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The Role of Culturally Responsive Teaching in Developing Students' Self-Regulated Learning in Elementary School Mathematics Education: A Systematic Literature Review

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ABSTRACT
Background: Self-Regulated Learning is one of the key factors that contributes to students' success in elementary mathematics education. However, numerous studies have indicated that students' self-regulation skills still require further enhancement through learning experiences that are aligned with their characteristics and learning backgrounds. One pedagogical approach that has the potential to support the development of Self-Regulated Learning is Culturally Responsive Teaching, an instructional approach that integrates students' cultural backgrounds into the teaching and learning process. *Aim:* This study aims to examine the role of Culturally Responsive Teaching in fostering students' Self-Regulated Learning in elementary school mathematics education through a Systematic Literature Review approach. Data were collected from articles indexed in the Google Scholar and ERIC databases. The data were analyzed using a thematic synthesis technique to identify patterns of Culturally Responsive Teaching implementation and its contribution to the development of students' Self-Regulated Learning. *Result and Discussions:* The findings reveal that the implementation of Culturally Responsive Teaching in elementary mathematics education is generally carried out through the integration of local culture, ethnomathematics, the use of students' real-life contexts, and the creation of inclusive learning environments that value cultural diversity. These practices contribute to the enhancement of intrinsic motivation, self-efficacy, learning engagement, goal-setting skills, self-monitoring, and self-reflection, which are essential components of Self-Regulated Learning. *Conclusion:* Therefore, Culturally Responsive Teaching can serve as an effective pedagogical approach to promoting students' autonomous learning while fostering mathematics instruction that is more meaningful, contextualized, and responsive to cultural diversity.
Keywords: Culturally Responsive Teaching, Self-Regulated Learning, Mathematics Education, Elementary School, Systematic Literature Review

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INTRODUCTION

Mathematics education constitutes one of the fundamental components of elementary education, as it plays a crucial role in developing students' logical, systematic, and critical thinking skills, as well as their problem-solving abilities (Masliah & Nirmala, 2023). From the elementary school level, mathematics serves not only as a means of understanding numerical concepts, arithmetic operations, geometry, and measurement but also as a vehicle for fostering reasoning skills and informed decision-making based on available information (Anggraeni, 2024). These competencies form the foundation of numeracy literacy, which is currently recognized as one of the essential competencies required in the twenty-first century (Patriana et al., 2021). Numeracy literacy enables students to apply mathematical knowledge to understand, analyze, and solve various problems encountered in everyday life (Sulastri et al., 2024). Therefore, mastery of mathematics at the elementary school level is a critical factor influencing students' readiness to meet the learning demands of subsequent educational stages as well as the challenges of social life. Despite its importance, numerous studies have reported that mathematics learning remains a significant challenge for many elementary school students. The abstract nature of mathematical concepts often makes it difficult for students to understand and connect them with their real-life experiences (Belinda et al., 2023; Anugraheni et al., 2025).

Furthermore, instructional practices that predominantly emphasize procedural knowledge and final outcomes frequently limit students' opportunities to develop a deep conceptual understanding. Such conditions may lead to low student engagement, decreased learning motivation, and insufficient ability to manage their own learning processes (Mufidah et al., 2025). In fact, success in mathematics learning is determined not only by cognitive abilities but also by affective factors and students' capacity to regulate, monitor, and evaluate their learning independently. In other words, the development of self-regulatory learning skills represents a critical aspect that deserves greater attention in efforts to enhance the quality of mathematics education at the

elementary school level. Self-Regulated Learning (SRL) is one of the key factors contributing to students' academic success, particularly in mathematics learning (Astuti, 2024). According to Barry J. Zimmerman, SRL is an active process through which learners systematically regulate their thoughts, motivation, behaviors, and learning environment in order to achieve predetermined learning goals (Utami et al., 2022). In Zimmerman's cyclical model of SRL, the learning process consists of three major phases: forethought, performance control, and self-reflection (Zimmerman, 2010). Through these phases, students learn to set learning goals, select appropriate learning strategies, monitor their learning progress, and evaluate their achievements in order to improve subsequent learning processes. Therefore, SRL extends beyond academic competence and encompasses metacognitive, motivational, and behavioral dimensions that enable students to become more autonomous learners and take greater responsibility for their own learning processes.

In the context of elementary mathematics education, SRL plays a particularly important role because students are frequently engaged in learning activities that require perseverance, problem-solving skills, and the ability to comprehend abstract concepts. Numerous studies have demonstrated that students with higher levels of SRL tend to employ learning strategies more effectively, possess stronger self-confidence, and achieve better mathematics learning outcomes than those with lower levels of SRL (Fauzi & Widjajanti, 2018). Research involving elementary school students has further revealed that SRL-based instructional interventions can enhance the use of learning strategies, self-efficacy, and mathematics achievement. Moreover, other studies have found that high-achieving mathematics students exhibit stronger self-regulatory processes during the planning, monitoring, and reflection stages than their lower-achieving peers (Dent & Koenka, 2016). These findings indicate that the development of SRL should be a major concern in mathematics education from the elementary school level onward, enabling students not only to understand mathematical concepts but also to manage their learning processes independently and sustainably. Despite the widely recognized importance of SRL in mathematics learning, self-regulatory skills do not develop automatically; rather, they are influenced by various factors within the learning environment. One instructional approach that has been recognized as having the potential to foster the development of SRL is Culturally Responsive Teaching (CRT), an educational approach that incorporates students' cultural backgrounds, experiences, and identities into the teaching and learning process (Gay, 2018).

Students' self-regulated learning abilities do not develop automatically; rather, they are influenced by a variety of factors within the learning environment, including the instructional strategies and pedagogical approaches employed by teachers (Panadero, 2017). Culturally Responsive Teaching (CRT) is an instructional approach that integrates students' cultural backgrounds, lived experiences, values, languages, and identities into the teaching and learning process, thereby making learning activities more relevant and meaningful. This approach is grounded in the view that every student brings unique cultural experiences into the classroom and that these experiences can serve as valuable learning resources (Aronson & Laughter, 2016). In the context of mathematics education, CRT does not merely position culture as a supplementary component of instruction; rather, it functions as a bridge that enables students to connect mathematical concepts with their everyday experiences and the sociocultural environments with which they are familiar. Consequently, mathematics learning becomes more contextualized, authentic, and accessible to students.

The implementation of CRT in elementary mathematics education can be achieved through various strategies, including the incorporation of local cultural contexts into mathematical tasks, the use of cultural artifacts as instructional media, the integration of ethnomathematical practices, and the design of learning activities that reflect students' social and cultural characteristics (Jacob & Effiong, 2023). This approach is believed to enhance student engagement because the learning materials are closely connected to students' prior experiences and cultural backgrounds. Numerous studies have demonstrated that CRT-based mathematics instruction can help students develop a deeper conceptual understanding, foster creative thinking, and promote more meaningful learning experiences. Furthermore, CRT contributes to the creation of inclusive learning environments by valuing cultural diversity and providing equitable opportunities for all students to participate actively in the learning process (Gay, 2018). Therefore, CRT is widely regarded as a promising pedagogical approach for addressing various challenges in mathematics education while simultaneously supporting both the cognitive and non-cognitive development of elementary school students.

Theoretically, Culturally Responsive Teaching (CRT) possesses strong potential to support the development of students' Self-Regulated Learning (SRL). CRT positions students' experiences, identities, and cultural backgrounds as integral components of the learning process, enabling students to feel valued, accepted, and connected to the content being learned. Such conditions can foster a sense of belonging within the learning environment, which, in turn, contributes to the enhancement of students' intrinsic motivation (Kern & Wehmeyer, 2021). When students perceive learning as relevant to their lives and cultural backgrounds, they are more likely to demonstrate higher levels of learning engagement, stronger self-efficacy beliefs, and greater initiative in setting goals and managing their learning processes. From the perspective of Bandura's Social Cognitive Theory, increased motivation and self-efficacy are critical factors that encourage students to engage in self-regulated learning. Therefore, culturally responsive learning environments contribute not only to students' academic understanding but also to the

development of key dimensions of SRL, including learning planning, self-monitoring, strategic learning management, and reflection on learning outcomes.

A growing body of research indicates that the implementation of culturally responsive instruction has positive effects on various aspects that constitute essential components of SRL. The integration of local culture and students' lived experiences into mathematics learning has been reported to enhance learning motivation, academic self-confidence, active participation, and perseverance in completing learning tasks. Furthermore, culturally relevant instruction helps students establish more meaningful connections with learning content, thereby encouraging them to take a more active role in the learning process. These findings suggest that students who learn through culturally based approaches tend to exhibit higher levels of learning engagement, greater confidence in their ability to solve mathematical problems, and stronger independence in managing their learning activities (Siwatu, 2007; Schunk & DiBenedetto, 2020). Such characteristics represent important indicators of SRL encompassing motivational, metacognitive, and behavioral dimensions. Consequently, CRT can be regarded as a promising instructional approach for fostering the development of SRL among students in elementary mathematics education (Rosa & Orey, 2023).

Although previous systematic reviews have examined Culturally Responsive Teaching and Self-Regulated Learning separately, few studies have specifically synthesized empirical evidence explaining how culturally responsive mathematics instruction contributes to the development of students' self-regulated learning in elementary education. Existing reviews have primarily emphasized academic achievement, motivation, or cultural relevance without integrating these findings into a comprehensive understanding of SRL development. Therefore, this review contributes to the literature by synthesizing current empirical evidence on the mechanisms through which CRT supports the development of SRL in elementary mathematics education and by proposing an integrated conceptual understanding of their relationship.

Based on the aforementioned research gap, a comprehensive review is needed to integrate the existing empirical findings regarding the role of Culturally Responsive Teaching (CRT) in fostering students' Self-Regulated Learning (SRL) within the context of elementary mathematics education. Therefore, this study aims to conduct a Systematic Literature Review (SLR) of previous studies examining the implementation of CRT and its relationship with the development of students' SRL. Specifically, this review seeks to identify the characteristics of CRT implementation in elementary mathematics classrooms, analyze the contributions of CRT to various indicators of students' SRL, and formulate implications that may serve as a foundation for the development of mathematics instruction that is more contextualized, inclusive, and supportive of students' autonomous learning.

METHOD

This study employed a Systematic Literature Review (SLR) approach to identify, evaluate, and synthesize research findings related to the role of Culturally Responsive Teaching (CRT) in fostering students' Self-Regulated Learning (SRL) within the context of elementary mathematics education (Booth et al., 2022). The SLR method was selected because it enables researchers to obtain a comprehensive understanding of the development of research on a particular topic through systematic, transparent, and replicable procedures. Furthermore, systematic reviews are widely recognized as rigorous approaches for synthesizing evidence and identifying research trends, gaps, and implications within a specific field of study.

The data sources for this study were obtained from two reputable academic databases in the field of education, namely Google Scholar and ERIC. These databases were selected to ensure broad coverage of the literature and to identify studies relevant to the research topic. The literature search was conducted in February 2026 using a combination of keywords derived from the three main concepts underlying this study: *Culturally Responsive Teaching*, *Self-Regulated Learning*, and *Mathematics Education* at the elementary school level. The search strategy was designed to maximize the retrieval of relevant studies while maintaining alignment with the objectives of the review.

The collected data were analyzed using a thematic synthesis approach. This analytical procedure consisted of three stages: (1) reading and thoroughly examining all selected articles, (2) coding findings relevant to CRT and SRL, and (3) grouping the resulting codes into broader themes and categories. Through this process, the study sought to identify the characteristics of CRT implementation in elementary mathematics education, determine the SRL indicators that emerged through the application of CRT, and explore the conceptual relationship between these two constructs. Thematic synthesis has been widely employed in systematic review studies to identify recurring patterns, generate conceptual themes, and provide a deeper understanding of complex educational phenomena.

To obtain a comprehensive understanding of the role of Culturally Responsive Teaching (CRT) in developing students' Self-Regulated Learning (SRL) in elementary mathematics education, this study was guided by a set of research questions (RQs). The research questions were formulated as follows:

RQ1: What are the characteristics of research on Culturally Responsive Teaching (CRT) and Self-Regulated Learning (SRL) in elementary mathematics education?

RQ2: How is Culturally Responsive Teaching (CRT) implemented in elementary mathematics classrooms?

RQ3: Which indicators of Self-Regulated Learning (SRL) are developed through the implementation of Culturally Responsive Teaching (CRT) in elementary mathematics education?

RQ4: What role does Culturally Responsive Teaching (CRT) play in supporting the development of students' Self-Regulated Learning (SRL) in elementary mathematics education?

RQ5: What are the implications of implementing Culturally Responsive Teaching (CRT) for the development of mathematics instruction that promotes Self-Regulated Learning (SRL) in elementary schools?

RESULTS AND DISCUSSION

The literature identification process was conducted through a systematic search of the Google Scholar and ERIC databases using combinations of keywords related to *Culturally Responsive Teaching* (CRT), *Self-Regulated Learning* (SRL), mathematics education, and elementary school students. The search process yielded a number of relevant studies that met the inclusion criteria established for this review. These studies were subsequently analyzed to identify patterns of CRT implementation, the dimensions of SRL that emerged through culturally responsive instructional practices, and the implications of these findings for elementary mathematics education. The results of the literature review are presented in Table 1.

Table 1. Summary of the Reviewed Literature

No.	Authors	Year	Article Title	Research Findings
1	Jasmaniah, Nurhayati, Fatma Zuhra (Jasmaniah et al., 2024)	2024	Game-Based Learning Model with A Culturally Responsive Teaching Approach to Enhance Student' Motivation in Learning Mathematics	The findings revealed that the integration of Game-Based Learning (GBL) and CRT was effective in enhancing students' learning motivation. This approach not only incorporated educational games but also structured learning activities that gradually guided students toward understanding mathematical concepts and achieving learning objectives
2	Harlina Harni, Hartono, Via Yustitia (Harini et al., 2025)	2025	Teaching mathematics through cultural contexts and motivation: A study on coastal students' numeracy learning in West Papua	Culturally responsive instruction and learning motivation significantly influenced numeracy achievement, explaining 69% of the variance in students' performance. Students exposed to culturally relevant lessons demonstrated higher motivation and improved numeracy skills
3	Elly Sukmanasa, Lina Novitaa, Eka Suhardia, Aries Maesyaa, Awitiab, Faridatul 'ala (Sukmanasa et al., 2024)	2024	Students' Motivation through Problem-based Learning with a Culturally Responsive Teaching (CRT) Approach in Mathematics Lessons	The study found that problem-based learning combined with a CRT approach significantly enhanced students' motivation to learn and served as an effective alternative for improving learning outcomes
4	Fahmi Rizqi Nashrullah, Rochmad, Adi Nur Cahyono (Nashrullah et al., 2023)	2023	Mathematical Critical Thinking Abilities of Students in Terms of Self-Regulated Learning in Realistic Mathematics Education Assisted by Mobile Learning	The findings indicated that: (1) mobile learning-assisted Realistic Mathematics Education (RME) effectively improved students' mathematical critical thinking skills, and (2) different levels of mathematical critical thinking were observed among students with low, moderate, and high levels of self-regulated learning
5	Yuliana, Budi Usodo, Riyadi (Yuliana et al., 2023)	2023	The New Way Improve Mathematical Literacy in Elementary School: Ethnomathematics Module with Realistic Mathematics Education	The ethnomathematics-based instructional module was found to be effective in improving students' mathematical literacy in the Petanahan District

6	Amelia Dwi Astuti, Achmad Zainul Rozikin (Astuti & Rozikin, 2025)	2025	Ethnomathematics: Urgency and Challenges of Implementation in Elementary School Mathematics Learning	The findings indicated that ethnomathematics is essential for: (1) enhancing students' learning motivation through culturally familiar contexts, (2) fostering critical thinking about socio-cultural realities, and (3) supporting inclusive education
7	Amelia Dwi Astuti, Achmad Zainul Rozikin (Astuti & Rozikin, 2024)	2024	The Role of Self-Regulated Learning in Strengthening Students' Independent Learning Character: Literature Review	The study demonstrated that improvements in independence and self-awareness across all phases of SRL positively contributed to personal growth and the development of desirable character traits. Overall, the findings emphasized the importance of SRL in developing effective and autonomous learners
8	Refni Adesia Pradiarti (Pradiarti, 2025)	2025	Students' Interest and Motivation in Mathematics Learning through a Culturally Responsive Teaching (CRT) Approach: A Systematic Literature Review	Culturally Responsive Teaching (CRT) has been shown to be effective in enhancing students' interest and motivation in mathematics learning. Its effectiveness lies in its ability to create culturally relevant instruction, increase student engagement, and foster more enjoyable and meaningful learning experiences.

RQ1: What are the characteristics of research on Culturally Responsive Teaching (CRT) and Self-Regulated Learning (SRL) in elementary mathematics education?

The synthesis findings indicate that research on Culturally Responsive Teaching (CRT) and Self-Regulated Learning (SRL) in elementary mathematics education has experienced substantial growth over the past decade. The increasing number of publications reflects a growing awareness of the importance of instructional approaches that not only emphasize academic achievement but also consider students' cultural backgrounds and the development of independent learning skills. Most studies have been conducted at the elementary school level using quantitative and mixed-methods approaches to examine the effects of CRT implementation on various aspects of mathematics learning. In addition, several qualitative studies have explored students' learning experiences and teachers' practices in integrating cultural elements into mathematics instruction.

With regard to research settings, studies on CRT have been predominantly conducted in culturally diverse countries such as the United States, Australia, South Africa, and Indonesia. This trend suggests that cultural diversity serves as one of the primary factors driving the adoption and development of culturally responsive pedagogical approaches. Meanwhile, research on SRL in mathematics education has primarily focused on the development of learning motivation, self-efficacy, learning strategies, and metacognitive skills that support students' academic success (Rosa & Orey, 2023). These findings indicate that both CRT and SRL have evolved as responses to the growing demand for more inclusive, student-centered, and equitable educational practices.

RQ2: How is Culturally Responsive Teaching (CRT) implemented in elementary mathematics classrooms?

The analysis revealed that the implementation of Culturally Responsive Teaching in elementary mathematics education is carried out through a variety of instructional strategies aimed at connecting mathematical concepts with students' cultural experiences. The most frequently identified approach is the integration of ethnomathematics into classroom instruction through the incorporation of local cultural elements into learning materials. Teachers utilize cultural artifacts, traditional games, indigenous architectural patterns, community economic activities, and other cultural practices as contexts for introducing mathematical concepts (Atiah & Assidiqi, 2024). Such strategies enable students to develop a more concrete understanding of mathematics because the learning content is directly related to their everyday lives.

In addition to ethnomathematics-based approaches, CRT is also implemented through the use of contextualized mathematical problems derived from students' social and cultural environments. The incorporation of culturally relevant contexts enhances the relevance of learning experiences, allowing students to connect new knowledge with their prior experiences more effectively. Several studies have further demonstrated that CRT is implemented through collaborative learning activities that provide opportunities for students to share cultural experiences, engage in discussions, and

construct mathematical understanding collectively (Gay, 2018). These instructional practices not only enhance students' conceptual understanding but also contribute to the creation of more inclusive learning environments that recognize and value cultural diversity within the classroom.

RQ3: Which indicators of Self-Regulated Learning (SRL) are developed through the implementation of Culturally Responsive Teaching (CRT) in elementary mathematics education?

The synthesis findings demonstrate that the implementation of Culturally Responsive Teaching (CRT) in elementary mathematics education contributes to the development of various indicators of Self-Regulated Learning (SRL). The indicators most frequently reported in the reviewed studies include intrinsic motivation, self-efficacy, learning engagement, goal-setting skills, self-monitoring, and self-reflection (Astuti & Rozikin, 2024; Sukmanasa et al., 2024; Jasmaniah et al., 2024; Pradiarti, 2025). These findings suggest that CRT not only enhances students' understanding of mathematical concepts but also supports the development of motivational, metacognitive, and behavioral dimensions that constitute the foundation of SRL.

Intrinsic motivation emerged as the most dominant SRL indicator across the reviewed studies. The integration of local culture and students' lived experiences into mathematics instruction makes learning activities more relevant and meaningful, thereby increasing students' interest and curiosity toward the learning process. When students perceive learning as connected to their cultural backgrounds and everyday lives, they are more likely to demonstrate a stronger willingness to learn without relying heavily on external incentives. This finding is consistent with Zimmerman's perspective, which identifies motivation as a central component of self-regulated learning (Zimmerman, 2010).

Another SRL indicator fostered through CRT implementation is learning engagement. Numerous studies have shown that instructional practices that acknowledge and value students' cultural identities can enhance active participation in discussions, collaborative learning activities, and mathematical problem-solving tasks (Jacob & Effiong, 2023). Increased engagement provides students with greater opportunities to develop self-regulatory skills, including managing attention, controlling learning behaviors, and maintaining focus throughout the learning process.

Several studies also indicate that CRT supports the development of goal-setting, self-monitoring, and self-reflection skills. Contextualized learning experiences that are closely related to students' backgrounds encourage them to take a more active role in establishing learning goals, monitoring their progress, and evaluating the effectiveness of the strategies they employ during mathematics learning. These skills represent essential metacognitive components of SRL that enable students to become more autonomous learners and assume greater responsibility for their academic success.

The SRL indicators that emerged through the implementation of CRT are summarized in Table II.

Table II. Implementation of CRT

No.	SRL Indicator	Description of Findings
1	Intrinsic Motivation	Increased students' interest and willingness to learn as a result of instruction that is relevant to their cultural backgrounds and lived experiences
2	Self-Efficacy	Enhanced students' confidence in their ability to successfully complete mathematical tasks and solve mathematical problems
3	Learning engagement	Increased active participation and involvement in learning activities, discussions, and classroom interactions
4	Goal Setting	Improved students' ability to establish and pursue specific learning goals
5	Self-Monitoring	Enhanced students' ability to monitor their learning progress and regulate their learning processes
6	Self-Reflection	Improved students' capacity to evaluate their learning outcomes and reflect on the effectiveness of the strategies they employed
7	Presistence	Increased perseverance and resilience in completing mathematical tasks and overcoming learning challenges

RQ4: What role does Culturally Responsive Teaching (CRT) play in supporting the development of students' Self-Regulated Learning (SRL) in elementary mathematics education?

CRT contributes to the development of SRL through several interconnected mechanisms. First, CRT enhances the relevance of learning experiences by connecting mathematical content to students' cultural backgrounds and everyday lives, thereby fostering intrinsic motivation to learn. When students perceive learning as meaningful and beneficial to their personal experiences, they are more likely to take an active role in setting learning goals and managing the learning strategies they employ. This finding is consistent with Zimmerman's theory of SRL, which emphasizes the critical role of motivational

processes in self-regulated learning (Zimmerman, 2010; Rosa & Orey, 2023).

CRT also contributes to the enhancement of students' self-efficacy. Instruction that incorporates culturally familiar contexts provides learning experiences that are more accessible and comprehensible, thereby strengthening students' confidence in their ability to complete mathematical tasks successfully. From the perspective of Bandura's Social Cognitive Theory, self-efficacy is a crucial determinant of students' willingness to persist when facing challenges, apply effective learning strategies, and evaluate their learning progress. Consequently, culturally responsive instructional practices can indirectly strengthen students' self-regulatory capacities by fostering stronger beliefs in their academic competence.

Furthermore, CRT promotes students' learning engagement through the creation of inclusive learning environments that recognize and value their cultural identities. When students feel respected, represented, and accepted within the classroom, they tend to participate more actively in learning activities. Higher levels of engagement provide greater opportunities for students to develop the ability to monitor, regulate, and evaluate their own learning processes. Therefore, CRT contributes not only to students' academic development but also to the cultivation of self-regulatory skills that serve as a foundation for lifelong learning.

RQ5: What are the implications of implementing Culturally Responsive Teaching (CRT) for the development of mathematics instruction that promotes Self-Regulated Learning (SRL) in elementary schools?

The findings of this review suggest that integrating local culture into mathematics instruction has the potential not only to improve students' understanding of mathematical concepts but also to foster the self-regulatory competencies required for twenty-first-century learning (Patriana et al., 2021; Masliah & Nirmala, 2023). Therefore, elementary school teachers should design instructional activities that utilize students' cultural contexts as meaningful learning resources. In addition, learning activities that encourage self-reflection, goal setting, and progress monitoring should be incorporated as integral components of CRT implementation in mathematics classrooms (Aronson & Laughter, 2016).

Across the reviewed studies, increased learning motivation consistently emerged as the most frequently reported outcome of culturally responsive mathematics instruction. Despite differences in research design and learning contexts, almost all studies indicated that integrating students' cultural backgrounds into mathematics learning enhanced intrinsic motivation and encouraged greater engagement. However, several studies differed regarding the mechanisms underlying this improvement. While some researchers emphasized cultural relevance as the primary factor influencing motivation, others highlighted collaborative learning activities and students' sense of belonging as the dominant contributors. These differences suggest that the effectiveness of CRT depends not only on cultural content but also on how culturally relevant pedagogies are implemented in classroom practice.

Based on the synthesis of the reviewed studies, a conceptual model can be proposed to explain the relationship between CRT and SRL in elementary mathematics education. The model suggests that the implementation of CRT creates culturally relevant learning experiences, which subsequently enhance students' intrinsic motivation. Increased intrinsic motivation then strengthens students' self-efficacy and learning engagement. The improvement of these two factors further promotes the development of self-regulatory skills, including learning planning, self-monitoring, the use of effective learning strategies, and reflection on learning outcomes. This conceptual pathway highlights the potential of CRT as a pedagogical approach that simultaneously supports mathematical understanding and the development of autonomous learning skills among elementary school students.

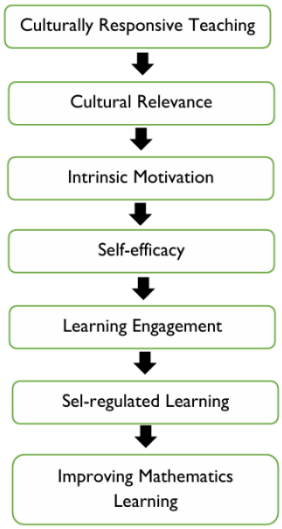

Figure 1. Conceptual Model of the Relationship between Culturally Responsive Teaching (CRT) and Self-Regulated Learning (SRL)

This conceptual model suggests that the influence of CRT on SRL does not occur directly, but rather through a variety of interrelated psychological and pedagogical factors. These findings provide a new conceptual contribution that broadens our understanding of the benefits of CRT in elementary school mathematics learning.

CONCLUSION

Based on the results of the Systematic Literature Review, it can be concluded that Culturally Responsive Teaching (CRT) plays a significant role in supporting the development of students' Self-Regulated Learning (SRL) in elementary school mathematics. Implementing CRT through the integration of local culture, ethnomathematics, students' life contexts, and a learning environment that respects cultural diversity can create more relevant, meaningful, and contextual learning. These conditions contribute to increased intrinsic motivation, self-efficacy, learning engagement, the ability to monitor the learning process, and self-reflection, all essential components of SRL. These findings confirm that culturally responsive mathematics learning not only contributes to cognitive aspects but also plays a role in fostering students' learning independence. Therefore, CRT can be an effective approach to supporting the development of inclusive, meaningful mathematics learning that is oriented toward strengthening lifelong learning skills.

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REFERENCES

Anggraeni, D. M. (2024). Keterampilan Literasi Numerasi Siswa Sekolah Dasar: Studi Kasus Sekolah Dasar Daerah 3T. Media Pendidikan Matematika, 12(2), 128-140. https://e-journal.undikma.ac.id/index.php/jmpm

Anugraheni, I., Gufron, A., & Purnomo, Y. W. (2025). The impact of realistic problem-based learning on mathematical connection abilities: evidence from elementary schools in Indonesia. COGENT EDUCATION, 12(1), 2523078. https://doi.org/10.1080/2331186X.2025.2523078

Aronson, B., & Laughter, J. (2016). The Theory and Practice of Culturally Relevant Education: A Synthesis of Research Across Content Areas. Review of Educational Research, 86(1), 163–206. DOI: 10.3102/0034654315582066

Astuti, A. D. (2024). The Effect of Self-Regulated Learning on Student Academic Procrastination. Tunas: Jurnal Pendidikan Guru Sekolah Dasar, 9(2), 108-112. DOI: https://doi.org/10.33084/tunas.v9i2.6149

Astuti, A. D., & Rozikin, A. Z. (2024). The Role of Self-Regulated Learning in Strengthening Students' Independent Learning Character: Literature Review. English Language in Focus (ELIF), 7(1), 1–10. https://doi.org/10.24853/elif.7.1.1-10

Astuti, A. D., & Rozikin, A. Z. (2025). Ethnomathematics: Urgency and Challenges of Implementation in Elementary School Mathematics Learning. Tunas: *Jurnal Pendidikan Guru Sekolah Dasar, 10*(2), 115–119. https://doi.org/10.33084/tunas.v10i2.10006

Atiah & Assidiqi, H. (2024). Etnomatematika Rumah Adat Betang Suku Dayak Kalimantan Tengah. JIPM (Jurnal Ilmiah Pendidikan Matematika), 12(2), 321-335. DOI:10.25273/jipm.v12i2.18257

Belinda, L. N., Irianto, D. M., & Yuniarti, Y. (2023). Analisis Kesulitan Belajar Operasi Hitung Pembagian Matematika pada Siswa Kelas 3. Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan dan Hasil Penelitian, 9(1), 37-42. https://journal.unesa.ac.id/index.php/PD

Booth, A., Sutton, A., Clowes, M., & James, M. M. (2022). Systematic Approaches to a Successful Literature Review. SAGE Publications Asia-Pacific Pte Ltd.

Dent, A. L., & Koenka, A. C. (2016). The Relation Between Self-Regulated Learning and Academic Achievement Across Childhood and Adolescence: A Meta-Analysis. Educational Psychology Review, 28, 425–474. https://link.springer.com/article/10.1007/s10648-015-9320-8

Fauzi, A., & Widjajanti, D. B. (2018). Self-regulated learning: the effect on student's mathematics achievement. IOP Conf. Series: Journal of Physics: Conf. Series 1097. DOI :10.1088/1742-6596/1097/1/012139

Gay, G. (2018). Culturally Responsive Teaching: Theory, Research, and Practice (3rd Edition). New York: Teachers College Press.

Harni, H., Hartono., & Yustitia, V. (2025). Teaching mathematics through cultural contexts and motivation: A study on coastal students' numeracy learning in West Papua. *Al-Jabar : Jurnal Pendidikan Matematika*, 16(2), 837-851. https://doi.org/10.24042/ajpm.v16i2.29093

Jacob & Effiong, E. (2023). Ethnomathematics and Culturally Responsive Pedagogy in Mathematics Learning. Journal of Education in Developing Areas (JEDA) Special Edition, 31(3), 380-389. https://journals.journalsplace.org/index.php/JEDA

Jasmaniah., Nurhayati., & Zuhra, F. (2024). Game-Based Learning Model with A Culturally Responsive Teaching Approach to Enhance Student' Motivation in Learning Mathematics. Jurnal Ilmiah Sekolah Dasar,

8(4), 708-717. https://doi.org/10.23887/jisd.v8i4.86595

Kern, M. L., & Wehmeyer, M. L. (2021). School Belonging: The Importance of Student and Teacher Relationships. The Palgrave Handbook of Positive Education, https://doi.org/10.1007/978-3-030-64537-3_21

Masliah, L. & Nirmala, S. D. (2023). Keefektifan Model Pembelajaran Problem Based Learning (PBL) terhadap Kemampuan Literasi dan Numerasi Peserta Didik di Sekolah Dasar. Jurnal Basicedu, 7(1), 1-10. https://doi.org/10.31004/basicedu.v7i1.4106

Mufidah, N. E., & Sartika, S. B. (2025). Hubungan Motivasi Belajar dan Disiplin Belajar Terhadap Hasil Belajar IPA Siswa SD Kelas VI. Jurnal Pendidikan Dasar Indonesia (JPDI), 10(1), 19 – 25. https://journal.stkipsingkawang.ac.id/index.php/JPDI/article/view/4585/pdf

Nashrullah, F. R., Rochmad., Cahyono, A. N. (2023). Mathematical Critical Thinking Abilities of Students in Terms of Self-Regulated Learning in Realistic Mathematics Education Assisted by Mobile Learning. Journal Of Mathematics and Mathematics Education, 8(3), 1035-1056. http://doi.org/10.31943/mathline.v8i3.469

Panadero, E. (2017). A Review of Self-regulated Learning: Six Models and Four Directions for Research. Frontiers in Psychology, 8, https://doi.org/10.3389/fpsyg.2017.00422

Patriana, W. D., Sutama, & Wulandari, M. D. (2021). Pembudayaan Literasi Numerasi untuk Asesmen Kompetensi Minimum dalam Kegiatan Kurikuler pada Sekolah Dasar Muhammadiyah. Jurnal Basicedu, 5(5), 3413-3429. DOI: 10.31004/basicedu.v5i5.1302

Pradiarti, R. A. . (2025). Minat dan Motivasi Belajar Matematika Siswa Pada Pendekatan *Culturally Responsive Teaching* (CRT): A Systematic Literature Review. *Jurnal MIPA dan Pembelajarannya*, 5(1), 4. https://journal3.um.ac.id/index.php/mipa/article/view/7377

Rosa, M., & Orey, D. C. (2023). Considerations about Ethnomathematics, the Culturally Relevant Pedagogy and Social Justice in Mathematical Education. Educ. Matem. Pesq., São Paulo, 25(2), 145-165. http://dx.doi.org/10.23925/1983-3156.2023v25i2p145-165

Schunk, D. H., & DiBenedetto, M. K. (2020). Self-efficacy and human motivation. Advances in Motivation Science, Elsevier Inc. https://doi.org/10.1016/bs.adms.2020.10.001

Siwatu, K. O. (2007). Preservice teachers' culturally responsive teaching self-efficacy and outcome expectancy beliefs. Teaching and Teacher Education, 23, 1086–1101. DOI: 10.1016/j.tate.2006.07.011

Sukmanasaa, E., Novitaa, L., Suhardia, E., Maesyaa, A., Awitia, 'Ala, F. (2024). Students' Motivation through Problem-based Learning with a Culturally Responsive Teaching (CRT) Approach in Mathematics Lessons. Pedagonal: Jurnal Ilmiah Pendidikan, 8(1), 90-97. DOI: 10.55215/pedagonal.v8i1.9573

Sulastri, S., Nisa, A. F., & Cahyani, B. H. (2024). Analisis Kemampuan Literasi Numerasi dalam Permasalahan Struktur Materi Bilangan Siswa Sekolah Dasar. Jurnal PGSD: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar, 17(1), 39-50. DOI:10.33369/pgsd.17.1.39-50

Utami, N., Eliza, R., & Warahma, S. (2022). Kemampuan Pemecahan Masalah Matematis dan Self-Regulated Learning dengan Model Pembelajaran Learning Cycle 7E. *Jurnal Cendekia : Jurnal Pendidikan Matematika, 6*(1), 1025-1038. https://doi.org/10.31004/cendekia.v6i1.1330

Yuliana., Usodo, B., & Riyadi. The New Way Improve Mathematical Literacy in Elementary School: Ethnomathematics Module with Realistic Mathematics Education. Al-Ishlah: Jurnal Pendidikan, 15(1), 33-44. DOI: 10.2591/alishlah.v15i1.2591

Zimmerman, B. J. (2010). Becoming a Self-Regulated Learner: An Overview. Taylor & Francis Online, 41(2), 64-70. https://doi.org/10.1207/s15430421tip4102_2