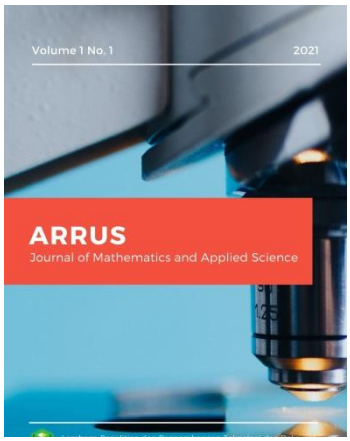
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RESEARCH ARTICLE

# Trends and Gaps in Realistic Mathematics Education for Indonesian Students' Mathematical Competence: A Systematic Review

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**Abstract:** This study aims to map trends and research gaps in Realistic Mathematics Education (RME) research on the development of students' mathematical competence in Indonesia. It examines the competencies investigated, research approaches used, educational levels studied, and regional distribution of RME research. The review analyzed 204 primary journal articles published between 2014 and 2024 and retrieved from Scopus, Google Scholar, Semantic Scholar, and Crossref. The study followed PRISMA 2020 reporting procedures, applied predetermined inclusion and exclusion criteria, and used qualitative narrative synthesis supported by frequency and percentage analysis. The findings show that problem-solving ability and conceptual understanding were the most frequently investigated competencies, each representing 18.63% of the studies. Development research (47.06%) and quantitative research (36.27%) dominated the methodological approaches, while qualitative and mixed-method studies were limited. Most studies were conducted at the lower secondary school level or its equivalent (62.75%), whereas upper secondary school or its equivalent accounted for only 6.86%. Geographically, studies were concentrated in Java (50.98%) and Sumatra (38.24%). Overall, RME research in Indonesia has developed consistently, but its distribution remains uneven across competence focus, methodology, educational level, and research region.

**Keywords**: Realistic Mathematics Education, Students' Mathematical Competence, Systematic Literature Review, Research Trends, Research Gaps

## 1. Introduction

The quality of mathematics learning in Indonesia still faces serious challenges, as reflected in the 2022 Programme for International Student Assessment (PISA), where Indonesian students obtained a mathematics score of 366, far below the OECD average of 472 (OECD, 2023; Wijaya et al., 2024). This condition indicates that many students still struggle to use mathematics to understand, interpret, and solve problems in real-life contexts, suggesting that the challenge is not limited to procedural mastery but also concerns broader mathematical competencies, including conceptual understanding, problem solving, reasoning, and mathematical literacy (Stacey, 2011; Kilpatrick et al., 2001; OECD, 2023).

This condition requires a learning approach that enables students to construct meaning, connect mathematics with real-life contexts, and actively develop problem-solving strategies. Realistic Mathematics Education (RME) is relevant to this need because it is grounded in Freudenthal's view of mathematics as a human activity, in which learning begins from

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meaningful situations that students can organize and mathematize (Freudenthal, 1991; Van den Heuvel-Panhuizen & Drijvers, 2020). In contrast to approaches that present mathematics as a finished product, RME emphasizes students' active construction of mathematical knowledge through horizontal and vertical mathematization, namely translating real-world problems into mathematical models and further processing them within the mathematical domain (Treffers, 1987; Gravemeijer & Doorman, 1999).

Within the RME framework, learning is designed through guided reinvention, didactical phenomenology, and self-developed models, which support students' movement from contextual situations toward formal mathematical understanding (Gravemeijer, 1994). These principles are consistent with the main characteristics of RME, including the use of contexts, models, students' contributions, interaction, and interconnections among mathematical concepts (Treffers, 1987; Van den Heuvel-Panhuizen & Drijvers, 2020). Therefore, RME is relevant to the development of mathematical competencies because it creates opportunities for students to solve problems, construct representations, communicate strategies, and develop mathematical reasoning (Gravemeijer & Doorman, 1999; Cobb et al., 1992; Yackel & Cobb, 1996).

Mathematical competence refers to students' ability to use mathematical knowledge and skills to solve mathematical and real-life problems (National Council of Teachers of Mathematics [NCTM], 2000; Kilpatrick et al., 2001). This competence includes interrelated strands of mathematical proficiency, such as conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition (Kilpatrick et al., 2001), and is also reflected in the PISA framework as the capacity to formulate, employ, and interpret mathematics in various contexts (OECD, 2023). In Indonesia's national curriculum, mathematical competence includes conceptual understanding, problem solving, reasoning, communication, connections, and representation (Kementerian Pendidikan dan Kebudayaan [Kemendikbud], 2016). Previous studies have shown that RME contributes positively to these competencies, including the role of mathematical representation in RME-based learning and the positive effect of RME on students' mathematics achievement (Yuanita et al., 2018; Juandi et al., 2022; Tamur et al., 2020).

In Indonesia, RME has developed through Pendidikan Matematika Realistik Indonesia (PMRI), or Indonesian Realistic Mathematics Education, which adapts RME ideas from the Netherlands while positioning local contexts, culture, and students' experiences as sources for mathematics learning (Sembiring et al., 2008). This development has encouraged many RME studies across educational levels, mathematical competencies, learning designs, media, and regional contexts. However, the growing number of studies has not been accompanied by a systematic mapping of their direction, distribution, and research gaps in Indonesia.

Several systematic literature reviews related to RME have been conducted, but their scope remains limited. Some reviews focused on specific topics or levels, such as fractions and elementary school contexts (Elwijaya et al., 2021; Asmaarobiyah et al., 2025; Listyaningrum et al., 2025), while others examined effectiveness or specific competencies, including creative thinking, mathematical numeracy, and mathematical literacy (Afsari et al., 2021; Choifah et al., 2022; Fauziyah et al., 2025; A'la et al., 2025). However, these studies have not systematically mapped RME research in Indonesia in terms of competencies investigated, research approaches employed, educational levels examined, and research locations. Therefore, a comprehensive mapping of the direction and gaps of RME research in Indonesia remains unavailable.

This gap is important because, in RME, context is not merely a narrative background but a source of situations that supports students in constructing meaning, developing models, and engaging in mathematization (Gravemeijer & Doorman, 1999; Van den Heuvel-Panhuizen & Drijvers, 2020). If RME research is concentrated only on certain competencies, methods, educational levels, or regions, the resulting knowledge may not reflect the diversity of mathematics learning needs in Indonesia (Nur et al., 2021). Therefore, this study reviews

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empirical studies on the implementation of RME that examine students' mathematical competence in Indonesia. Rather than measuring RME effectiveness meta-analytically, this review maps the research landscape, identifies dominant patterns, and reveals gaps requiring further attention (Snyder, 2019).

This study addresses the following research questions.

RQ1. What types of students' mathematical competence have been investigated in studies on the implementation of RME in Indonesia?

RQ2. What types of research approaches have been used in studies on the implementation of RME that examine students' mathematical competence?

RQ3. How are RME studies distributed across educational levels?

RQ4. How are RME studies distributed across regions or islands in Indonesia?

RQ5. What research gaps can be identified from the distribution of competencies, research approaches, educational levels, and research locations in RME research in Indonesia?

## 2. Research Method and Material

### *2.1. Review Design*

This study employed a Systematic Literature Review (SLR) method to map trends and gaps in Realistic Mathematics Education (RME) research on students' mathematical competence in Indonesia. The SLR method was selected because this study aims to synthesize and map the research landscape systematically, rather than calculate effect sizes as in a meta-analysis (Kitchenham, 2004; Snyder, 2019).

The review process followed the PRISMA 2020 reporting guidelines to ensure transparent reporting of identification, screening, eligibility assessment, and study inclusion (Page et al., 2021). The review was limited to empirical journal articles on the implementation of RME or Pendidikan Matematika Realistik Indonesia (PMRI) in relation to students' mathematical competence at the elementary, lower secondary, and upper secondary school levels or their equivalents in Indonesia, published between 2014 and 2024.

The research questions were formulated using the SPIDER framework, consisting of Sample, Phenomenon of Interest, Design, Evaluation, and Research type (Cooke et al., 2012). This framework was selected because it is suitable for descriptive and exploratory reviews in education, whereas PICO is more commonly used for intervention-based clinical questions (Methley et al., 2014). In this review, the Sample comprised Indonesian students at the elementary, lower secondary, and upper secondary school levels or their equivalents; the Phenomenon of Interest was the implementation of RME or PMRI in mathematics learning; the Design covered empirical studies, including experimental, quasi-experimental, descriptive, correlational, comparative, qualitative, Classroom Action Research, Research and Development, and design research; the Evaluation focused on mathematical competence, research approach, educational level, research location, and research gaps; and the Research type referred to empirical journal articles published between 2014 and 2024.

### *2.2. Data Sources and Search Strategy*

The article search was conducted in October 2025 through Scopus, Google Scholar via Publish or Perish, Semantic Scholar, and Crossref (Harzing, 2007). Scopus was used to identify indexed international publications, whereas Google Scholar, Semantic Scholar, and Crossref were used to broaden the coverage of relevant national and international articles. The search strings were developed in Indonesian and English by combining terms related to RME, PMRI, mathematical competence, mathematical ability, and school levels in Indonesia. The search string formats are presented in Table 1.

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**Table 1.** Search String Formats Used in the Databases

| Search Code | Search String Format | Database |
|---|---|---|
| 1 | ("pendidikan matematika realistik" OR RME) AND (kompetensi OR kemampuan) AND ("sekolah dasar" OR SD OR "sekolah menengah pertama" OR SMP OR "sekolah menengah atas" OR SMA OR "madrasah ibtidaiyah" OR MI OR "madrasah tsanawiyah" OR MTs OR "madrasah aliyah" OR MA OR "sekolah menengah kejuruan" OR SMK) | Scopus, Google Scholar, and Semantic Scholar |
| 2 | ("Realistic Mathematics Education" OR RME) AND (competence OR ability) AND ("elementary school" OR "primary school" OR "middle school" OR "junior high school" OR "high school" OR "senior high school") | Scopus, Google Scholar, and Semantic Scholar |
| 3 | "pendidikan matematika realistik" RME kompetensi kemampuan SD SMP SMA MI MTs MA SMK | Crossref |
| 4 | "Realistic Mathematics Education" RME competence ability "elementary school" "junior high school" "senior high school" | Crossref |

### 2.3. *Inclusion and Exclusion Criteria*

The inclusion criteria covered empirical journal articles that focused on RME or PMRI, examined students' mathematical competence, involved students at the elementary, lower secondary, or upper secondary school levels or their equivalents, were conducted in Indonesia, were published between 2014 and 2024, and appeared in Scopus-indexed or Sinta 1-2 accredited journals. Articles were excluded if they did not meet these criteria, were not empirical studies, involved subjects outside the specified school levels, were conducted outside Indonesia, or were published as theses, dissertations, proceedings, literature reviews, bibliometric studies, meta-analyses, or systematic literature reviews. The inclusion and exclusion criteria are presented in Table 2.

**Table 2.** Inclusion and Exclusion Criteria for the Studies

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| IC1: Empirical data-based articles related to the implementation of the RME approach that examined students' mathematical competence. | EC1: Articles that did not focus on the RME approach. |
| IC2: Articles involving students at the elementary school or equivalent level, lower secondary school or equivalent level, or upper secondary school or equivalent level as the research subjects or sample. | EC2: Articles that did not discuss students' mathematical competence. |
| IC3: Articles that specifically stated the research location within Indonesia. | EC3: Articles that were not empirical data-based research, such as literature reviews, meta-analyses, bibliometric studies, or systematic literature reviews. |
| IC4: Articles published between 2014 and 2024. | EC4: Articles whose research subjects or sample were not elementary, lower secondary, or upper secondary school students, such as university students, teachers, or early childhood education students. |
| IC5: Articles retrieved from Scopus, Google Scholar, Semantic Scholar, and Crossref. | EC5: Articles whose research location was outside Indonesia. |
| IC6: Articles written in English or Indonesian. | EC6: Publications in the form of undergraduate theses, master's theses, dissertations, or proceedings. |
| IC7: Articles published in scientific journals indexed by Scopus (Q1–Q4) or accredited by Sinta (Sinta 1–2). | EC7: Articles published in journals accredited by Sinta 3–6, or journals that were not accredited and not indexed by Scopus. |
| | EC8: Articles that did not clearly state the journal identity or research location. |

### 2.4. *Study Selection Process*

The study selection process followed the four PRISMA stages: identification, screening, eligibility, and inclusion. A total of 5,989 records were retrieved from the four databases, and 1,524 duplicates were removed. The remaining 4,465 records were screened, of which 3,302 were excluded because they did not meet the initial criteria. Subsequently, 1,163 articles were

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assessed for eligibility, and 959 were excluded because they did not meet the publication eligibility criteria or did not provide the required information. Thus, 204 primary articles were included in the final synthesis. The study selection flow is presented in Figure 1 using the PRISMA 2020 format (Page et al., 2021).

This study used journal indexing or accreditation status as a publication quality threshold, rather than as the sole indicator of the methodological quality of each study. The included articles were published in journals indexed by Scopus Q1-Q4 or in national journals accredited by Sinta 1-2. This decision was made to maintain traceability and a minimum standard of scientific publication. However, the interpretation of the findings still recognizes that journal indexing is not always identical to the methodological quality of each article.

### 2.5. *Data Extraction and Coding*

Data extraction was conducted using a protocol sheet in Microsoft Excel. The extracted information included article identity, publication year, database, journal name, journal indexing or accreditation status, type of mathematical competence, research approach, educational level, research location, and article link. Coding was carried out in two stages. First, the main focus of each article was identified based on its objectives, instruments, variables, and main findings. Second, the initial codes were grouped into final categories, namely mathematical competence, research approach, educational level, and research location. Articles examining more than one competence were classified according to the most dominant focus; when two competencies were equally central, they were placed in a combined category. To ensure consistency, the articles were reviewed collaboratively by the research team, and differences in judgment were resolved through discussion until consensus was reached (Popay et al., 2006).

### 2.6. *Data Synthesis*

Data analysis was conducted through qualitative narrative synthesis (Popay et al., 2006). Frequencies and percentages were used to describe the distribution of studies, while narrative interpretation was used to identify dominant trends, imbalances across categories, and research gaps. The synthesis followed the five research focuses: types of mathematical competence, research approaches, educational levels, research locations, and research gaps in RME research in Indonesia.

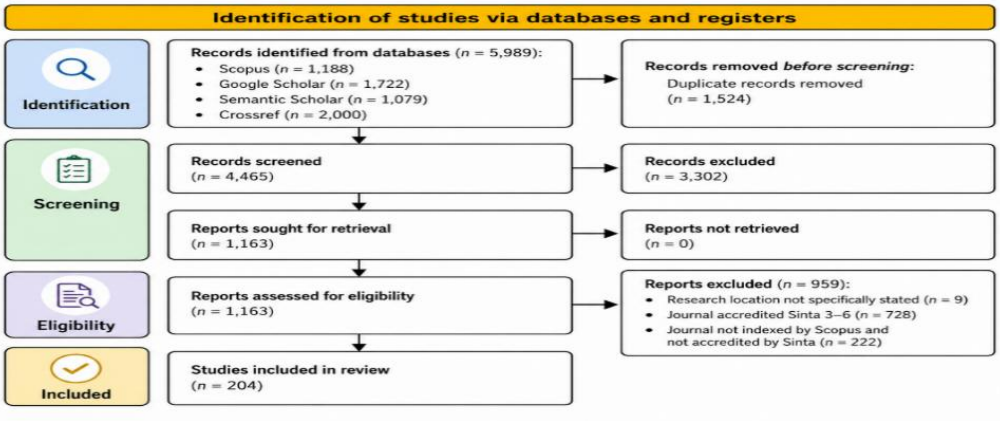



**Figure 1.** PRISMA 2020 Flow Diagram of the Study Selection Process

## 3. Results and Discussion

### 3.1. *Results*

#### 3.1.1. *General Characteristics of the Primary Studies*

The literature selection process resulted in 204 primary studies that met all inclusion criteria. These studies were retrieved from four search sources, namely Scopus, Google Scholar,

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Semantic Scholar, and Crossref. Figure 2 presents the general characteristics of the primary studies by database, publication year, and journal accreditation or indexing.

As shown in Figure 2A, the largest number of primary studies was obtained from Scopus, with 73 studies or 35.78%, followed by Semantic Scholar with 47 studies or 23.04%, Crossref with 44 studies or 21.57%, and Google Scholar with 40 studies or 19.61%. Figure 2B shows that the number of studies generally increased from 2014 to 2024, although fluctuations occurred in several years. The lowest number was found in 2015, with 3 studies or 1.47%, whereas the highest number was found in 2024, with 31 studies or 15.20%. Figure 2C shows that most primary studies were published in Sinta 2 journals, with 119 studies or 58.33%. Studies indexed in Scopus Q1 accounted for 30 studies or 14.71%, followed by Scopus Q4 with 28 studies or 13.73%, Scopus Q2 with 20 studies or 9.80%, Scopus Q3 with 6 studies or 2.94%, and Sinta 1 with 1 study or 0.49%.

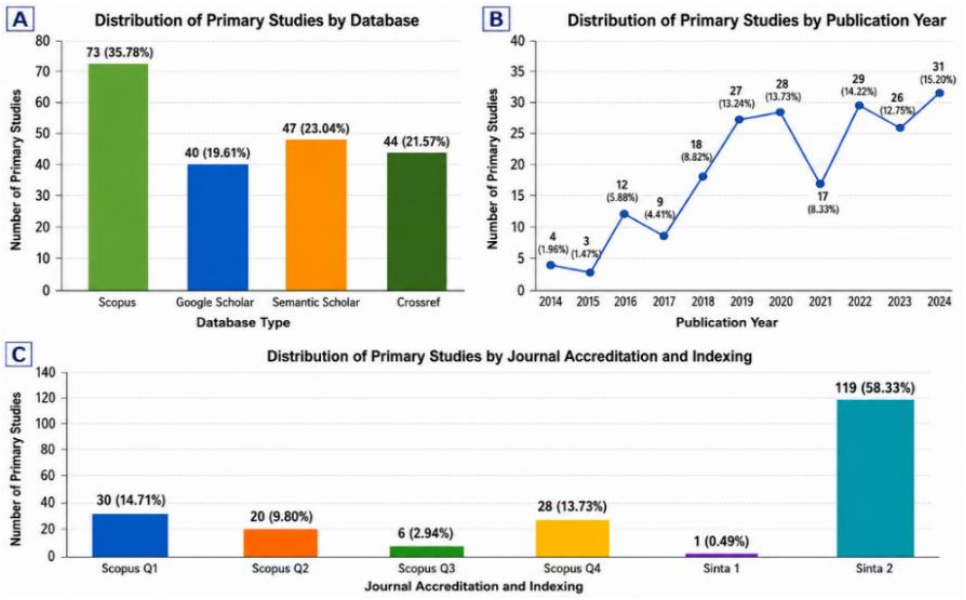



**Figure 2:** General Characteristics of the Primary Studies: (A) Distribution by Database, (B) Distribution by Publication Year, and (C) Distribution by Journal Accreditation and Indexing

### *3.1.2. RQ1: Types of Students' Mathematical Competence Investigated in RME Studies*

Table 3 shows that mathematical problem-solving ability and conceptual understanding were the most frequently investigated competencies in RME studies in Indonesia, each appearing in 38 studies or 18.63%. Other competencies that were relatively frequently examined included mathematical communication with 19 studies or 9.31%, mathematical literacy with 18 studies or 8.82%, mathematical critical thinking with 17 studies or 8.33%, and mathematical reasoning and mathematical creative thinking, each with 14 studies or 6.86%. Competencies with fewer studies included mathematical connections and mathematical representation, each with 7 studies or 3.43%, numeracy and higher-order thinking skills, each with 4 studies or 1.96%, and other specific and combined competencies with 24 studies or 11.76%. Overall, this distribution indicates uneven attention across types of mathematical competence.

**Table 3.** Distribution of Students' Mathematical Competencies Investigated in RME Studies

| No. | Type of Mathematical Competence | Number of Primary Studies | Percentage |
|---|---|---|---|
| 1 | Mathematical Problem-Solving Ability | 38 | 18.63% |
| 2 | Conceptual Understanding Ability | 38 | 18.63% |
| 3 | Mathematical Communication Ability | 19 | 9.31% |
| 4 | Mathematical Literacy Ability | 18 | 8.82% |

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| No. | Type of Mathematical Competence | Number of Primary Studies | Percentage |
|---|---|---|---|
| 5 | Mathematical Critical Thinking Ability | 17 | 8.33% |
| 6 | Mathematical Reasoning Ability | 14 | 6.86% |
| 7 | Mathematical Creative Thinking Ability | 14 | 6.86% |
| 8 | Mathematical Connection Ability | 7 | 3.43% |
| 9 | Mathematical Representation Ability | 7 | 3.43% |
| 10 | Numeracy Ability | 4 | 1.96% |
| 11 | Higher-Order Thinking Skills (HOTS) | 4 | 1.96% |
| 12 | Other specific and combined competencies | 24 | 11.76% |
| **Total** | | **204** | **100%** |

Note. The category of other specific and combined competencies includes competencies that appeared with low frequency as well as categories combining two competencies.

### *3.1.3. RQ2: Types of Research Approaches Used in RME Studies*

Table 4 shows that development research or Research and Development was the most dominant approach used in RME studies, with 96 studies or 47.06%, followed by quantitative research with 74 studies or 36.27%. Qualitative research was found in 17 studies or 8.33%, Classroom Action Research in 9 studies or 4.41%, and mixed-method research in 8 studies or 3.92%. This distribution indicates that RME studies more frequently employed development and quantitative approaches than qualitative and mixed-method approaches.

**Table 4.** Distribution of Research Approaches in RME Studies

| No. | Type of Research Approach | Number of Primary Studies | Percentage |
|---|---|---|---|
| 1 | Quantitative Research | 74 | 36.27% |
| 2 | Qualitative Research | 17 | 8.33% |
| 3 | Mixed-Method Research | 8 | 3.92% |
| 4 | Classroom Action Research (CAR) | 9 | 4.41% |
| 5 | Development Research (R&D) | 96 | 47.06% |
| **Total** | | **204** | **100%** |

### *3.1.4. RQ3: Distribution of RME Studies by Educational Level*

Figure 3 presents the distribution of RME studies by educational level. Studies at the lower secondary school or equivalent level were the most frequently found, with 128 studies or 62.75%. The elementary school or equivalent level ranked second, with 62 studies or 30.39%, whereas the upper secondary school or equivalent level accounted for only 14 studies or 6.86%. This distribution shows that RME studies in the review corpus were concentrated at the lower secondary school level.

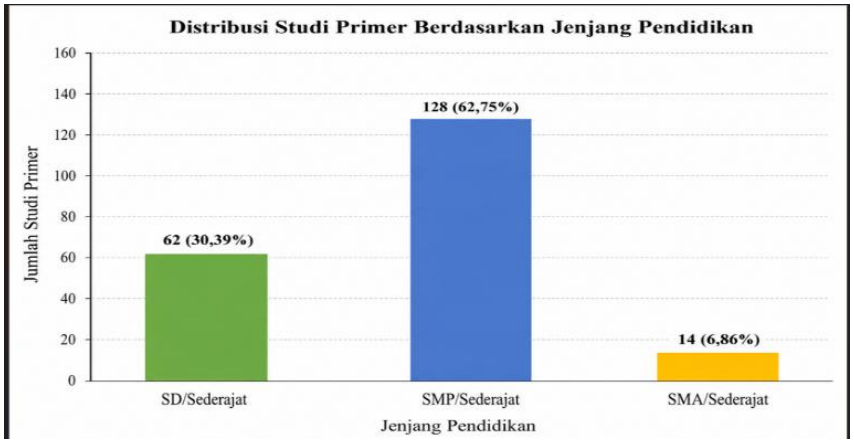



**Figure 3.** Distribution of RME Studies by Educational Level

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### *3.1.5. RQ4: Distribution of RME Studies by Region in Indonesia*

Table 5 shows that the geographical distribution of RME studies was concentrated on Java and Sumatra. Java accounted for 104 studies or 50.98%, while Sumatra accounted for 78 studies or 38.24%. Together, these two regions represented 89.22% of all primary studies. Regions outside Java and Sumatra accounted for only 22 studies or 10.78% of the total studies.

**Table 5.** Distribution of RME Studies by Region in Indonesia

| No. | Research Region | Number of Primary Studies | Percentage |
|---|---|---|---|
| 1 | Java Island | 104 | 50.98% |
| 2 | Sumatra Island | 78 | 38.24% |
| 3 | Bali Island | 9 | 4.41% |
| 4 | Kalimantan Island | 5 | 2.45% |
| 5 | Other regions | 8 | 3.92% |
| **Total** | | **204** | **100%** |

Note. The category of other regions includes Sulawesi, Papua, Lombok, Seram, Flores, and one cross-regional study involving Sumatra, Sulawesi, and Papua.

### *3.1.6. RQ5: Research Gaps in RME Research in Indonesia*

Based on the distribution patterns in RQ1 to RQ4, four main research gaps were identified in RME research in Indonesia. First, in terms of competence, research remains centered on problem solving and conceptual understanding, whereas mathematical connections, representation, modeling, computational thinking, and numeracy remain rarely examined. Second, in terms of methodology, development and quantitative research dominate, while qualitative and mixed-method studies remain limited. Third, in terms of educational level, RME studies remain concentrated at the lower secondary school level, while the upper secondary school level remains underexplored. Fourth, in terms of region, research remains concentrated in Java and Sumatra, while other regions remain minimally represented. A summary of these gaps is presented in Table 6.

**Table 6.** Map of Research Gaps in RME Research in Indonesia

| Aspect | Dominant Pattern | Identified Gap | Direction for Future Research |
|---|---|---|---|
| Mathematical competence | Problem solving and conceptual understanding | Mathematical connections, representation, modeling, computational thinking, and numeracy remain rarely examined. | Expanding studies on integrative competencies. |
| Research approach | R&D and quantitative research | Qualitative and mixed-method studies remain limited. | Strengthening studies on learning processes and mathematization. |
| Educational level | Lower secondary school or equivalent level | Upper secondary school or equivalent level remains very limited. | Developing RME for abstract mathematical topics at the upper secondary level. |
| Research region | Java and Sumatra | Regions outside Java and Sumatra remain minimally represented. | Expanding studies based on local contexts. |

## *3.2. Discussion*

The review of 204 primary studies shows that RME research in Indonesia has developed over the past decade, yet its distribution remains uneven in terms of competence focus, methodology, educational level, and research region.

The dominance of studies on problem solving and conceptual understanding can be understood because these two competencies are closely related to the basic characteristics of RME. From the RME perspective, contextual problems serve as a starting point for students to engage in mathematization, develop models, and gradually construct conceptual understanding (Gravemeijer, 1994; Treffers, 1987; Van den Heuvel-Panhuizen & Drijvers,

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2020). However, this dominance also indicates that the potential of RME has not yet been used in a balanced way to develop other competencies that are equally important.

Integrative competencies such as mathematical connections, mathematical representation, mathematical modeling, computational thinking, and numeracy remain underrepresented, even though they are closely aligned with the principles of RME. RME-based learning requires students to connect contexts, models, representations, and mathematical structures in the process of mathematical thinking (Gravemeijer & Doorman, 1999; Van den Heuvel-Panhuizen & Drijvers, 2020). Therefore, RME research in Indonesia needs to move beyond commonly examined competencies toward more complex, integrative, and contextual competencies.

In terms of methodology, the dominance of development and quantitative research indicates that many RME studies have focused on producing learning materials and measuring learning outcomes. Although this pattern offers practical contributions, it is not sufficient to explain the learning processes that constitute the core of RME. Processes such as model development, mathematization, negotiation of meaning, and the transition from informal strategies to formal reasoning require deeper process-based evidence. Therefore, qualitative and mixed-method approaches are needed to explain how RME learning works, not only whether it affects learning outcomes (Creswell & Plano Clark, 2018; Johnson & Onwuegbuzie, 2004).

In terms of educational level, RME research remains concentrated at the lower secondary school or equivalent level. This pattern may be related to the characteristics of many topics at this level, which provide opportunities for the use of contexts, models, and transitions from informal to formal thinking. However, the limited number of studies at the upper secondary school level indicates that the implementation of RME in more abstract mathematical concepts has not been widely explored, even though the principles of RME apply across educational levels (Van den Heuvel-Panhuizen & Drijvers, 2020; Gravemeijer & Doorman, 1999).

In terms of region, RME research remains concentrated in Java and Sumatra. This imbalance deserves attention because RME strongly depends on context. The RME literature emphasizes that context is not merely a background for problems, but a source of situations that helps students construct mathematical meaning (Gravemeijer & Doorman, 1999; Sembiring et al., 2008). If research is mostly conducted in particular regions, the variation of local contexts that serves as the basis for RME development also becomes limited (Zulkardi et al., 2020).

Overall, these findings indicate that the development of RME research in Indonesia has not yet been accompanied by an even distribution of research focus. Therefore, future RME research should be directed not only toward increasing the number of studies, but also toward improving methodological depth, diversifying competence focus, expanding educational levels, and representing the contexts of mathematics education in Indonesia more broadly.

## 4. Conclusion

Based on the analysis of 204 primary studies published between 2014 and 2024, this study shows that RME research in Indonesia has continued to develop, but its distribution remains uneven. The reviewed studies were dominated by problem-solving ability and conceptual understanding, development and quantitative research approaches, the lower secondary school level, and research locations in Java and Sumatra. These findings indicate that RME research in Indonesia has not yet fully reflected the diversity of mathematical competencies, methodological approaches, educational levels, and regional contexts.

The main contribution of this study is that it provides a systematic map of trends and gaps in RME research in Indonesia. This map can serve as a reference for researchers in designing more focused and diverse research agendas, for teachers in developing local context-based

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RME learning, and for policymakers in supporting more equitable development of mathematics education research and teaching materials across regions.

This study has several limitations. The primary studies were limited to articles published in Scopus-indexed journals and Sinta 1-2 accredited journals; therefore, relevant studies published in other journals, proceedings, theses, dissertations, or non-indexed publications were not included. The classification of competencies, methods, educational levels, and regions also depended on information explicitly available in the primary articles. In addition, this study used journal indexing and accreditation as a publication quality threshold but did not conduct a detailed methodological quality appraisal of each article. Because this review used qualitative narrative synthesis, it did not calculate the effect size of RME implementation on students' mathematical competence.

Based on these limitations and the identified gaps, future RME research should give greater attention to underexplored competencies such as mathematical connections, representation, modeling, numeracy, and computational thinking. Qualitative and mixed-method studies also need to be strengthened to explain students' mathematization processes and conceptual development more deeply. In addition, further studies are needed at the upper secondary school level and in regions outside Java and Sumatra so that RME research in Indonesia can better represent the diversity of national mathematics education contexts.

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