



A systematic review of the alignment between pre-service mathematics teachers' beliefs and classroom actions

A'yunnisa Tsani¹, Erlita Nur Rahmawati², Any Herawati³, Retno Trisniwati⁴, Surya Sari Faradiba⁵

^{1,2,5}Universitas Islam Malang

^{3,4}SMAN 3 Malang

*Correspondence: ayunnisat@gmail.com

Received: 25-02-2026; Revised: 21-03-2026; Accepted: 07-05-2026

Abstract. Teacher beliefs are widely recognized as critical determinants of instructional quality, yet the extent to which pre-service mathematics teachers' beliefs align with their actual classroom actions remains underexplored in global literature. This study addresses this gap by conducting a Systematic Literature Review (SLR) following the PRISMA framework to critically synthesize research on the relationship between pre-service mathematics teachers' beliefs and their instructional practices. A total of 23 peer-reviewed articles, published between 2015 and 2025, were selected and analyzed from the Scopus database. Data were extracted using a structured framework covering belief types (constructivist, traditional, or mixed), classroom action orientations (student-centered, teacher-centered, or mixed), and the nature of their relationship (aligned, misaligned, or partially aligned). Findings reveal that the majority of pre-service teachers hold constructivist beliefs and tend to implement student-centered instruction, resulting in an aligned relationship. However, misalignment and partial alignment were also evident, frequently attributed to low self-efficacy, mathematics teaching anxiety, and the influence of prior schooling experiences. These results underscore the importance of integrating critical reflection and psychological support into teacher education programs to bridge the gap between idealistic beliefs and realistic classroom practice. Future research is encouraged to pursue longitudinal designs and examine the mediating role of digital technology in this relationship.

Keywords: Pre-service Mathematics Teachers, Teacher Beliefs, Classroom Actions, Systematic Literature Review.

How to cite: Tsani, A., Rahmawati, E. N., Herawati, A., Trisniwati, R., & Faradiba, S. S. (2026). A Systematic Review of the Alignment Between Pre-service Mathematics Teachers' Beliefs and Classroom Actions. *Journal of Philosophy and Research in Islamic Mathematics Education (J-PRIMa)*, 2(1), 37–49. <https://doi.org/10.33474/j-prima.v2i1.25365>

Introduction

Achieving high-quality learning does not solely depend on the availability of various new innovations in the field of education. As pivotal figures in the learning process, teachers hold a core pedagogical role that must be taken into account. Teacher beliefs are a primary factor influencing the quality of instructional practices (Siswono et al., 2019). These beliefs are thought of as psychologically-held understandings (Shah & Kumar, 2021) and serve as a filter through which instructional judgments and decisions are made (Farrel, 2016). Fives and Gill (2021) further explain that beliefs are systems of mental representation considered true by teachers, functioning as guides in ambiguous classroom situations. Thurm & Barzel (2022) suggest that teachers with strong constructivist beliefs tend to have a student-centered environment in which students have ample opportunities to construct their own mathematical meanings. Conversely, teachers holding traditional beliefs often prioritize algorithmic

procedures and one-way knowledge transmission. However, this relationship is not always linear; "misalignments" frequently occur due to situational constraints within the school (Čuka & Cindrić, 2025).

Within the scope of mathematics education, teacher beliefs encompass broad dimensions, ranging from views on the nature of mathematics to perspectives on how the discipline should be taught and learned (Lo, 2021). Specifically, teacher beliefs regarding the learning and teaching of mathematics play a vital role in the implementation of classroom instruction (Yang et al. 2020). Beliefs and attitudes act as the primary overseers of a mathematics teacher's professional behavior and significantly influence decision-making in any mathematics classroom (Jacobs & Durandt, 2016). This cognitive foundation is crucial, as it determines whether a pre-service teacher will adopt a mechanical traditional approach with emphasizing formula memorization, or shift toward a student-centered constructivist approach that encourages conceptual understanding.

For pre-service teachers, beliefs are often shaped by their prior experiences as students. Darling-Hammond & McLaughlin, (1995) found that the period of professional education is a phase where they can reflect critically on their practice and create new knowledge and beliefs about content, pedagogy, and learners. Pre-service teachers' attitudes viewed as a combination of their beliefs about the nature of mathematics and their attitudes toward learning mathematics (Cooke, 2015) exert a relevant influence on their initial teaching strategies and practices. Understanding how and why this misalignment occurs is a fundamental first step for teacher educators to design training curricula that focus not only on content knowledge but also on strengthening pedagogical content knowledge.

Although studies continue to evolve, there remains a need for a global synthesis that summarizes new findings to identify patterns and solutions offered by global literature over the past ten years. This article presents a Systematic Literature Review (SLR) adopting the PRISMA flow. This review aims to critically analyze literature exploring the relationship between the beliefs and instructional actions of pre-service mathematics teachers in the classroom. Through an analysis of 23 selected articles, this study will map the factors influencing this relationship and provide recommendations for future professional teacher development to bridge the gap between idealistic theory and realistic practice. Therefore, this study aims to systematically review the existing body of research on pre-service mathematics teachers' beliefs and their impact on classroom actions. Specifically, it seeks to

- (1) What are the dominant beliefs held by pre-service mathematics teachers as reported in the literature?
- (2) How do pre-service mathematics teachers' beliefs influence their classroom actions?

Method

This study employed a Systematic Literature Review (SLR) as the method approach (Gough, et al., 2017) to identify, evaluate, and interpret all relevant research evidence concerning the alignment between pre-service mathematics teachers' beliefs and their instructional actions in mathematics education. To ensure the objectivity of the conclusion, the review process was conducted in strict accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow (Page, et al., 2021). The adoption of the PRISMA framework ensures transparency, objectivity, and accountability throughout the selection process, thereby minimizing the risk of selection bias (Page, et al., 2021).

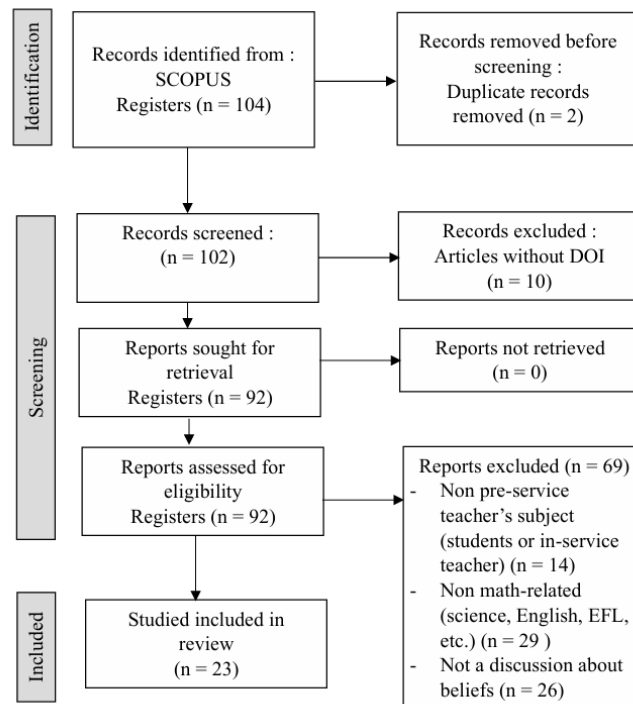


Figure 1. PRISMA Flow diagram Tailored to The SLR

During the identification phase, an electronic literature was performed via the Scopus database, selected for its rigorous indexing standards for high-quality educational journals. The initial search, utilizing a combination of relevant keywords, yielded a total of 104 records. Based on literature selection guidelines, preliminary data cleaning was conducted, where 2 documents were identified as duplicates and subsequently removed. Following this, 102 records entered the screening phase based on their titles and abstracts. At this stage, the researchers evaluated the initial relevance of each article to the research focus. A total of 10 articles were excluded for failing to meet the initial inclusion criteria primarily due to the absence of valid Digital Object Identifier (DOI) or being classified as non-journal documents and leaving 92 articles for further in-depth evaluation.

The eligibility assessment phase involved a comprehensive full-text review of the remaining 92 articles. This process utilized stringent inclusion and exclusion criteria to ensure that the retrieved data were truly representative. During this process, it was determined that 68 articles did not meet the final criteria for the following reasons: 1) 14 articles focused on subjects other than pre-service teachers (such a in-service teachers or students), 2) 29 articles were unrelated to mathematics education (science, english, EFL, etc.), and 3) 26 articles did not discuss the “beliefs” variable as a primary research focus. Consistent with the principles of qualitative synthesis in systematic reviews (Snyder, 2019), the precision of these criteria is crucial for generating valid conclusion. Ultimately, 23 studies were officially selected for inclusion in the final analysis and data synthesis to address the research questions regarding the instructional perspective dynamics of pre-service mathematics teachers.

Result

To ensure a systematic synthesis of information, this study employed a data extraction framework to capture key elements related to the pedagogical beliefs and classroom actions of preservice mathematics teachers. This process included an evaluation of the research context and methods, as well as detailed photography of the consistency between theoretical perspectives and actual practices in the field. These relationships were specifically suggested

as aligned, misaligned, or partially aligned. The use of this structured method ensured transparency in describing the various studies and facilitated the discovery of research patterns or representations, as presented in Table 1.

Table 1. Data Extraction Aligned with Research Questions on Beliefs and Classroom Actions

No.	Author(s) & Year	Country	Beliefs Identified	Type	Classroom Actions	Relationship
1	Justicia-Galiano, M. J., & Pelegrina, S. (2024)	Spain	Some false beliefs about mathematics may predispose individuals to experience negative emotions. Specifically, endorsing certain ideas about who is naturally good at mathematics appears to be linked to math anxiety.	Traditional	- (Focused on pre-service teachers's false belief and relations with math anxiety	-
2	Wellberg, S. (2025).	USA	Teacher candidates who come in with a strong mathematics background may hold views of mathematics and student ability that may hinder their abilities to implement student-centered instruction and assessment techniques in their future classrooms.	Mix	Teacher Centered	Misaligned
3	Wadanambi, G. (2023).	Sri Lanka	The nature of mathematics and of teaching	Constructivist	Mixed	Partially Aligned

			and learning mathematics were more flexible view oriented.			
4	Hatisaru, V., Johnston, O., Collins, J., & Rott, B. (2025)	Australia	Challenge traditional views of mathematics and instead are primarily process-oriented and application-oriented.	Constructivist	Student centered	Aligned
5	Francis, D. C., Bharaj, P. K., Habib, K., Hinden, A., Gustaverson, A., & Hong, J. (2025)	USA	Fostering a deep understanding through exploration should be followed by practice to ensure accurate retention of the material by students so that the ideas could be used accurately.	Mix	- (Focused on understanding the process of how refutation texts instigate belief change)	-
6	Jeong, J. S., & González-Gómez, D. (2022).	Spain	More student-centered and inquiry-based methodologies allowed to build positive teaching/learning environment for PSTs, which expects better learning outcomes for children.	Constructivist	Student Centered	Aligned
7	Min, M., Whitehead, A., Wells, C.,	USA	Future teachers needs to learn effective scaffolding	Constructivist	Student Centered	Aligned

	& Akerson V. (2023).		strategies for helping students use their home languages to learn math and science concepts.			
8	Lo, W. Y. (2021).	Hong Kong	The positive learning experiences included not only innovative teaching methods but also traditional teaching methods.	Mix	Teacher Centered	Misaligned
9	Yang, X., Kaiser, G., König, J., & Blömeke, S. (2020)	China	A significant change in mathematics instruction is encouragement for the traditional teacher- centered approach to be replaced by a student- centered approach	Mix	Student Centered	Partially Aligned
10	Peker, M., & Ulu, M. (2018).	Turkey	The traditional beliefs have no effect on the anxiety of pre- service math teachers toward math teaching. However, the constructivist beliefs seem to have an effect on the anxiety of pre-service math teachers	Mix	- (Focused on the correlation of pre- service mathematics teachers' beliefs and teaching anxiety)	-

			toward math teaching.			
11	Mainali, B. (2022).	USA	Learning mathematics was difficult and teaching mathematics was challenging.	Constructivist	Student centered	Aligned
12	Segarra, J., Julia, C., & Valls, C. (2021)	Spain	Self-efficacy beliefs about mathematics teaching: Personal Mathematics Teaching Efficacy (PMTE) and Mathematics Teaching Outcome Expectancy (MTOE)	Constructivist	Student-centered	Aligned
13	Segarra, J., & Julia, C. (2022)	Spain	Mathematics teaching efficacy beliefs (PMTE and MTOE) and attitude toward mathematics.	Constructivist	Student-centered	Aligned
14	Scherer, P., & Bertram, J. (2024)	Germany	Beliefs about inclusive mathematics education and self-efficacy for teaching students with special educational needs.	Constructivist	Student-centered	Aligned
15	Kartal, B. (2020)	Turkey	Teaching efficacy beliefs and attitudes toward teaching; gender and	Constructivist	Student-centered	Aligned

			grade-level influence on self-efficacy.			
16	Hidayat, R., Zainuddin, Z., & Mazlan, N. H. (2024)	Malaysia	Beliefs about teaching mathematics with technology; relationship with TPACK sub-components	Constructivist	Mixed	Partially Aligned
17	Aljaberi, N. M., & Gheith, E. (2018)	Jordan	Beliefs about teaching, learning, and nature of mathematics (constructivist vs. traditional orientation)	Mix	Mixed	Partially aligned
18	Unlu, M. (2018)	Turkey	Self-efficacy beliefs about using concrete models (manipulatives) in mathematics teaching.	Constructivist	Student-centered	Aligned
19	Yang, X., & Leung, F. K. S. (2015)	China	Dynamic beliefs about nature of mathematics; constructivist beliefs about teaching and learning; beliefs about ICT use.	Constructivist	Student-centered	Aligned
20	Hourigan, M., & Leavy, A. M. (2022)	Ireland	Personal Mathematics Teaching Efficacy (PMTE) and outcome expectancy (MTOE); influenced by mathematics attainment,	Constructivist	Student-centered	Aligned

			educational level, preparedness, and gender.			
21	Xie, S., & Cai, J. (2020)	China	Five-dimensional belief system: beliefs about mathematics, learning, teaching, students, and teachers.	Mix	Mixed	Partially aligned
22	Letwinsky, K. M., & Cavender, M. (2018)	USA	Constructivist vs. procedural beliefs about mathematics teaching and learning, shaped by prior school experiences.	Traditional	Teacher-centered	Misaligned
23	Abdul Rahman, M. N., Syed Zamri, S. N. A., & Leong, K. E. (2019)	Malaysia	Constructivist beliefs and traditional beliefs about mathematics teaching and learning (mathematical belief/MB)	Mix	Mixed	Partially Aligned

Based on the data obtained from the selected studies, a consistent pattern emerged regarding pre-service mathematics teachers' beliefs and their relationship with classroom actions. The analysis categorized these beliefs into three dominant orientations: constructivist, traditional, and mixed.

Regarding RQ1, the analysis reveals that a segment of pre-service teachers still holds traditional beliefs, viewing mathematics as a difficult subject that is best taught through rote memorization and procedural activities. Conversely, the majority of the studies indicate that pre-service teachers possess constructivist beliefs, where mathematics education prioritizes conceptual knowledge, experiential learning, and various instructional innovations. Furthermore, several studies highlight pre-service teachers with mixed beliefs, representing a transitional phase from traditional toward constructivist perspectives. These beliefs are influenced by several factors, most notably the teachers' prior learning experiences during their own time as students.

In response to RQ2, the findings show that classroom actions performed by these teachers generally fall into two categories: student-centered and teacher-centered. Student-centered instruction prioritizes activities that actively involve students in exploration and collaboration,

adopting a constructivist approach to foster the understanding of mathematical concepts. In contrast, teacher-centered instruction implements a system where the teacher serves as the sole source of information for the students.

The relationship between beliefs and classroom actions was evaluated using three general categories: aligned, misaligned, and partially aligned. The majority of the reviewed studies indicate a consistent alignment between pre-service teachers' beliefs and their actual classroom practices. Specifically, several studies demonstrate that pre-service teachers who hold constructivist beliefs tend to implement student-centered learning environments. Other studies report a "partially aligned" relationship; this is typically observed in pre-service teachers who possess constructivist beliefs but still employ a mixed instructional approach (alternating between teacher-centered and student-centered methods). Furthermore, some studies highlight a "misaligned" relationship, such as instances where pre-service teachers in a transitional phase (mixed beliefs) continue to rely predominantly on teacher-centered method.

Discussion

The analysis of the selected literature reveals a complex relation between pre-service mathematics teachers' belief and their manifestations in classroom actions. The results show that several studies demonstrate both alignment and inconsistency, which is relevant to the theory that teacher beliefs are dynamic, changeable, and resistant to contextual factors around them (Utami, 2016). Pre-service teachers with a strong constructivist orientation proved successful in implementing student-centered environments through innovative methods such as Flipped-ABN, while those holding traditional beliefs consistently maintained procedural instruction as they viewed mathematics as a rigid discipline (Segarra & Julià, 2022).

However, the phenomenon of misalignment remains a critical finding, where pre-service teachers who idealistically support constructivist values often "retreat" to teacher-centered practices when facing field realities due to the influence of mathematics teaching anxiety and low self-efficacy (Peker & Ulu, 2018; Segarra, et al., 2021). On the other hand, the "partially aligned" category reflects an evolutionary transitional phase where pre-service teachers begin to adopt student-centered activities but still engage in dominant intervention due to the influence of prior learning experiences, which act as a traditional anchor (Lo, 2021; Wadanambi & Leung, 2019). Ultimately, the alignment between beliefs and instructional actions is not merely a result of individual will but rather a complex interaction between internal beliefs and the demands of the educational ecosystem, including the influence of school culture and the availability of technology in supporting mathematics learning reform (Hidayat et al., 2024; Yang & Leung, 2015).

Acknowledgement

The authors express sincere gratitude to the supervisors and academic advisors at Universitas Islam Malang (UNISMA) for their continuous guidance and constructive feedback throughout the preparation of this manuscript. The authors also acknowledge to the support of the Teacher Professional Education (Pendidikan Profesi Guru/PPG) Program at Universitas Islam Malang for providing financial support for this research.

Conclusion

This study concludes that there is a dynamic and layered relationship between pre-service mathematics teachers' beliefs and their instructional actions in the classroom. Based on the analysis of literature over the past decade, the majority of pre-service teachers demonstrate an alignment between their beliefs and their teaching practices. However, significant inconsistencies were also identified, where idealistic student-centered beliefs are often hindered by psychological factors such as mathematics anxiety and low self-efficacy. This suggests that beliefs can be influenced by prior learning experiences and situational field

realities. The transition from traditional to constructivist beliefs is an evolutionary process that frequently results in "partially aligned" practices, where pre-service teachers begin to adopt active methods while still maintaining dominant teacher control.

The outcomes of this research offer significant contributions to the fields of mathematics teacher training, academic inquiry, and instructional implementation. Teacher education programs are encouraged to integrate critical reflection on prior learning experiences into the curriculum to break the cycle of traditional pedagogy, while placing greater emphasis on psychological support to build self-efficacy and reduce teaching anxiety. Furthermore, stronger synchronicity between university theory and the culture of partner schools is essential to provide pre-service teachers with a supportive environment for experimenting with student-centered methods. Future research should pursue longitudinal studies to observe the evolution of these beliefs as pre-service teachers transition into in-service roles, alongside exploring the role of digital technology in mediating the relationship between beliefs and instructional actions in the modern era.

References

- Abdulrahman, M. N., Syed Zamri, S. N. A., & Leong, K. E. (2019). Modelling opportunities to learn, mathematical belief and knowledge for teaching among pre-service teachers. *EURASIA Journal of Mathematics, Science and Technology Education*, 15(11), em1764. <https://doi.org/10.29333/ejmste/106228>
- Aljaberi, N. M., & Gheith, E. (2018). In-service mathematics teachers' beliefs about teaching, learning and nature of mathematics and their mathematics teaching practices. *Journal of Education and Learning*, 7(5), 156–173. <https://doi.org/10.5539/jel.v7n5p156>
- Cooke, A. (2015). Considering pre-service teacher disposition towards mathematics. *Mathematics Teacher Education and Development*, 17(1), 1–11.
- Čuka, J., & Cindrić, M. (2025). Teacher beliefs about mathematics instruction and teaching practices in Croatian primary schools. *European Journal of Science and Mathematics Education*, 13(4), 433–448. <https://doi.org/10.30935/scimath/17512>
- Darling-Hammond, L., & McLaughlin, M. W. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 597–604.
- Farrell, T. S. C. (2016). The teacher is a facilitator: Reflecting on ESL teacher beliefs through metaphor analysis. *Iranian Journal of Language Teaching Research*, 4(1), 1–10.
- Fives, H., & Gill, M. G. (2021). *International Handbook of Research on Teachers' Beliefs*. Routledge.
- Francis, D. C., Bharaj, P. K., Habib, K., Hinden, A., Gustaveson, A., & Hong, J. (2025). Understanding the role of refutation texts on pre-service teachers' mathematics-related beliefs. *Journal of Mathematical Behavior*, 80, 101278. <https://doi.org/10.1016/j.jmathb.2025.101278>.
- Gough, D., Oliver, S., & Thomas, J. (2017). *An Introduction to Systematic Reviews* (2nd ed.). SAGE Publications. <https://doi.org/10.53841/bpsptr.2017.23.2.95>
- Hatisaru, V., Johnston, O., Collins, J., & Rott, B. (2025). New insights into the beliefs of secondary pre-service teachers about mathematics. *EURASIA Journal of Mathematics, Science and Technology Education*, 21(8), em2675. <https://doi.org/10.29333/ejmste/16656>
- Hidayat, R., Zainuddin, Z., & Mazlan, N. H. (2024). The relationship between technological pedagogical content knowledge and belief among preservice mathematics teachers. *Acta Psychologica*, 248, 104432. <https://doi.org/10.1016/j.actpsy.2024.104432>
- Hourigan, M., & Leavy, A. M. (2022). Primary preservice teachers' mathematics teaching efficacy beliefs: The role played by mathematics attainment, educational level, preparedness to teach, and gender. *International Journal of Science and Mathematics Education*, 21(2), 601–622. <https://doi.org/10.1007/s10763-022-10259-5>

- Jacobs, G. J., & Durandt, R. (2017). Attitudes of Pre-Service Mathematics Teachers towards Modelling: A South African Inquiry. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(1), 61-84. <https://doi.org/10.12973/eurasia.2017.00604a>
- Jeong, J. S., & González-Gómez, D. (2022). Mathematics self-belief comparison and examination of pre-service teacher (PST) through a flipped-open calculation based on numbers (ABN) learning method. *Heliyon*, 8(7). <https://doi.org/10.1016/j.heliyon.2022.e09806>
- Justicia-Galiano, M. J., & Pelegrina, S. (2024). False beliefs about mathematics in Spanish pre-service teachers and relations with math anxiety. *European Journal of Investigation in Health, Psychology and Education*, 14(7), 1913–1926. <https://doi.org/10.3390/ejihpe14070127>
- Kartal, B. (2020). Pre-service science and mathematics teachers' teaching efficacy beliefs and attitudes toward teaching: A partial correlation research. *Australian Journal of Teacher Education*, 45(9), 34–51. <http://dx.doi.org/10.14221/ajte.2020v45n9.3>
- Letwinsky, K. M., & Cavender, M. (2018). Shifting preservice teachers beliefs and understandings to support pedagogical change in mathematics. *International Journal of Research in Education and Science*, 4(1), 12–25. <https://doi.org/10.21890/ijres.382939>
- Lo, W. Y. (2021). Pre-service teachers' prior learning experiences of mathematics and the influences on their beliefs about mathematics teaching. *International Journal of Instruction*, 14(1), 795–812. <https://doi.org/10.29333/iji.2021.14148a>
- Mainali, B. (2022). Investigating pre-service teachers' beliefs towards mathematics: A case study. *European Journal of Science and Mathematics Education*, 10(4), 412–435. <https://doi.org/10.30935/scimath/12103>
- Min, M., Whitehead, A., Wells, C., & Akerson, V. (2023). Unpacking elementary preservice teachers' beliefs on culturally and linguistically responsive mathematics and science teaching for English language learners. *International Journal of Research in Education and Science*, 9(3), 582–600. <https://doi.org/10.46328/ijres.3068>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, 88, 105906. <https://doi.org/10.1016/j.ijssu.2021.105906>
- Peker, M., & Ulu, M. (2018). The effect of pre-service mathematics teachers' beliefs about mathematics teaching-learning on their mathematics teaching anxiety. *International Journal of Instruction*, 11(3), 249–264. <https://doi.org/10.12973/iji.2018.11318a>
- Scherer, P., & Bertram, J. (2024). Professionalisation for inclusive mathematics—teacher education programs and changes in pre-service teachers' beliefs and self-efficacy. *ZDM – Mathematics Education*, 56(4), 619–633. <https://doi.org/10.1007/s11858-024-01580-0>
- Segarra, J., Julià, C., & Valls, C. (2021). Pre-service teachers' belief about the efficacy of their mathematics teaching: A case study. *European Journal of Science and Mathematics Education*, 9(3), 66–80. <https://doi.org/10.30935/scimath/11236>
- Segarra, J., & Julià, C. (2022). Mathematics teaching efficacy belief and attitude of pre-service teachers and academic achievement. *European Journal of Science and Mathematics Education*, 10(1), 1–14. <https://doi.org/10.30935/scimath/11381>
- Shah, R., & Kumar, R. (2021). Teachers' belief: An overview. *International Journal of Creative Research Thoughts (IJCRT)*, 9(1), 3890–3909.
- Siswono, T. Y. E., Kohar, A. W., & Hartono, S. (2019). Beliefs, knowledge, teaching

- practice: Three factors affecting the quality of teacher's mathematical problem-solving. *Journal of Physics: Conference Series*, 1317(1), 012127. <https://doi.org/10.1088/1742-6596/1317/1/012127>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Thurm, D., & Barzel, B. (2022). Teaching mathematics with technology: A multidimensional analysis of teacher beliefs. *Educational Studies in Mathematics*, 109(1), 41–63. <https://doi.org/10.1007/s10649-021-10072-x>
- Ünlü, M. (2018). Effect of micro-teaching practices with concrete models on pre-service mathematics teachers' self-efficacy beliefs about using concrete models. *Universal Journal of Educational Research*, 6(1), 68–82. <https://doi.org/10.13189/ujer.2018.060106>
- Utami, D. N. (2016). The EFL teachers' beliefs and their teaching practices. *OKARA: Jurnal Bahasa dan Sastra*, 10(2), 135–144. <https://doi.org/10.19105/ojbs.v10i2.974>
- Wadanambi, G. M., & Leung, F. K. S. (2019). Exploring the influence of pre-service mathematics teachers' professed beliefs on their practices in the Sri Lankan context. *LUMAT: International Journal on Math, Science and Technology Education*, 7(2), 133–149. <https://doi.org/10.31129/LUMAT.7.2.405>
- Wellberg, S. (2024). An examination of pre-service mathematics teachers' course-taking, beliefs, and preferred assessment practices. *Journal of Mathematics Teacher Education*, 1–40. <https://doi.org/10.1007/s10857-024-09640-8>
- Xie, S., & Cai, J. (2020). Teachers' beliefs about mathematics, learning, teaching, students, and teachers: Perspectives from Chinese high school in-service mathematics teachers. *International Journal of Science and Mathematics Education*, 19(4), 747–769. <https://doi.org/10.1007/s10763-020-10074-w>
- Yang, X., Kaiser, G., König, J., & Blömeke, S. (2020). Relationship between pre-service mathematics teachers' knowledge, beliefs and instructional practices in China. *ZDM – Mathematics Education*, 52(2), 281–294. <https://doi.org/10.1007/s11858-020-01145-x>
- Yang, X., & Leung, F. K. S. (2015). The relationships among preservice mathematics teachers' beliefs about mathematics, mathematics teaching, and use of technology in China. *EURASIA Journal of Mathematics, Science and Technology Education*, 11(6), 1363–1378. <https://doi.org/10.12973/eurasia.2015.1393a>