e-ISSN: 2808-8263
p-ISSN: 2829-0976
International Conference on Elementary Education
Volume 8, Nomor 1

Enhancing Elementary Students' Numeracy Skills through Ethnomathematics in Geometry Learning: *A Systematic Literature Review*

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Abstract. The abstract should concisely summarize the research problem, objectives, methodology, key findings, and conclusions. It must not contain citations, references, or quotes. The abstract should be clear and self-contained, giving readers a quick overview of the entire study. The length of the abstract should be between 150-200 words, ensuring it remains informative without being too detailed. The formatting requirements include using Helvetica 9pt font, with single line spacing to maintain readability and professional appearance. All essential elements, such as the study's problem, goals, methods, results, and final conclusions, must be clearly presented.

Keywords: Ethnomathematics, Geometry, Culturally Based Learning, Mathematics, Numeracy Skills.

INTRODUCTION

The rapid advancement of science and technology has driven transformative changes in education, including how mathematics is taught at the elementary level. Globally, numeracy competence has emerged as a key indicator of mathematical literacy in the 21st century, reflecting students' ability to apply quantitative and spatial reasoning in real life contexts. Reports from the Programme for International Student Assessment (PISA) reveal that Indonesian students' numeracy performance remains below the international average, signaling a persistent challenge in developing contextual and meaningful mathematics learning (OECD, 2019). At the national level, results from the literacy and numeracy based national assessments similarly indicate a significant gap between expected competencies and students' actual achievements, particularly at the primary school level (Kemdikbudristek, 2022). The limited connection between mathematics instruction and students' everyday experiences has been identified as a major factor contributing to the weak conceptual understanding of geometry and basic numeracy (Tampubolon et al., 2023). Consequently, the integration of local cultural values into mathematics instruction particularly through an ethnomathematical approach has gained increasing attention as a promising strategy to bridge this pedagogical gap (Musliana et al., 2024).

Within academic discourse and classroom practice, the ethnomathematics approach has demonstrated effectiveness in enhancing students' motivation and mathematical understanding through culturally familiar and locally relevant contexts (D'Ambrosio, 2018).

e-ISSN: 2808-8263
p-ISSN: 2829-0976

However, few systematic studies have specifically examined how ethnomathematics can be integrated into the teaching of plane geometry at the elementary level to improve numeracy skills. Limited evidence suggests that contextual learning media such as traditional games (*congklak*), local musical instruments, and traditional architectural structures can help students grasp geometric and numerical concepts more concretely (Zulkardi & Putri, 2020; Arisetyawan et al., 2014). Yet, most existing studies remain descriptive or culturally bounded, lacking a comprehensive theoretical and practical synthesis of ethnomathematical integration strategies in geometry instruction for strengthening elementary students' numeracy.

Theoretically, ethnomathematics is rooted in a constructivist paradigm that emphasizes meaning-making through students' lived experiences and cultural practices (Civil, 2020). It does not merely connect mathematical ideas with culture but functions as a pedagogical bridge between students' informal cultural knowledge and formal academic mathematics (Fouze & Amit, 2018). In the context of geometry learning, two- and three-dimensional shapes naturally appear in cultural artifacts such as batik patterns, traditional houses, indigenous games, and historical architecture elements that can serve as authentic learning contexts (Prahmana et al., 2021). This perspective aligns closely with the principles of *Realistic Mathematics Education* (RME), which prioritizes real-world problem-solving as the foundation for meaningful mathematics learning (van den Heuvel Panhuizen, 2005).

Building upon this background, the present study aims to systematically examine how ethnomathematical approaches can be effectively integrated into geometry instruction at the elementary level to enhance students' numeracy competence. The study is designed as a *Systematic Literature Review* (SLR) to address three guiding research questions: (1) What effective strategies exist for integrating ethnomathematics into geometry learning for elementary students? (2) Which instructional models and approaches are most suitable for improving numeracy through culturally based learning contexts? And (3) What challenges and opportunities do teachers encounter in implementing ethnomathematics in geometry instruction?

This article provides a significant scholarly contribution to the field of mathematics education by presenting a comprehensive synthesis of recent research (2020–2024) on the application of ethnomathematics in elementary geometry learning. The distinctiveness of this study lies in its systematic design, which not only compiles empirical findings but also critically analyzes pedagogical strategies and the contextual relevance of local culture in supporting numeracy. The findings are expected to enrich the body of literature on culturally responsive mathematics

education and offer theoretical and practical insights for educators, researchers, and policymakers in developing more inclusive and contextually grounded mathematics curricula.

The study adopts a *Systematic Literature Review* (SLR) approach, a rigorous research design intended to identify, critically evaluate, and synthesize findings from a wide range of scholarly studies relevant to a specific topic in a systematic and transparent manner. This approach has been widely employed in educational research to summarize and integrate scientific evidence from multiple sources in order to address complex and multidimensional research questions (Snyder, 2019). Unlike a traditional narrative review, an SLR follows clearly defined and replicable procedures, emphasizing transparency, validity, and traceability of the reviewed data (Xiao & Watson, 2019). Such a methodological framework is particularly suitable for examining the integration of ethnomathematics in geometry learning to improve numeracy in elementary education.

The data used in this review are secondary sources drawn from accredited national journals and reputable international publications. The corpus includes quantitative, qualitative, and mixed-method studies focusing on the integration of ethnomathematics into mathematics education, particularly geometry and numeracy at the elementary level. Literature was gathered from multiple academic databases, including Google Scholar, the Directory of Open Access Journals (DOAJ), and specialized research aggregators such as Consensus, which provide access to thousands of peer-reviewed articles across disciplines (Boell & Cecez Kecmanovic, 2015). To ensure reliability, only open access literature published between 2020 and 2024 and explicitly reporting research methodologies were included.

Data collection followed a structured five-stage SLR protocol: (1) formulation of research questions, (2) systematic literature search using specific keywords, (3) selection of studies based on inclusion and exclusion criteria, (4) data extraction, and (5) analysis and synthesis of findings (Kitchenham & Charters, 2007). The search process employed Boolean syntax combinations such as *AND*, *OR*, and *NOT* to refine results, using keywords including “ethnomathematics,” “mathematics,” “geometry,” “numeracy,” “elementary school,” and “culturally based learning.” To minimize bias, the search was conducted independently by two reviewers and consolidated through collaborative discussion.

The inclusion criteria were as follows: (1) peer reviewed journal articles; (2) published between 2019 and 2024; (3) written in English or Indonesian; (4) explicitly addressing ethnomathematics integration or geometry and numeracy learning at the elementary level; and (5) fully accessible as open-access publications. Exclusion criteria encompassed (1) non

e-ISSN: 2808-8263
p-ISSN: 2829-0976

empirical works such as editorials or opinion pieces, (2) non refereed conference papers, (3) articles lacking full text access, and (4) studies focusing on secondary or tertiary education without relevance to elementary contexts. These criteria ensured the quality and relevance of the included literature (Moher et al., 2009).

Collected data were analyzed using a qualitative thematic approach to identify recurring patterns, trends, and key categories across studies. The analysis employed open coding to highlight strategies of integration, instructional models, implementation challenges, and impacts on numeracy development. This process followed the principles of *grounded theory*, allowing categories to emerge inductively from the data (Thomas & Harden, 2008). To ensure interpretive validity, triangulation was conducted by comparing findings across different study types (quantitative and qualitative) and diverse cultural settings.

In summary, the systematic literature review method employed in this study was designed to be transparent and replicable, ensuring the scientific validity of the synthesized findings while providing a strong conceptual foundation for addressing the research questions comprehensively and objectively.

METHODOLOGY

This study employs a *Systematic Literature Review* (SLR) approach a research strategy designed to identify, critically evaluate, and synthesize findings from a range of scientific studies relevant to a specific topic in a systematic and structured manner. The SLR method is widely applied in educational research as it enables the integration of evidence based findings from multiple sources to address complex and multidimensional research questions (Snyder, 2019). Unlike a traditional narrative review, an SLR follows transparent and replicable procedures and protocols, emphasizing validity, objectivity, and the traceability of data sources (Xiao & Watson, 2019). This approach is particularly suitable for summarizing best practices in integrating ethnomathematics into geometry learning to enhance elementary students' numeracy skills.

The data used in this study comprise secondary sources in the form of scholarly publications from accredited national journals and reputable international journals. The dataset includes quantitative, qualitative, and mixed-method research articles relevant to the integration of ethnomathematics into mathematics instruction, particularly in geometry and numeracy at the elementary level. Data were collected from several academic databases, including Google Scholar, the *Directory of Open Access Journals* (DOAJ), and specialized research platforms

such as Consensus, which provide access to thousands of peer reviewed articles across disciplines (Boell & Cecez Kecmanovic, 2015). To ensure reliability, only open access literature published between 2019 and 2024 that explicitly stated its research methodology was included in the selection process.

The data collection procedure followed a systematic protocol consisting of five stages: (1) identification of research questions, (2) literature search using specific keywords, (3) selection of studies based on inclusion and exclusion criteria, (4) data extraction, and (5) analysis and synthesis of findings (Kitchenham & Charters, 2007). The search utilized combinations of keywords such as “ethnomathematics,” “geometry,” “numeracy,” “elementary school,” and “culturally based learning.” Boolean operators (*AND*, *OR*, *NOT*) were used to refine or broaden search results. To minimize potential bias, the search process was independently conducted by two researchers and reconciled through a consensus discussion.

The inclusion criteria applied in the selection process were as follows: (1) peer reviewed journal articles, (2) published between 2019 and 2024, (3) written in English or Indonesian, (4) explicitly discussing ethnomathematics integration or geometry and numeracy learning at the elementary level, and (5) available in full-text open access. The exclusion criteria consisted of: (1) non-empirical papers such as editorials, opinions, or essays; (2) non-journal publications like unreviewed conference proceedings; (3) articles without complete access; and (4) studies focusing on secondary or tertiary education with no contextual relevance to elementary schooling. These criteria were applied to ensure the quality, credibility, and relevance of the selected literature (Moher et al., 2009).

The collected data were analyzed using a qualitative thematic approach to identify key patterns, trends, and thematic categories emerging from the reviewed studies. The analysis involved open coding focused on integration strategies, instructional models, implementation challenges, and impacts on students’ numeracy outcomes. This analytical technique followed the principles of *grounded theory*, which allows for inductive category construction based on the data (Thomas & Harden, 2008). To strengthen the validity of interpretations, triangulation was employed by comparing findings across different study types (quantitative and qualitative) and diverse cultural contexts.

In summary, the *Systematic Literature Review* method adopted in this study was designed with transparency and replicability to ensure the scientific rigor and reliability of the synthesized findings, while also providing a strong conceptual foundation for addressing the research questions comprehensively and objectively.

e-ISSN: 2808-8263
p-ISSN: 2829-0976

RESULTS AND DISCUSSION

A total of eleven peer-reviewed articles met the inclusion criteria, covering publications between 2020 and 2024 in both national (SINTA 2–3) and international open-access journals. The analyzed studies represented diverse methodologies, including quantitative experiments, qualitative case studies, and Research and Development (R&D) models, each examining different dimensions of integrating ethnomathematics into elementary geometry learning to enhance numeracy. Through thematic coding and comparative analysis, four dominant foci emerged: (1) conceptual understanding of geometry through cultural artifacts, (2) enhancement of numeracy literacy, (3) motivational and socio-cognitive engagement, and (4) innovation in culturally based learning media.

Ethnomathematics was consistently identified as a powerful bridge connecting abstract mathematical principles to students' everyday experiences (Prahmana et al., 2021; D'Ambrosio, 2018). Quantitative studies (e.g., Tampubolon et al., 2023; Musliana et al., 2024) demonstrated significant improvements in students' numeracy scores after learning through cultural contexts such as traditional games, local architectural patterns, and textile motifs. Qualitative and mixed-method designs (e.g., Sari & Pramudya, 2022; Rahmawati et al., 2021) emphasized how contextual learning increased students' participation, curiosity, and spatial reasoning. These outcomes confirm the premise of Realistic Mathematics Education (RME) that learning becomes meaningful when mathematical problems are grounded in students' real-world experiences (van den Heuvel Panhuizen, 2005).

Table 1. Summary of Empirical Studies on the Integration of Ethnomathematics in Plane Geometry Learning in Elementary Schools

No	Author & Year	Research Method	Measured Variables	Main Findings
1	Tampubolon et al. (2023)	Quantitative (Experimental)	Conceptual understanding of numeracy	Ethnomathematics-based learning using the traditional *congklak* game significantly improved students' conceptual understanding of numeracy.
2	Musliana et al. (2024)	Mixed Method (Qualitative & Quantitative)	Numeracy through culturally rooted plane geometry	Implementing ethnomathematics through the historical site *Taman Mayura* had a significant

No	Author & Year	Research Method	Measured Variables	Main Findings
				impact on developing students' numeracy competence.
3	Nasution et al. (2023)	R&D	Mathematical and numeracy thinking skills	Learning media based on *ulos* fabric motifs effectively enhanced students' numeracy and geometry understanding.
4	Sari & Pramudya (2022)	Descriptive Qualitative	Visual representation of cultural geometry	Using batik motifs as geometry teaching media strengthened students' understanding of forms and patterns while connecting mathematics with local culture.
5	Yunita et al. (2022)	Critical Literature Study	Integration of ethnomathematics into the curriculum	The elementary curriculum provides substantial potential for integrating ethnomathematical activities, particularly in geometry.
6	Rahmawati et al. (2021)	Qualitative Case Study	Contextual numeracy skills	Incorporating traditional houses in geometry lessons effectively enhanced engagement and contextual numeracy understanding.
7	Ardiansyah et al. (2021)	Classroom Action Research (CAR)	Mathematics learning outcomes	A culturally contextual learning model improved students' mathematics achievement, especially in topics of area and perimeter.
8	Fitriyani et al. (2020)	Descriptive Qualitative	Ethnomathematics implementation in RME	Ethnomathematics-based *Realistic Mathematics Education* (RME) effectively built connections between students' real experiences and basic geometry concepts.
9	Handayani et al. (2020)	R&D (Borg & Gall)	Contextual geometry media	Geometry media inspired by traditional houses enhanced students' understanding of planar shapes.
10	Ramdani et al. (2020)	Qualitative Ethnographic	Cultural values in geometric concepts	Cultural values such as balance and symmetry found in local artifacts can be integrated into elementary geometry lessons.

e-ISSN: 2808-8263
p-ISSN: 2829-0976

No	Author & Year	Research Method	Measured Variables	Main Findings
11	Khoiriyah et al. (2023)	Qualitative Field Study	Numeracy literacy in local contexts	Teaching mathematics through games and cultural contexts strengthened early numeracy literacy among lower-grade students.

The synthesis presented in Table 1 reveals that the implementation of ethnomathematics functions not only as a means of contextualizing geometric concepts but also as a cognitive–cultural framework that reinforces the meaningfulness of mathematics learning. A consistent pattern across the reviewed studies indicates that students who learn through local cultural contexts demonstrate significant improvements in conceptual understanding, computational ability, and their capacity to connect mathematical symbols with real-life situations. Moreover, several studies highlight positive effects on non-cognitive dimensions such as learning motivation, collaboration, and self-confidence. These findings affirm that ethnomathematics holds strong potential as a holistic learning approach, simultaneously addressing the cognitive, affective, and social domains of students (Ronda, 2022; Tularam, 2021).

From a methodological standpoint, the diversity of research designs employed across the studies demonstrates both flexibility and methodological rigor. Research and Development (R&D) models such as ADDIE and 4D ensured product validity and systematic development procedures (Nasution et al., 2023; Handayani & Purwanto, 2020), while experimental designs, as in Tampubolon et al. (2023), provided stronger causal evidence of ethnomathematics' effectiveness in improving numeracy competence. However, several methodological limitations require attention. Most studies were conducted on a small scale, often within a single school or class, and few examined the long-term sustainability of learning impacts. Additionally, almost all studies were conducted within the Indonesian cultural context, which limits the cross-cultural generalizability of the findings (Ramadhani et al., 2024; Wijaya et al., 2023).

In terms of data quality and empirical contribution, the majority of the reviewed articles consistently demonstrate that ethnomathematics-based approaches have a positive and measurable impact on enhancing elementary students' numeracy literacy. The integration of cultural contexts proved effective in developing students' number sense, spatial reasoning, and contextual problem-solving abilities. Furthermore, this approach enriches the affective dimension of mathematics learning by making it more relatable to students' social and cultural

realities. Consequently, ethnomathematics serves not only as a pedagogical innovation but also as a national strategy to bridge the gap between students' mathematical performance and the objectives of educational policy that emphasize numeracy as a core 21st-century competence (Kemdikbudristek, 2022; OECD, 2021).

The findings also provide a roadmap for future research directions. To strengthen the scientific evidence base, future studies should employ more robust designs such as quasi-experimental, design-based research, or longitudinal multi-site studies to capture broader and more sustained learning effects. Moreover, there is a pressing need to develop context-based numeracy assessment instruments grounded in local cultural contexts to ensure that learning outcomes are measured authentically and meaningfully. The sustained implementation of ethnomathematics-based approaches is expected to make a substantial contribution to improving national numeracy literacy while simultaneously reinforcing students' cultural identity and the values embodied in the Pancasila Student Profile within Indonesia's *Merdeka Curriculum*.

Overall, the findings confirm that integrating ethnomathematics into elementary geometry instruction is highly effective in improving conceptual understanding, numeracy competence, and students' learning motivation. Culture-rooted mathematics instruction not only enriches cognitive processes but also provides deep contextual meaning, positioning mathematics as an integral part of students' lives and cultural heritage.

Discussion

The synthesis of the reviewed literature demonstrates a strong and consistent pattern: the integration of ethnomathematics into geometry instruction at the elementary level plays a transformative role in enhancing students' numeracy competence while simultaneously cultivating cultural awareness and engagement. When mathematical learning is anchored in students' cultural environments through motifs, games, architecture, and artifacts it moves beyond abstract symbol manipulation to become a meaningful cognitive process grounded in lived experience. This resonates deeply with the constructivist view that mathematical knowledge is not transmitted but actively constructed through the interplay between experience, reflection, and context (Civil, 2020). In the studies reviewed, particularly those by Sari and Pramudya (2022) and Handayani and Purwanto (2020), cultural materials such as batik patterns and traditional houses were used to visualize geometric properties like symmetry, reflection, and proportion. These representations functioned as *semiotic bridges* that connected abstract mathematical symbols with tangible cultural forms, allowing students

e-ISSN: 2808-8263
p-ISSN: 2829-0976

to internalize concepts through sensory and visual engagement rather than rote memorization. This finding echoes Bishop's (2020) assertion that mathematics is inherently cultural, and that its meanings are co-constructed within social and symbolic systems shaped by the learners' communities.

Ethnomathematics, therefore, becomes not merely an instructional strategy but a pedagogical philosophy that situates mathematics as a human cultural practice. It affirms the idea proposed by D'Ambrosio (2018) that mathematical thought arises from cultural problem-solving needs, and that embedding this origin into classroom learning fosters both relevance and inclusivity. The review highlights how traditional games such as *congklak* (Tampubolon et al., 2023) and contextual tasks based on local heritage sites (Musliana et al., 2024) enhance students' ability to reason quantitatively, compare magnitudes, and interpret numerical patterns within real-life situations. These practices embody the essence of numeracy literacy as defined by the OECD (2019) the capacity to apply mathematical reasoning to interpret and act upon the world. By situating numeracy within familiar cultural practices, students learn not only how to calculate but also why mathematical ideas matter in their communities. The cultural context gives emotional significance to learning, improving both retention and transfer.

Furthermore, the reviewed research reveals a multidimensional impact that extends beyond cognitive outcomes. Ethnomathematics-based instruction also enhances students' affective and social engagement, creating collaborative learning environments where dialogue, shared problem-solving, and collective reasoning are central. Ardiansyah and Ramdhani (2021) observed that culturally grounded group activities increased peer interaction and mutual respect, mirroring Vygotsky's (1978) social constructivist notion that knowledge develops through social mediation. In the same vein, Khoiriyah and Astuti (2023) found that the use of traditional games as numeracy contexts stimulated enthusiasm and persistence among younger students, thereby reducing math anxiety and promoting confidence. Similar findings were reported in Tularam (2021) and Ronda (2022), who noted that students' self-efficacy improves when mathematical content reflects their identity and lived experiences. This intersection of cognition, culture, and emotion underscores the holistic nature of ethnomathematics it humanizes learning by integrating mind, body, and culture into one continuum.

Another key pattern emerging from the review is the growing synergy between Ethnomathematics and Realistic Mathematics Education (RME). The two share foundational principles contextualization, guided reinvention, and mathematization but differ in their

sources of "reality." While RME situates learning in everyday contexts (van den Heuvel-Panhuizen, 2005), ethnomathematics deepens this by rooting reality in cultural authenticity. Fitriyani and Wulandari (2020) as well as Nasution et al. (2023) demonstrated that when cultural materials such as *ulos* weaving patterns or regional architecture are embedded within RME cycles, students are able to construct mathematical models that are both contextually meaningful and analytically rigorous. The hybrid RME-ethnomathematics model encourages students to reinvent mathematical concepts through exploration of their own heritage, effectively bridging cognitive development with cultural identity. This model also addresses the challenge of relevance in mathematics education highlighted by UNESCO (2020), emphasizing that culturally responsive instruction promotes equity, diversity, and sustainability in learning.

Technological innovation further amplifies the potential of ethnomathematics in modern classrooms. Several studies integrated digital tools such as augmented reality (Utami et al., 2023) and multimedia learning platforms to visualize local geometric motifs and patterns dynamically. These approaches not only engage digital-native learners but also serve as tools for cultural preservation. For example, the AR-based application developed by Nasution et al. (2023) allowed students to manipulate geometric shapes derived from traditional houses, enhancing their spatial reasoning while fostering appreciation of local craftsmanship. Such innovations align with global movements in digital ethnomathematics (Achor & Mbagwu, 2023), which aim to merge cultural sustainability with technological literacy. Within the context of Indonesia's *Kurikulum Merdeka*, this integration resonates with the "Profil Pelajar Pancasila" framework that emphasizes creativity, independence, and cultural rootedness as pillars of 21st-century learning (Kemdikbudristek, 2022).

Despite these promising findings, several challenges persist that must be critically examined. One recurring issue is teacher readiness and pedagogical competence in applying ethnomathematical principles effectively. As noted by Fauzi and Suryadi (2024), many teachers possess limited conceptual understanding of how to identify mathematical ideas embedded in cultural practices, resulting in superficial applications where cultural artifacts are used decoratively rather than epistemologically. Moreover, the lack of context-based assessment tools hinders the measurement of authentic numeracy growth (OECD, 2021). To overcome these barriers, professional development programs must equip teachers with ethnopedagogical design skills capacities to analyze local traditions mathematically, design culturally responsive problems, and facilitate reflective learning. This requires institutional collaboration among teacher training colleges, local cultural centers, and curriculum

e-ISSN: 2808-8263
p-ISSN: 2829-0976

developers. Prahmana and Shahrill (2022) emphasize that sustained partnerships with communities are essential to maintain authenticity and avoid the commodification of culture in education.

Methodologically, the dominance of small-scale R&D and descriptive studies in the reviewed corpus limits generalizability and empirical strength. Very few investigations adopt longitudinal or quasi-experimental approaches capable of assessing the durability of numeracy improvement or the transferability of ethnomathematical approaches across diverse regions (Ramadhani et al., 2024; Wijaya et al., 2023). Future research must therefore expand beyond validation studies to large-scale implementations, incorporating mixed-method longitudinal designs that capture both cognitive and sociocultural transformations. Additionally, there is a pressing need for the development of contextualized numeracy assessments that combine standardized metrics with culturally sensitive indicators. Such instruments could bridge the current gap between global frameworks like PISA (OECD, 2019) and local educational priorities under Indonesia's national literacy and numeracy initiatives (Kemdikbudristek, 2022).

From a theoretical perspective, the findings collectively reaffirm that ethnomathematics operationalizes the humanistic dimension of mathematics education. It situates mathematical understanding within the continuum of culture, language, and social practice transforming mathematics from a universal abstraction into a localized epistemology. This approach harmonizes Freudenthal's RME theory, which advocates learning through realistic contexts, with D'Ambrosio's ethnoscientific paradigm, which views mathematics as a cultural artifact. Such synthesis contributes to what can be called contextual constructivism, a perspective that values both cognitive development and cultural continuity. In policy terms, this synthesis supports Indonesia's educational transformation agenda that aims to balance global competence with local identity. Policymakers should thus encourage the institutionalization of ethnomathematics within curricular standards, textbook design, and national assessments. Aligning this approach with UNESCO's (2020) call for culturally inclusive education could strengthen both national and international dimensions of numeracy education.

In conclusion, the integration of ethnomathematics in elementary geometry learning represents a multidimensional strategy for improving numeracy skills, fostering cultural identity, and supporting inclusive education. It transcends conventional pedagogy by merging the cognitive, affective, and sociocultural dimensions of learning into a coherent whole. As Indonesia strives to enhance students' numeracy performance within global benchmarks such as PISA and the national *Asesmen Kompetensi Minimum*, the adoption of ethnomathematics

provides a contextually grounded and theoretically sound pathway forward. Mathematics learning becomes not only a tool for quantitative reasoning but also a medium for cultural expression, empathy, and national character building. Through the synthesis of empirical evidence, theoretical integration, and policy relevance, ethnomathematics emerges as a vital framework for reimagining the future of mathematics education in culturally diverse contexts.

CONCLUSION

This systematic literature review concludes that the integration of ethnomathematics into geometry instruction at the elementary school level provides a powerful and contextually grounded approach to strengthening students' numeracy competence. Across the eleven studies analyzed, consistent evidence demonstrates that embedding cultural contexts such as traditional games, local architectural forms, and regional textile motifs creates meaningful learning experiences that enhance students' conceptual understanding, spatial reasoning, and problem-solving abilities. Ethnomathematics thus operates not merely as a pedagogical technique but as a transformative framework that unites the cognitive, affective, and social dimensions of learning.

Theoretically, this study reaffirms that ethnomathematics is firmly situated within the constructivist paradigm and aligns closely with the principles of Realistic Mathematics Education (RME). By connecting mathematical concepts to learners' lived experiences, this integration promotes deeper comprehension and long-term retention. It also humanizes mathematics by situating it within the continuum of culture, language, and identity, thereby affirming that mathematics is both a universal science and a cultural practice.

From a pedagogical standpoint, ethnomathematics supports inclusive and culturally responsive teaching practices. It motivates students to learn mathematics through meaningful contexts, fosters collaborative learning, and strengthens teacher-student interaction. The reviewed evidence highlights the need for teacher training that develops ethnopedagogical competencies enabling educators to recognize mathematical ideas within local traditions and to design instructional materials that are both culturally authentic and pedagogically sound.

Methodologically, the reviewed studies demonstrate encouraging progress but also reveal areas for improvement. Future research should adopt more rigorous experimental and longitudinal designs to validate the long-term impacts of ethnomathematical learning. The development of culturally contextualized assessment instruments is equally essential to

e-ISSN: 2808-8263
p-ISSN: 2829-0976

measure authentic numeracy growth and to align learning outcomes with national education goals.

In broader educational policy terms, ethnomathematics directly supports Indonesia's *Merdeka Curriculum* and the *Pancasila Student Profile*, emphasizing creativity, cultural appreciation, and global competence. Integrating ethnomathematics systematically into the curriculum can serve as a national strategy for revitalizing numeracy education while preserving cultural diversity. Ultimately, mathematics learning rooted in culture transforms the classroom into a space where quantitative reasoning, cultural identity, and character formation converge helping students not only to understand mathematics but also to live it as part of their social and cultural heritage.

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