors such as self-efficacy and mathematics anxiety play a significant role, while teacher factors such as feedback and teacher-student relationships strongly influence interest. Curriculum relevance and instructional materials also enhance interest. Internal factors (such*

*as personal goals and self-confidence) and external factors (such as parental support and peer influence) both influence students' interest. The study provides a holistic understanding of determinants of interest in mathematics and offers implications for improving teaching, curriculum design, and student engagement in both K–12 and higher education contexts.*

**Keywords:** Curriculum, mathematics, psychological, student interest, teacher

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## INTRODUCTION

Mathematics is a subject that has a significant influence on students' academic performance and career prospects (Arthur, 2018; Boadu & Bonyah, 2024; Richards, 2007). Despite its importance, many students continue to show low interest and weak motivation toward the subject, which negatively affects their learning outcomes and engagement (Mwape, 2021; Phiri, 2019). Recent studies continue to confirm that sustaining students' interest in mathematics remains a global challenge (Boadu et al., 2026). For example, Harefa (2023) found that students' interest in learning mathematics is closely linked to their learning outcomes, suggesting that interest is not only an affective factor but also a strong predictor of academic performance. Similarly, Nurmanov et al. (2024) observed that well-structured teaching approaches significantly enhance students' interest in mathematics when lessons are interactive and meaningful.

In the same direction, Wang et al. (2023) highlighted that students' interest in STEM-related fields, including mathematics, varies across gender, reinforcing the need for inclusive and supportive learning environments that nurture interest among all learners. Low achievement in mathematics has also been linked to several factors, including self-esteem, behavioral values, and mathematics anxiety (Anigbo & Idigo, 2016; Arthur et al., 2017). Students' interest in mathematics has been widely recognized as a key predictor of performance in mathematical problem-solving (Fadila et al., 2026; Hsu et al., 2026). Attitudes toward mathematics also play a major role in shaping learning experiences, as positive attitudes encourage motivation and willingness to engage in challenging tasks (Hashim et al., 2021). Empirical evidence further indicates that students' interest positively influences their attitudes toward learning mathematics, reinforcing the reciprocal relationship between the affective and cognitive dimensions of learning

(Park & Han, 2021; Xu et al., 2016). However, teachers often struggle to sustain this interest, especially when instructional methods fail to connect mathematics to real-life experiences (Khayati & Payan, 2014; Stailud & Zanzini, 2024).

Research consistently shows that students' interest in mathematics is closely associated with teachers' clarity, confidence, instructional strategies, and classroom interactions (Arthur et al., 2014; Boadu et al., 2026; Tambunan, 2018). When teachers encourage goal setting, autonomy, and responsibility for learning, students' motivation and interest are significantly enhanced (Arthur et al., 2022; Tambunan et al., 2021). Promoting interest in mathematics attracts students, sustains their engagement, and motivates them to learn (Jingsong, 2003). Teacher feedback also plays a crucial role in shaping students' interest and motivation in mathematics. Controlling or externally focused feedback has been found to undermine intrinsic motivation, whereas informational, supportive, and competence-oriented feedback enhances students' interest and enjoyment of mathematics (Carmichael et al., 2017; Roche et al., 2023).

Despite numerous pedagogical interventions reported in previous studies, low performance and disengagement in mathematics persist across many educational contexts (Boadu et al., 2026). Contributing factors include shortages of qualified teachers, inadequate instructional materials, large class sizes, insufficient infrastructure, and persistent challenges related to self-efficacy and mathematics anxiety (Ieren & Eraikhuemen, 2017). Beyond classroom practices, broader contextual and structural factors also influence students' interest in mathematics. Infrastructure limitations, negative perceptions of mathematics, and policy-related challenges have been identified as significant barriers to students' interest (Abid & Noori, 2023; Anigbo & Idigo, 2016). Students are more likely to learn mathematics effectively when they are actively involved in the learning process and perceive the subject as meaningful and relevant (Mazana et al., 2019).

## **LITERATURE REVIEW**

Generally, factors influencing students' interest in mathematics can be classified into internal and external categories (Korompot et al., 2020). Internal factors include students' abilities, understanding, motivation, self-confidence, intelligence, learning skills, hobbies, and attitudes toward learning (Almanthari et al., 2020). External factors encompass teaching methods, socio-cultural influences, class schedules, peer relationships, availability of learning resources, recognition and rewards, and economic conditions. Students' interest in mathematics has been shown to significantly influence academic achievement across educational levels (Boadu et al., 2026). Importantly, students' perceptions of mathematics itself whether it is viewed as useful, relevant, or overly abstract also influence their engagement and persistence (Amaral et al., 2023). Collectively, existing studies demonstrate that students' interest in mathematics is not influenced by a single

factor but rather by a complex interaction of internal and external factors (Ito & McPherson, 2018; Roche et al., 2023). Recent empirical studies further reinforce the central role of psychological variables such as self-efficacy and mathematics anxiety (Arthur et al., 2017; Boadu et al., 2026; Mohamad & Nasri, 2025; Schukajlow, 2015), alongside teacher-related factors including instructional strategies and classroom support (Arthur et al., 2026; Habimana et al., 2024; Tambunan et al., 2021). Curriculum relevance and alignment with students' academic and career aspirations have also been linked to enhanced interest and performance in mathematics (Arthur et al., 2018; Cruz & Marbella, 2025). Beyond the classroom, parental involvement, cultural expectations, and societal perceptions of mathematics significantly influence students' interest in mathematics (Boadu et al., 2026; Garin & Campit, 2017; Ito & McPherson, 2018; Mohd Hanafiah et al., 2024).

Cross-national evidence further suggests that variations in educational systems, instructional practices, and cultural values contribute to differences in students' interest in mathematics across countries (Muhaimin et al., 2025). Despite the growing body of empirical research, existing findings remain fragmented across contexts, educational levels, and methodological approaches. To address this gap, the present systematic literature review synthesizes empirical studies published between 2000 and 2026, thereby integrating both foundational and contemporary research on students' interest in mathematics. By combining earlier and recent evidence, the review provides a comprehensive and balanced understanding of the factors influencing students' interest in mathematics. Accordingly, the present study conducts a systematic literature review to synthesize empirical evidence on the determinants of students' interest in mathematics across five interrelated dimensions: psychological, teacher-related, curriculum-related, internal, and external factors. By providing a coherent synthesis, this review aims to inform future research, instructional practice, and policy development across both K–12 and higher education contexts. The review addresses the following research questions:

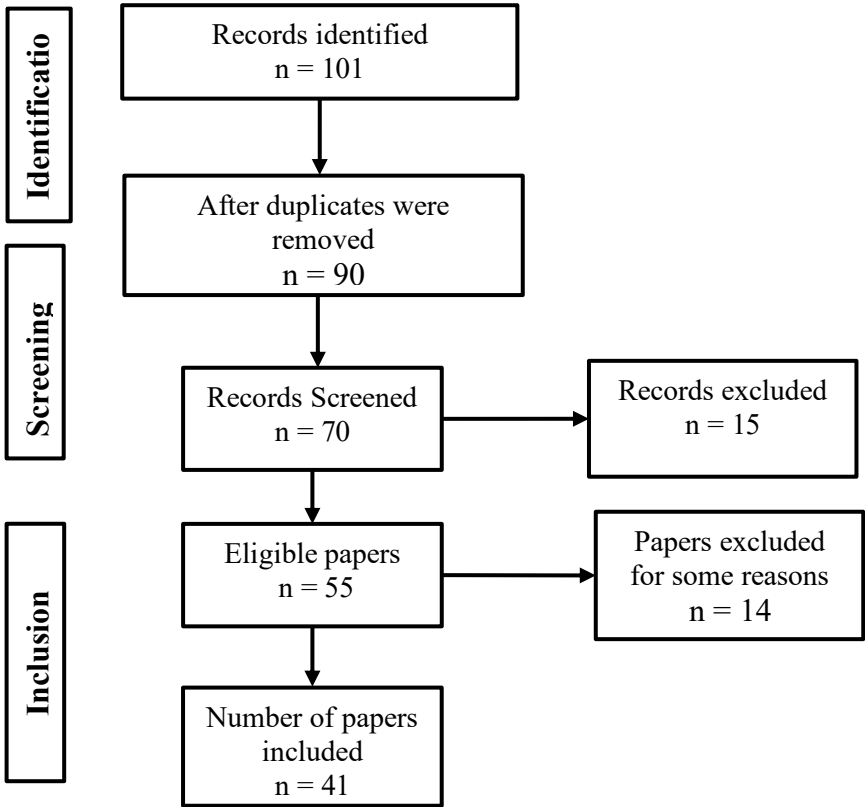
1. What factors influence students' interest in mathematics?
2. What are the effects of psychological, teacher-related, curriculum-related, internal, and external factors on students' interest in mathematics?

## **RESEARCH METHOD**

The systematic literature review (SLR) followed the PRISMA methodology. PRISMA, which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses, provides a structured approach for conducting and reporting systematic reviews. The PRISMA process involves four main stages: identification, screening, eligibility, and inclusion of studies (see Figure 1). The methodology was

implemented immediately after the review questions were established. The process began with a comprehensive keyword search, followed by the application of inclusion and exclusion criteria, and then proceeded to the detailed review, analysis, and synthesis of the selected studies. Although the PRISMA 2020 guidelines were followed, minor adaptations were made to the PRISMA flow diagram to reflect the specific inclusion and exclusion procedures applied in this review. In particular, duplicate records were removed at multiple stages because of database overlap, and several studies were excluded after full-text screening because they lacked empirical data or did not directly address students' interest in mathematics. These modifications were necessary to ensure transparency and to provide an accurate representation of the screening and selection process used in this study.

**Figure 1**  
*PRISMA Flow Chart (The PRISMA Group, 2020)*



*Note.* The PRISMA flow diagram was self-designed and adapted to reflect the specific screening procedures and inclusion criteria applied in this review.

### *Identification*

To identify peer-reviewed articles on factors influencing students' interest in mathematics, Google Scholar was searched using Harzing's Publish or Perish tool. The search included articles published between 2000 and 2026 using keywords aligned with the research questions (Goncalves et al., 2022).

The keywords included terms related to students' interest in mathematics, such as "students' interest," "teacher factors," "internal factors," "psychological factors," "external factors," and "curriculum design factors," as well as terms associated with mathematics education, including "mathematics education," "mathematics teaching and learning," "mathematics instruction," and "mathematics pedagogy." The final search query combined these terms to ensure relevance to the review questions: ("students' interest" OR "teacher factors" OR "psychological factors" OR "curriculum design factors" OR "internal factors" OR "external factors") AND ("mathematics education" OR "mathematics teaching and learning" OR "mathematics instruction" OR "mathematics pedagogy").

The search was conducted in April 2025 and yielded 101 article records (see Table 1). This strategy ensured the inclusion of studies addressing both affective constructs (e.g., interest, motivation, and anxiety) and instructional or contextual dimensions of mathematics education. The retrieved records were imported into Mendeley Desktop for reference management and duplicate removal. Additional searches were conducted by examining the reference lists of the selected studies to improve the comprehensiveness and reliability of the review.

**Table 1**  
*Results for the Literature Search*

Keyword	Papers Found
Students' interest	35
Psychological factors	21
Mathematics education	20
Teacher factors	10
Curriculum design factors	6
Internal factors	5
External factors	4
Total	101

Note. The table presents the distribution of studies identified through the literature search based on key thematic areas. The total number of papers reflects the cumulative count of all relevant studies retrieved across the selected keywords.

### *Screening*

The inclusion criteria focused on peer-reviewed studies that examined factors influencing students' interest in mathematics. Studies that were not published in

English or were unrelated to mathematics education were excluded. Following the initial screening process, which involved reviewing abstracts and applying the inclusion and exclusion criteria, 70 articles were shortlisted for full-text review. These articles were subsequently retrieved in full and examined in detail to extract relevant information.

### *Eligibility, Inclusion, and Exclusion*

The eligibility and inclusion process involved evaluating each study based on its relevance to the review objectives and research questions. Each article was assessed according to the extent to which it examined students' interest in mathematics and the depth of its theoretical and empirical engagement with the construct. Studies were excluded when students' interest in mathematics was mentioned only superficially, treated as a secondary outcome, or presented without clear theoretical grounding or empirical measurement. Additional exclusions were made for studies with insufficient methodological transparency, particularly where data collection instruments or analytical procedures were unclear. As a result of this rigorous assessment, 29 studies were excluded, primarily because of weak methodological clarity or limited focus on students' interest in mathematics. The final synthesis comprised 41 empirical studies, which formed the evidence base for this review. Although the PRISMA 2020 guidelines were followed, minor adaptations were made to the flow diagram to reflect the actual screening process. Specifically, duplicate records were removed at multiple stages because of overlap across databases, and additional studies were excluded after full-text review due to insufficient empirical rigor or limited conceptual alignment. A clarifying note was included beneath the PRISMA diagram to ensure transparency in reporting. These exclusion decisions were guided by the need to maintain methodological rigor and conceptual relevance.

### *Data Extraction and Synthesis*

A structured data extraction template was used to ensure consistency across all included studies. The extracted information included authorship, publication year, country, sample characteristics, factors examined, research design, and key findings related to students' interest in mathematics.

Rather than presenting individual study summaries, the data were synthesized thematically. The studies were organized into five interrelated categories: psychological, teacher-related, curriculum-related, internal, and external factors. This approach enabled systematic comparison across studies and facilitated the identification of converging and diverging patterns across contexts and methodologies.

**Table 2**  
*Characteristics of Included Studies*

Study	Country	Sample	Factors Examined	Major Findings
Abid and Noori (2023)	Afghanistan	100 students	Student, teacher, curriculum, infrastructure, government involvement	Student and teacher factors positively influenced interest, whereas government involvement and class size showed negative associations
Amaral et al. (2023)	Timor-Leste	5 students	Motivation, perceptions, teaching methods	Motivation and teaching style influenced students' interest
Anigbo and Idigo (2016)	Nigeria	210 senior high school students	Teacher quality, curriculum, anxiety, student factors	Teacher quality and curriculum significantly influenced students' interest
Arthur et al. (2014)	Ghana	650 university students	Teacher motivation, teaching methods, learning resources	Teacher motivation and teaching methods positively influenced interest
Stailud and Zanzini (2024)	Zambia	120 pupils, 16 teachers	Teacher quality, attitudes, peers, parental influence	Teachers' instructional practices contributed to changes in students' interest
Ieren and Eraikhuemen (2017)	Nigeria	525 students, 75 teachers	Teacher quality, motivation, learning environment	Lack of qualified teachers and low motivation reduced students' interest
Hidayati et al. (2024)	Indonesia	27 students	Internal, external, and content-related factors	Curriculum, peer influence, and content difficulty affected interest.
Jingsong (2003)	China	university students	Teaching methods, motivation	Effective teaching strategies enhanced students' interest

Heinze et al. (2005)	Germany	500 students	Achievement and interest	Interest was positively associated with mathematics achievement
Korompot et al. (2020)	Indonesia	38 students	Psychological, physical, and social aspects	Physical factors exerted the strongest influence on learning interest
Boadu and Boateng (2024)	Ghana	385 students	Technology integration, collaborative learning, motivation	Interest did not mediate the association between instructional factors and mathematics achievement
Sauer (2012)	United States	2 college students	Instructor effectiveness, interest	Instructor effectiveness predicted interest and academic performance
Xu et al. (2016)	China	1,799 students	Homework engagement, interest	Homework engagement positively predicted academic performance
Mohamad and Nasri (2025)	Malaysia	Senior high school students	Interest and achievement factors	A heavy syllabus and negative perceptions reduced students' interest
Muhaimin et al. (2025)	Multiple countries	Students	Individual, social, and pedagogical factors	Interest was shaped by cultural, environment, and curricular contexts
Cruz and Marbella (2025)	Philippines	183 high school students	Motivation and performance	Motivation was strongly associated with students' interest
Habimana et al. (2024)	Rwanda	Senior high school students	Instructional strategy and attitudes	Teacher support positively influenced students' interest
Hanafiah et al. (2024)	Malaysia	186 Form Four students	Parental involvement	Parental support positively

Arthur et al. (2026)	Ghana	219 TVET students	Self-efficacy, history of mathematics	influenced students' interest Self-efficacy and prior mathematical experiences influenced interest
Boadu et al. (2026)	Ghana	300 college students	Self-efficacy, anxiety, cultural perceptions	Interest was influenced by self-efficacy and cultural perceptions
Amany et al. (2023)	Indonesia	Students	Interest, problem-solving, communication	Interest was positively associated with problem-solving and communication skills
Arthur (2018)	Ghana	1,263 SHS students	Teacher and student factors	Both teacher and student factors significantly predicted interest in mathematics
Arthur et al. (2022)	Ghana	394 SHS students	Peer-assisted learning	Peer-assisted learning improved students' interest in mathematics
Arthur et al. (2017)	Ghana	1,263 SHS students	Student perceptions	Negative perceptions reduced students' interest in mathematics
Arthur et al. (2018)	Ghana	1,263 SHS students	Real-life applications, teaching quality	Real-life applications and teaching quality enhanced students' interest
Asare et al. (2023)	Ghana	250 university students	ChatGPT, interest, performance	Interest was positively associated with ChatGPT use
Azmidar et al. (2017)	Indonesia	Students	Teaching methods	The CPA instructional approach improved students' interest
Bright et al. (2024)	Ghana	216 SHS students	Technology, interest, performance	Technology integration and interest influenced

Carmichael et al. (2017)	Australia	471 secondary school students	Classroom environment, emotional factors	academic performance Teacher enthusiasm positively predicted students' interest
Garin and Campit (2017)	Philippines	183 Grade VI pupils	Pedagogy and assessment practices	Pedagogical and assessment practices were significantly associated with students' interest
Ito and McPherson (2018)	United States	High school students	Self-perception, STEM interest	Students' self-perceptions predicted their interest in STEM
Khayati and Payan (2014)	Iran	Senior high school students	Teacher influence	Teacher-related factors influenced students' interest
Otoo et al. (2018)	Ghana	275 SHS students	Motivation and confidence	Motivation and confidence significantly predicted students' interest
Park and Han (2021)	South Korea	Students	Situational interest	Situational factors influenced students' interest
Poudel (2020)	Nepal	365 students	Academic and social barriers	Weak academic foundations and parental neglect reduced students' interest
Richards (2007)	United States	Primary school students	Attitudes and activities	Positive attitudes predicted students' interest
Roche et al. (2023)	Australia	Primary school students	Engagement strategies	Engagement strategies enhanced students' Interest
Schukajlow (2015)	Germany	119 ninth-grade students	Enjoyment and boredom	Enjoyment increased interest, whereas boredom reduced it

Tambunan (2018)	Indonesia	209 secondary school students	Motivation	Teacher motivation positively influenced students' interest
Tambunan et al. (2021)	Indonesia	277 junior high school students	Teacher performance	Teacher performance influenced interest

*Note.* The table summarizes empirical studies on students' interest in mathematics across countries, educational levels, and key influencing variables.

**Table 3**

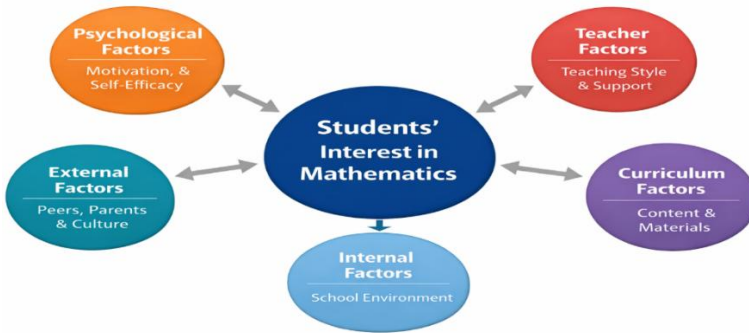
*Methodological Characteristics of Included Studies*

Methodological Aspect	Description
Research Design	Most studies used cross-sectional survey designs (n = 27), followed by SEM-based quantitative studies (n = 3), quasi-experimental designs (n = 4), mixed-methods designs (n = 3), qualitative studies (n = 1), and review studies (n = 3)
Sample Size	Sample sizes ranged from 5 to 1,799 participants, with most studies involving 100-500 participants
Educational Level	The majority focused on secondary education, with fewer studies at primary and tertiary levels
Data Analysis Techniques	Included descriptive statistics, correlation, regression, ANOVA, SEM, mediation analysis, and thematic analysis
Common Limitations	Small sample sizes, cross-sectional designs, self-reported data, limited generalizability, and lack of longitudinal studies.

*Note.* Most studies employed quantitative cross-sectional designs, with limited use of qualitative and mixed-methods approaches.

**Figure 2**

*Conceptual Diagram Illustrating the Interplay Between the Five Identified Factors*



*Note.* Figure 2 presents a conceptual framework illustrating the interplay among five key factors influencing students' interest in mathematics: psychological, teacher-related, curriculum-related, internal, and external factors. Each factor independently contributes to students' interest, motivation, and perceptions of mathematics. The directional arrows indicate interrelationships among these factors, suggesting that students' interests are shaped by a dynamic and interconnected system rather than isolated influences. This framework provides a conceptual basis for interpreting the synthesized findings of the review.

## RESULTS

This section presents a synthesized analysis of findings from the 41 empirical studies included in the systematic review. Rather than reporting individual study findings in isolation, the results are organized thematically to highlight recurring patterns, dominant trends, and contextual differences across studies. The synthesis reveals that students' interest in mathematics is influenced by a complex interaction of psychological, teacher-related, curriculum-related, internal, and external factors, with no single factor operating independently.

### *Psychological Factors*

Across the reviewed studies, psychological factors emerged as the most consistently reported determinants of students' interest in mathematics. Key constructs identified included motivation, attitudes toward mathematics, self-efficacy, mathematics anxiety, and perceived usefulness of mathematics. Studies conducted across diverse contexts consistently showed that students with higher intrinsic motivation and more positive attitudes toward mathematics demonstrated

stronger and more sustained interest in the subject. Conversely, mathematics anxiety and low self-confidence were repeatedly associated with reduced interest and disengagement. Several studies highlighted that fear of failure, negative past experiences, and high-stakes assessment environments significantly contribute to emotional disengagement from mathematics. While most studies reported strong relationships between psychological factors and students' interest, variations were observed in the magnitude of these relationships depending on students' age, educational level, and cultural context.

### *Teacher-Related Factors*

Teacher-related factors were identified as critical external influences on students' interest in mathematics across the majority of the reviewed studies. Effective teaching practices, such as clear explanations, the use of multiple instructional strategies, constructive feedback, and supportive teacher-student relationships, were consistently associated with higher levels of student interest. In contrast, authoritarian teaching styles, limited pedagogical content knowledge, and low teacher motivation were associated with declining interest and negative attitudes toward mathematics. Several studies emphasized that teachers' enthusiasm for mathematics and their ability to connect mathematical concepts to real-life applications significantly enhance students' interest. However, contextual variations were observed, with resource-constrained settings reporting stronger effects of teacher behavior because of limited alternative instructional supports.

### *Curriculum and Instructional Design Factors*

Curriculum-related factors, including content relevance, instructional materials, assessment practices, and the integration of real-world applications, were found to substantially influence students' interest in mathematics. Studies consistently reported that curricula perceived as abstract, overloaded, or examination-driven contributed to student disengagement. Conversely, curricula that incorporated problem-solving activities, technology integration, collaborative learning, and contextualized examples were associated with higher levels of student interest. Differences across educational levels were also evident. While curriculum design had a stronger influence at the secondary school level, instructional flexibility and application-oriented content were particularly important during transitions to higher education.

### *Internal Factors*

Internal factors related to students' personal characteristics and learning dispositions also played a significant role in shaping interest in mathematics. These factors included prior achievement, attitudes toward learning, self-regulation skills, self-confidence, and personal goals. Studies consistently showed that students with stronger foundational skills and effective study strategies were more likely to

maintain interest over time. However, the findings also revealed that high prior achievement alone does not guarantee sustained interest. Several studies indicated that students with strong academic ability but low motivation or negative perceptions of mathematics still exhibited declining interest, underscoring the interaction between the cognitive and affective dimensions of learning.

### *External and Contextual Factors*

External factors such as parental support, peer influence, school environment, availability of instructional resources, and socio-cultural expectations were frequently identified as indirect but influential determinants of students' interest in mathematics. Positive parental attitudes toward mathematics and peer encouragement were associated with increased student interest, whereas negative stereotypes and limited institutional support undermined engagement. Studies from low-resource and developing contexts highlighted infrastructural challenges, such as large class sizes and limited teaching materials, as significant barriers to sustaining interest. In contrast, studies from more resource-rich contexts emphasized psychosocial and instructional factors over material constraints, indicating important contextual differences.

### *Cross-Study Patterns and Divergences*

A key cross-study pattern identified in this review is that students' interest in mathematics is multidimensional and dynamic, shaped by the interaction of personal, instructional, and contextual factors rather than by any single variable. While psychological and teacher-related factors emerged as dominant across most studies, their relative influence varied by educational level and context.

Notably, the review identified a strong reliance on cross-sectional research designs and self-reported data, which limits causal interpretation. Few studies employed longitudinal or experimental designs, highlighting a significant gap in understanding how students' interest in mathematics develops or declines over time, particularly during critical educational transitions.

## **DISCUSSION**

This systematic review synthesized findings from 41 empirical studies to examine the factors influencing students' interest in mathematics across diverse educational contexts. The findings clearly indicate that students' interest is influenced by an interaction of psychological, teacher-related, curriculum-related, internal, and external factors. Recent studies reinforce these findings. For example, Harefa (2023) demonstrated that students with stronger interest in mathematics tend to achieve better learning outcomes, confirming the link between affective engagement and academic success. This supports earlier findings that motivation and interest are central to effective mathematics learning (Arthur et al., 2022;

Boadu et al., 2023; Otoo et al., 2018; Xu et al., 2016). Psychological factors such as motivation, self-efficacy, and anxiety remain among the most consistent predictors of interest (Otoo et al., 2018). However, recent evidence suggests that these factors are also influenced by classroom environment and teaching quality.

Nurmanov et al. (2024) emphasized that engaging instructional strategies foster more positive emotional responses toward mathematics, thereby strengthening students' interest over time. Studies using statistical modeling further indicate that students with higher self-efficacy and positive beliefs about mathematics are more likely to sustain interest even when faced with challenging content (Boadu et al., 2026). Conversely, mathematics anxiety and fear of failure are strongly associated with declining interest, particularly at the secondary level where curricular demands are higher (Anigbo & Idigo, 2016; Mohamad & Nasri, 2025). These findings highlight the need for interventions that address both cognitive and emotional dimensions of learning. The study aligns with Expectancy-Value Theory, which posits that students' engagement is influenced by their expectations of success and the value they attach to learning tasks (Xu et al., 2016). Teacher-related factors also emerged as a critical influence on students' interest in mathematics. Across the reviewed studies, effective teaching practices, clear explanations, and supportive teacher-student relationships were consistently associated with higher levels of interest (Habimana et al., 2024; Tambunan, 2018).

A recent study by Wang et al. (2023) indicates that students' interest in STEM subjects may also be influenced by gender-based perceptions and classroom experiences, highlighting the importance of teacher sensitivity to learner diversity. Studies conducted in Ghana, Nigeria, Zambia, and Indonesia further show that students often attribute reduced interest to ineffective teaching approaches, poor explanations, and negative classroom interactions (Ieren & Eraikhuemen, 2017; Stailud & Zanzini, 2024). In contrast, learner-centered strategies, peer-assisted learning, and instructional approaches that emphasize understanding rather than rote memorization were found to enhance interest (Arthur et al., 2018; Azmidar et al., 2017). Instructional approaches that incorporate real-life applications, conceptual understanding, and the history of mathematics were particularly effective in enhancing interest, especially in TVET contexts (Arthur et al., 2026). These findings suggest that while high-quality pedagogy universally supports engagement, its effectiveness is moderated by cultural and contextual alignment. Curriculum-related factors also play a significant role in shaping students' interest in mathematics. Studies consistently show that interest declines when mathematics content is abstract and examination-driven, whereas it increases when content is contextualized and linked to real-life situations (Arthur et al., 2017; Garin & Campit, 2017; Cruz & Marbella, 2025).

Recent findings by Nurmanov et al. (2024) further confirm that interactive and student-centered curriculum delivery enhances engagement. These results support constructivist learning theory, which emphasizes meaning-making and

relevance as essential for sustained engagement (Carmichael et al., 2017; Park & Han, 2021). Beyond the classroom, parental involvement and supportive home environments were consistently associated with higher interest and achievement (Korompot et al., 2020; Hanafiah et al., 2024). In contrast, negative societal perceptions of mathematics were found to suppress interest, particularly among low-achieving learners (Boadu et al., 2026; Poudel, 2020). Cross-national evidence suggests that while similar factors influence interest globally, their relative importance varies across educational systems and cultural contexts (Amaral et al., 2023; Muhaimin et al., 2025). This review highlights the need to broaden the geographic and cultural scope of research on students' interest in mathematics, as underrepresentation of regions such as South America and Northern Europe may limit global generalizability. Comparative evidence further shows that contextual influences vary across settings: in low-resource environments, structural constraints (such as large class sizes and limited resources) play a stronger role, whereas in high-resource contexts, psychological factors are more prominent.

This underscores the importance of context-sensitive interpretations of students' interests. Studies from low-resource contexts emphasize infrastructural constraints, whereas those from resource-rich contexts emphasize psychological and pedagogical factors. This interactionist perspective challenges deficit-based explanations that attribute low interest solely to students and highlights the role of educational systems in shaping mathematical identity. Although most included studies focused on K–12 education, the findings have important implications for higher education. Interest developed during secondary schooling strongly predicts persistence, confidence, and performance in university-level mathematics and STEM-related disciplines. Psychological factors such as self-efficacy and anxiety, along with instructional relevance and supportive teaching practices, continue to influence engagement at the tertiary level. Despite these insights, methodological limitations remain. The dominance of cross-sectional designs limits causal inference (Arthur et al., 2014; Cruz & Marbella, 2025). In addition, reliance on self-reported data introduces potential bias (Abid & Noori, 2023). Few longitudinal or experimental studies were identified, limiting understanding of how interest develops over time, particularly during transitions from secondary to higher education (Muhaimin et al., 2025; Sauer, 2012).

## CONCLUSIONS

This systematic review demonstrates that students' interest in mathematics is influenced by the interaction of psychological, teacher-related, curriculum-related, internal, and external factors rather than ability alone. Strong self-efficacy, supportive teaching practices, and relevant curricula consistently enhance students' interest, whereas mathematics anxiety and poorly contextualized instruction

undermine it. Although most evidence originates from K-12 contexts, the findings have clear implications for higher education, as interest developed in secondary school strongly influences students' readiness, persistence, and success in university-level mathematics. Educational policies should therefore prioritize confidence-building pedagogies, culturally responsive curriculum design, and structured support during transitions to higher education in order to strengthen long-term engagement and learning outcomes.

## **IMPLICATIONS**

The findings of this review have important implications for educational practice, curriculum design, and policy. First, teachers should adopt instructional approaches that actively engage students and make mathematics meaningful. Learner-centered strategies significantly enhance students' interest; therefore, teachers should move beyond traditional lecture-based methods and incorporate problem-solving, real-life applications, and collaborative learning. Second, curriculum developers should ensure that mathematics content is relevant and connected to students lived experiences. Since interest directly influences learning outcomes, curriculum design should balance content coverage with engagement.

Third, educational stakeholders should prioritize diversity and inclusion in mathematics education. Variations in interest across contexts and gender highlight the need for inclusive instructional strategies that support all learners.

Finally, policymakers should invest in continuous professional development for teachers, focusing on pedagogical strategies that enhance engagement. Strengthening teacher capacity will promote sustained interest, motivation, and achievement in mathematics. In addition, educators and schools may benefit from practical tools such as interest audits, reflective interviews, and context-specific engagement strategies to better identify and respond to students' learning needs.

## **LIMITATIONS AND FUTURE DIRECTIONS**

Despite its comprehensive synthesis, this review has several limitations. Most included studies employed cross-sectional designs and relied heavily on self-reported data, which limits the ability to establish causal relationships between students' interest in mathematics and related outcomes such as achievement and engagement. These methodological constraints make it difficult to determine the directionality of effects and to understand how interest develops over time. In addition, the majority of studies focused on K-12 educational contexts, with limited attention to higher education settings. This restricts the generalizability of the findings, particularly in understanding how students' interests evolve during critical academic transitions, such as progression from secondary to tertiary education.

Geographic representation was also uneven, further limiting the global applicability of the findings. Future research should therefore adopt more robust methodological approaches, including longitudinal, quasi-experimental, and experimental designs, to better capture changes in students' interest over time and to establish clearer causal relationships.

Longitudinal studies, in particular, are needed to examine how interest develops, declines, or stabilizes across key educational transitions. Furthermore, future studies should explicitly distinguish between situational interest (short-term, context-dependent engagement triggered by specific instructional conditions) and individual interest (a stable, long-term disposition toward mathematics). Making this distinction will enhance conceptual clarity and allow researchers to better understand how instructional practices and learning environments contribute to both immediate engagement and sustained interest development. Future research should also incorporate more diverse cultural and educational contexts to improve generalizability and provide a more comprehensive understanding of the factors influencing students' interest in mathematics globally. The geographic distribution of studies remains uneven, with limited representation from regions such as South America and Northern Europe. Comparative studies across regions are therefore recommended. Finally, future research should adopt mixed-methods approaches that combine quantitative analysis with qualitative data, such as interviews and student narratives.

Integrating these perspectives will provide deeper insight into the underlying reasons for student disengagement and the emotional and contextual factors that shape interest in mathematics.

## **ETHICAL APPROVAL**

The study was approved by the University of Skills Training and Entrepreneurial Development Institutional Ethics and Research Committee (USTED/IERC/2025/023).

## **AI DISCLOSURE STATEMENT**

The authors independently conducted all aspects of this study, including conceptualization, data collection, data analysis, interpretation of findings, and manuscript preparation. Artificial intelligence (AI) tools were used solely to support language editing, grammar improvement, and refinement of sentence structure. The authors take full responsibility for the accuracy, originality, ethical integrity, citations, and intellectual content of the manuscript.

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