Universitas Pendidikan Indonesia

ICEE 2026 | International Conference on Educational Excellence

What Design Challenges Emerge When Integrating Local Wisdom into Sustainable Elementary Mathematics Education?

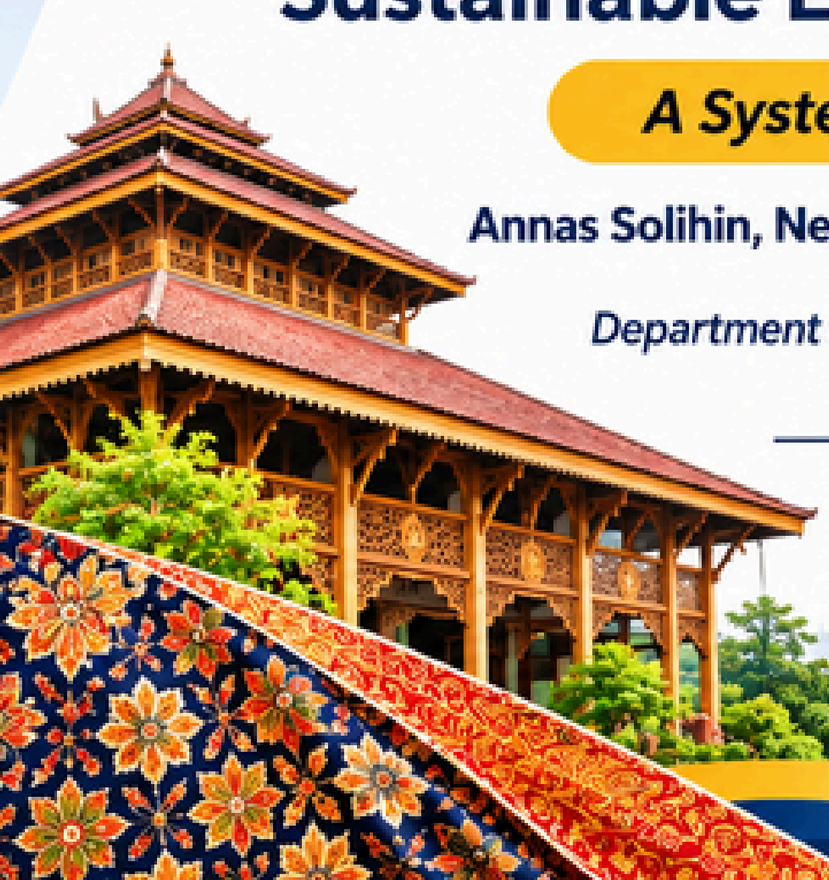
A Systematic Literature Review (PRISMA 2020)

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Why This Review Matters

- Local wisdom gives children familiar contexts for learning mathematics
- Cultural forms in the literature: games, textiles, buildings, foods, crafts
- Digital media such as augmented reality (AR) brings culture into classrooms
- Earlier research catalogued cultural practices and measured learning gains



The design decisions that link a cultural practice to a grade-level mathematical task have not been synthesized for elementary education.

Research Aim and Question

Research question: Which design challenges are reported in research on integrating local wisdom into elementary mathematics education?

1. Map the characteristics of the research

2. Identify and categorize the reported design challenges

Cultural knowledge stays relevant to children when learning experiences give it a meaningful role in mathematical activity.

Method

1 Design



Systematic literature review, PRISMA 2020

2 Search



3 October 2026, web search interfaces returning SAGE, Springer, Taylor and Francis, Frontiers, OJS journals, ERIC, ResearchGate, Zenodo

3 Records



11 queries, 68 unique records

4 Criteria



9 inclusion, 7 exclusion, DOI required

5 Appraisal



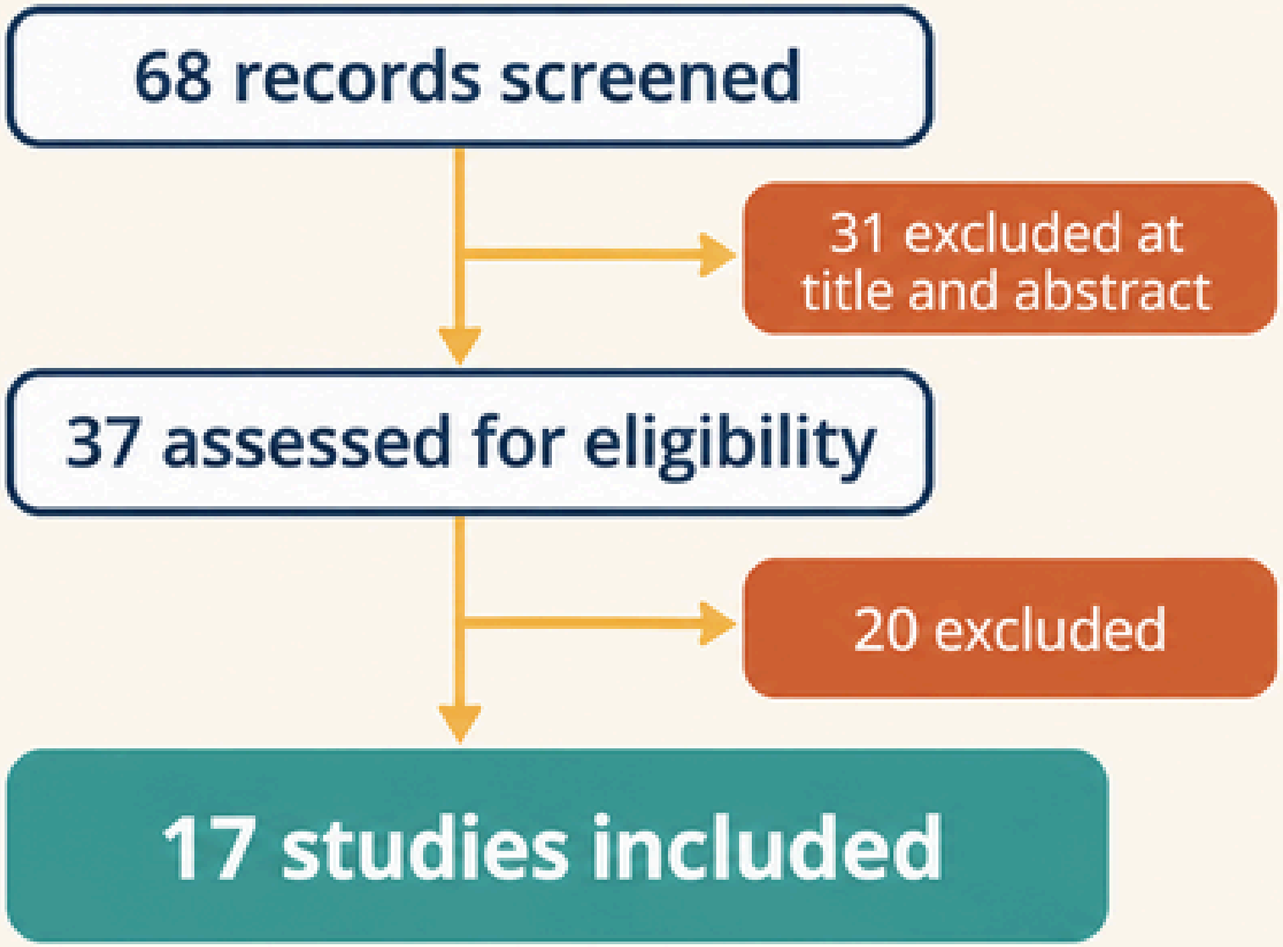
7 criteria, maximum score 7, 11 empirical studies

6 Analysis



Descriptive analysis and thematic synthesis, segments labeled E (explicit) or I (inferred)

Study Selection and the Included Corpus



11
empirical studies

6
reviews

Published 2023 to 2026

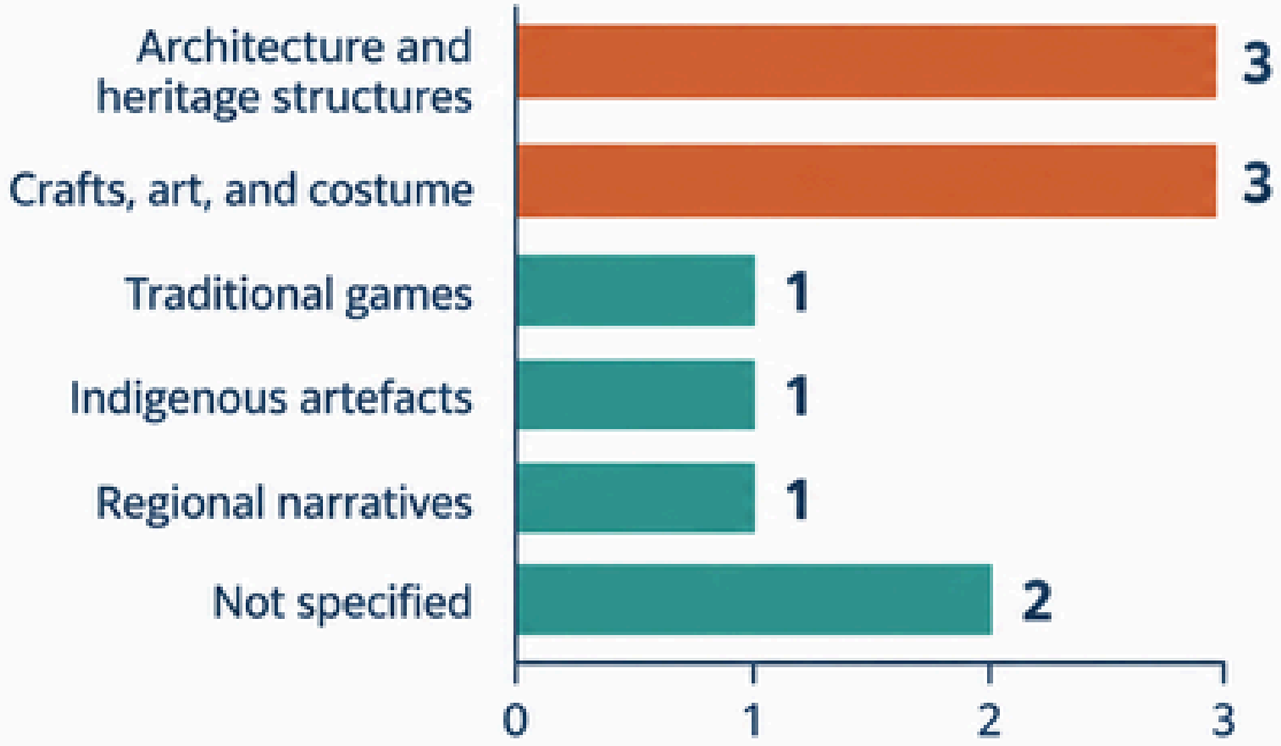
10 of 11 empirical studies in Indonesia

4 studies in East Java

Mean quality score 6.18 out of 7 (7 high, 3 moderate, 1 low)

Forms of Local Wisdom and Mathematical Concepts

Cultural forms in the 11 empirical studies



Mathematical focus

Geometry-related concepts: 8 of 11 studies

Numeracy: 1 study

Ratio: 1 study

Fractions, data handling, and probability: no study reported them as the main concept

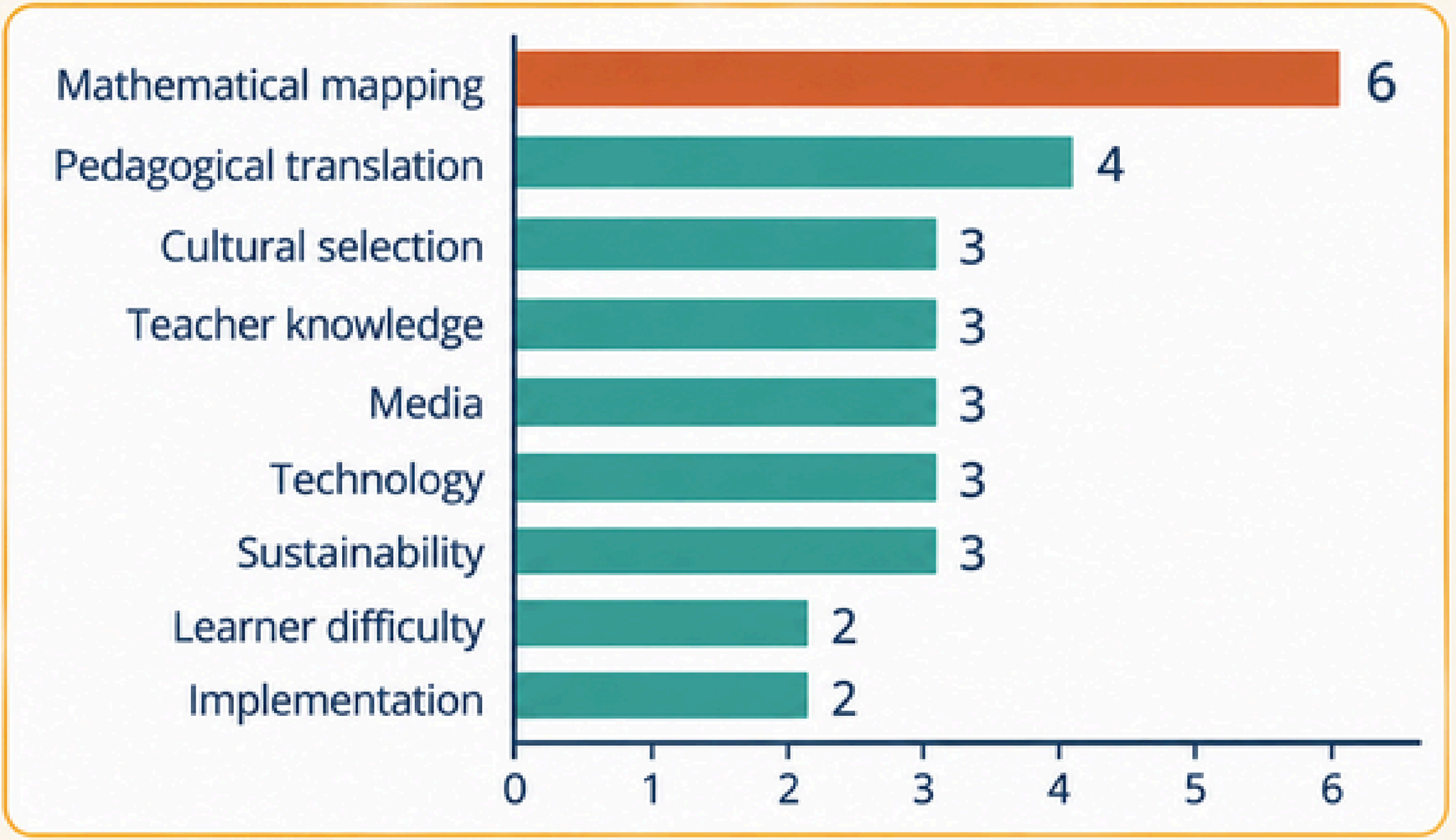
Nine Categories of Design Challenges

29 coded segments

14 codes

9 categories

- 15 explicit segments
- 14 inferred segments



Key Findings by Design Stage

Mathematical mapping

A cultural reference needs a stated mathematical question and a grade-level target

Teachers and pedagogy

Limited cultural, mathematical, and didactic knowledge appears across studies. A hypothetical learning trajectory helped teachers plan and deliver lessons on Damar Kurung

Media and technology

4 studies used AR, a mobile app, or a digital comic. 1 of the 4 reported learning outcomes. Device and channel conditions belong in the design brief

Implementation

Curriculum alignment, class time, and rural resource limits need attention at the start of design

Sustainability and Review-Level Triangulation

Sustainability

3 studies reported benefits for cultural awareness or preservation

0 of the 11 empirical studies reported follow-up evidence on cultural continuity

Review-level evidence

8 of 9 primary-study categories matched

+1 assessment added as a tenth issue

Reviews report shortages of culture-based materials, limited teacher guidance, unclear curriculum positioning, and gaps in assessment

Design implication: Add indicators of cultural continuity and rubrics that combine mathematical and cultural dimensions

Conclusion, Limitations, and Next Steps



Conclusion

Sustainable integration of local wisdom in elementary mathematics requires design decisions that connect cultural meaning, grade-level mathematical tasks, teacher knowledge, and evidence of learning over time

Limitations

- Web-based search without direct Scopus or Web of Science queries
- Abstract-level extraction for most studies
- Single-reviewer coding
- Small corpus

Next steps

- Repeat the search in indexed databases with two coders and full-text reading
- Test the categories on topics beyond geometry
- Run longitudinal studies on cultural knowledge retention
- Develop assessment frameworks that combine mathematical and cultural dimensions

Thank you [annassolihin51200@gmail.com]