Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
ISSN: 2086-6135 E-ISSN: 2541-612x
Volume 15 No. 3. September 2026 https://ejournal.unibabwi.ac.id/index.php/sosioedukasi/index

PRACTICALITY OF A RIAU MALAY SONGKET ETHNOMATHEMATICS WORKSHEET FOR FOURTH-GRADE GEOMETRY

Siti Quratul Ain[1]*, Fitriyeni[2], Riva Agusvina[3] Ria Anjelina[4]

[1,2,3,4]Department of Elementary School Teacher Education, Faculty of Teacher Training and Education, Universitas Islam Riau, Pekanbaru, Riau, Indonesia

quratulain@edu.uir.ac.id

*Corresponding author:
quratulain@edu.uir.ac.id

ARTICLE HISTORY
Received : 28-07-2026
Revised : 05-08-2026
Accepted : 25-08-2026

KEYWORDS
ethnomathematics;
geometry;
practicality;
student worksheet;
Riau Malay songket

ABSTRACT
This study examined the user-perceived practicality of a student worksheet integrating Riau Malay *songket* motifs into fourth-grade geometry learning. A descriptive quantitative approach was embedded in a limited formative trial involving 14 fourth-grade students and one classroom teacher. Data were collected using a 15-item student response questionnaire, a 20-item teacher response questionnaire, open-ended teacher feedback, classroom observation, and documentation. Both questionnaires used a four-point scale. Student responses reached 829 of 840 points (98.69%), while the teacher response reached 78 of 80 points (97.50%); both were categorized as very practical. Aspect-level student results ranged from 97.62% to 100.00%, indicating strong perceived usability, readability, visual appeal, learning support, motivation, and cultural relevance. The teacher identified four targeted revisions: adding space for drawing plane figures, relocating a measurement label to the triangle height, simplifying a fan illustration, and providing complete length and width information. The findings indicate that the worksheet was highly accepted in the limited trial and can proceed to a broader field test after minor revision. Because the study relied on a small group, one teacher, and post-use responses, the results demonstrate practicality and user acceptance rather than effectiveness in improving achievement.

INTRODUCTION

Geometry in elementary school is often introduced through definitions, properties, and formulas, yet students learn more meaningfully when mathematical ideas are connected to objects and practices that they recognize. Ethnomathematics provides a framework for examining how mathematical ideas are embedded in cultural practices and for transforming those ideas into classroom resources (D'Ambrosio, 1985; Barton, 1996). In this perspective, culture is not merely a decorative context; it can provide representations, problems, and activities through which students interpret mathematical relationships.

Riau Malay culture contains numerous mathematical practices related to measurement, patterns, architecture, weaving, and ornamentation. A systematic review found that Riau Malay ethnomathematics studies were still concentrated on particular cultural objects and were dominated by geometry-related concepts (Deswita & Muslim, 2021). Ethnographic work in the Bengkalis Malay community also documented measurement practices that can be connected to elementary mathematics resources (Anriana et al., 2023). More recently, geometric forms and measurement ideas have been identified in Malay architecture on Penyengat Island (Fadhillah et al., 2025).

Riau Malay songket is especially relevant to geometry because its motifs contain recognizable lines, angles, triangles, circular forms, transformations, and repeated patterns. Zuhdi and Reflina (2024) showed that Riau Malay songket motifs embody several mathematical concepts, indicating that weaving traditions can provide culturally meaningful visual representations for classroom geometry. However, identifying mathematical concepts in cultural artifacts does not automatically produce a classroom-ready learning resource. These findings need to be translated into instructions, illustrations, and student activities that are understandable and usable.

Previous development studies indicate that ethnomathematics-based modules and worksheets can achieve positive validity and practicality results. A Kuansing Malay ethnomathematics module for plane geometry was reported as valid and practical (Putri et al., 2023). Fourth-grade ethnomathematics worksheets have also received positive expert and student assessments (Anawati et al., 2024), while other studies have combined ethnomathematics worksheets with guided discovery or problem-based learning to support mathematical thinking (Solihin et al., 2024; Atikasari et al., 2024). Recent elementary-school studies further demonstrate the development of ethnomathematics-based geometry modules and interactive materials (Ariyani et al., 2024; Bidiyah et al., 2024), Malay ethnomathematics worksheets for arithmetic learning (Ramadhani et al., 2025), and a higher-order thinking skills (HOTS)-oriented cultural module for spatial geometry (Istiningsih et al., 2026). A recent review similarly concluded that elementary ethnomathematics worksheets commonly connect cultural contexts with geometry and arithmetic (Via et al., 2025).

Despite this growing body of work, the practical use of a worksheet cannot be inferred solely from its conceptual design. Formative evaluation should establish whether intended users can understand the language, follow the tasks, interpret the visual information, and complete the activities within an authentic classroom setting (Nieveen & Folmer, 2013). User responses are also useful for detecting specific design weaknesses that may not be evident during product preparation.

This study therefore focused on a limited formative trial of a fourth-grade geometry worksheet integrating Riau Malay songket motifs. Its contribution lies in combining quantitative user-response evidence with item-specific teacher feedback that directly informs product revision. The study addressed three questions: (1) How did students respond to the worksheet? (2) How did the classroom teacher respond to the worksheet? and (3) What revisions were required before a broader field test?

METHOD

The study used a descriptive quantitative design within the limited-trial stage of formative product evaluation. The product was a student worksheet for fourth-grade geometry that incorporated Riau Malay songket motifs into explanations, illustrations, and geometry tasks. The trial involved 14 fourth-grade students and one classroom teacher from one elementary school in Riau Province. The participants represented the intended users of the product at the limited-trial stage; consequently, the study was designed to identify usability and revision needs rather than to test causal effects.

The classroom activity required students to read the worksheet, observe geometric representations, use rulers and colored paper, draw or construct plane figures, and complete the provided exercises. The teacher monitored students and provided assistance when needed. Observation and photographic documentation were used as supporting evidence of implementation; they were not scored as an achievement measure.

Table 1. Data sources and instruments

Data source	Number	Instrument	Data focus
Fourth-grade students	14	15-item response questionnaire	Usability, readability, attractiveness, learning support, motivation, and cultural relevance
Classroom teacher	1	20-item response questionnaire and open feedback	Use, content, language, evaluation, visual design, student activity, culture, and reuse
Classroom implementation	One class	Observation and documentation	How students used the worksheet and completed the activities

The student questionnaire consisted of 15 statements, and the teacher questionnaire consisted of 20 statements. Responses used four options: strongly agree (4), agree (3), disagree (2), and strongly disagree (1). For interpretation, student items were organized into six descriptive aspects after data collection: usability, content and learning support, language and readability, visual design, motivation and engagement, and cultural relevance. This analytical grouping improves the presentation of the findings but does not replace separate psychometric construct validation.

Quantitative data were analyzed by dividing the observed score by the maximum possible score and multiplying the result by 100. Categories were derived from equal intervals on the four-point scale: 81.26–100.00% = very practical, 62.51–81.25% = practical, 43.76–62.50% = less practical, and 25.00–43.75% = impractical. Open-ended feedback was condensed into design problems, instructional implications, and proposed revisions. Because the available documentation did not include separate evidence of questionnaire validity or reliability, the results are interpreted as descriptive user responses and this limitation is stated explicitly.

SJP Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
ISSN: 2086-6135 E-ISSN: 2541-612x
Volume 15 No. 3. September 2026 https://ejournal.unibabwi.ac.id/index.php/sosioedukasi/index

RESULTS AND DISCUSSION

Limited-trial implementation

The worksheet was used during classroom geometry activities in which students read instructions, measured and drew geometric forms, manipulated colored paper, and completed written tasks. The documentation shows students working independently and alongside classmates, while the teacher circulated to monitor progress. Figure 1 presents two views selected because they clearly show the worksheet, measuring tools, construction materials, and teacher-supported implementation.

Figure 1. Students completing geometry construction and worksheet activities during the limited trial

Student responses

The 14 students produced a total score of 829 from a maximum of 840, equivalent to 98.69% and categorized as very practical. Of the 210 item responses, 199 were strongly agree and 11 were agree; no student selected disagree or strongly disagree. Table 2 summarizes the response results by descriptive aspect.

Table 2. Student response results by aspect

Aspect	Items	Observed score	Maximum	Percentage
Usability	1–2	112	112	100.00%
Content and learning support	5, 6, 12	164	168	97.62%
Language and readability	7–8	110	112	98.21%
Visual design	9–11	165	168	98.21%
Motivation and engagement	3, 4, 13	168	168	100.00%
Cultural relevance	14–15	110	112	98.21%
Overall	1–15	829	840	98.69%

The lowest item-level percentage was 92.86% for the statement that the worksheet was appropriate for geometry learning: ten students selected strongly agree and four selected agree. Statements concerning the absence of confusing terms, the consistency of pictures with instructions, and interest in learning geometry through Riau Malay songket each

SJP Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
ISSN: 2086-6135 E-ISSN: 2541-612x
Volume 15 No. 3. September 2026 https://ejournal.unibabwi.ac.id/index.php/sosioedukasi/index

obtained 96.43%. The statement that pictures helped students understand the content obtained 98.21%, whereas the remaining items reached 100.00%. These differences are small, but they identify the visual-language interface as the main area for refinement.

Table 3. Item-level responses requiring closer attention

Item focus	Strongly agree	Agree	Percentage
Suitability for geometry learning	10	4	92.86%
No confusing words or terms	12	2	96.43%
Pictures match instructions	12	2	96.43%
Interest in geometry and Riau Malay songket	12	2	96.43%
Pictures support understanding	13	1	98.21%

Teacher response and product revisions

The teacher questionnaire produced 78 of 80 points (97.50%), also categorized as very practical. The teacher selected strongly agree for 18 statements and agree for two statements. The two agree responses concerned the clarity of pictures in supporting understanding and the potential use of the worksheet outside geometry. This pattern indicates that the product was highly accepted for its intended geometry content, while broader cross-topic use requires additional adaptation.

The open-ended response described the worksheet as unique, contextually connected to daily life in Riau, and capable of linking mathematics, art, and Riau Malay culture. More importantly, the teacher identified four concrete design issues. These comments were converted into revision actions, as shown in Table 4.

Table 4. Teacher feedback and proposed worksheet revisions

Worksheet section	Teacher feedback	Revision action
Learning activity 2	Add a plane-figure column so students can copy or draw a form and focus on counting sides and angles.	Add a drawing/workspace column and an explicit instruction to reproduce the plane figure.
Learning activity 3, item 1	Place the 12-cm label on the triangle height to prevent confusion between the base and height.	Move the label to the height segment and add a clear visual marker.
Learning activity 3, item 4	Display one fan only so students are not uncertain about which boundary should be used for perimeter.	Simplify the illustration to one object and visually define the boundary to be calculated.
Learning activity 3, item 6	Add complete length or width information so students can identify the dimensions of the rectangle.	Add length and width labels and revise the wording of the question.

Discussion

The student and teacher percentages above 97% indicate very high perceived practicality in the limited trial. This finding is consistent with development studies reporting positive practicality for culture-based geometry modules, worksheets, and interactive materials (Putri et al., 2023; Anawati et al., 2024; Ariyani et al., 2024; Bidiyah et al., 2024). It also aligns with more recent evidence that Malay ethnomathematics worksheets and culture-based geometry modules can be implemented with strong user acceptance when the activities are clearly structured and connected to students' cultural experience (Ramadhani et al., 2025; Istiningsih et al., 2026). In this study, the cultural context was not presented separately from the mathematics: the songket motifs functioned as visual entry points for observing shapes, sides, angles, measurement, perimeter, and area.

The worksheet's distinctive contribution is the transformation of a specifically Riau Malay cultural artifact into student activities and the use of classroom feedback to revise the product. Studies by Zuhdi and Reflina (2024) and Fadhillah et al. (2025) demonstrate that Riau Malay artifacts contain geometry and measurement concepts. The present trial extends that exploratory work by examining whether an instructional resource based on such cultural content can be followed by its intended users. The high scores suggest that students and the teacher generally understood and accepted the design. This interpretation is also compatible with recent comparative evidence showing that elementary students exposed to ethnomathematics-based instruction demonstrated stronger geometry-concept understanding than a conventional group, although that ex post facto evidence should be interpreted as associative rather than causal (Yulailah et al., 2026).

Nevertheless, very high post-use ratings must be interpreted cautiously. A small intact group, one teacher, and the absence of negative responses may reflect genuine acceptance, but they may also indicate a ceiling effect or socially desirable responding. The item-level variation and open-ended teacher feedback are therefore more informative than the overall percentage alone. In particular, uncertainty about labels, boundaries, and dimensions shows that a visually attractive image can still hinder mathematical interpretation when the visual cues are incomplete.

The proposed revisions are pedagogically important. Moving the 12-cm label to the triangle height supports correct identification of base-height relationships. Reducing the fan illustration to one object clarifies the perimeter boundary. Adding length and width labels helps students distinguish known and unknown dimensions, while a dedicated drawing column makes the activity demand more explicit. These revisions illustrate how practical evaluation can improve both usability and mathematical precision, which is a central purpose of formative evaluation (Nieveen & Folmer, 2013).

The next evaluation stage should involve a broader sample, more than one teacher, documented instrument review, and reliability analysis. A revised field test could also include structured observation and pretest-posttest measures if the research objective is expanded from practicality to effectiveness. Until such evidence is available, the findings should not be used to claim that the worksheet improves achievement; they support only its limited-trial practicality and user acceptance.

CONCLUSION

The Riau Malay songket ethnomathematics worksheet obtained a student response score of 829/840 (98.69%) and a teacher response score of 78/80 (97.50%). Both results fall within the very practical category. Students perceived the worksheet as easy to use, readable, visually attractive, motivating, supportive of geometry learning, and relevant to local culture. The teacher similarly evaluated the worksheet positively and identified four focused revisions concerning drawing space, measurement-label placement, illustration simplification, and dimensional information. After these minor revisions, the worksheet is suitable for a broader field test. The conclusion is limited to practicality and user acceptance because the trial involved only 14 students, one teacher, and response-based data without separate achievement testing or psychometric evidence for the questionnaires.

Acknowledgment

The authors thank the participating elementary school, the classroom teacher, and the fourth-grade students who supported the limited trial and provided feedback for product improvement.

REFERENCES

Anawati, S., Seruni, & Lestari, M. I. (2024). The development of ethnomathematics-based student worksheets (LKPD) in mathematics for fourth grade students. EduMatSains: Jurnal Pendidikan, Matematika dan Sains, 8(2), 293–301. https://doi.org/10.33541/edumatsains.v8i2.5336

Anriana, R., Witri, G., Putra, Z. H., Fendrik, M., Dahnilsyah, & Aljarrah, A. (2023). Ethnomathematics study in measurement of Bengkalis Malay community as mathematics resources for elementary school. Ethnography and Education, 18(3), 299–322. https://doi.org/10.1080/17457823.2023.2232500

Ariyani, K., Widiana, I. W., & Suarjana, I. M. (2024). Interactive teaching materials based on Balinese ethnomathematics to improve the HOTS abilities of third-grade elementary school students. Jurnal Pendidikan dan Pengajaran, 57(1), 213–224. https://doi.org/10.23887/jpp.v57i1.74603

Atikasari, N., Efendi, A., & Yamtinah, S. (2024). Ethnomathematics digital student worksheet using the problem-based learning model to improve creative mathematical thinking for elementary school students. Jurnal Pendidikan dan Pengajaran, 57(2), 404–416. https://doi.org/10.23887/jpp.v57i2.77866

Barton, B. (1996). Making sense of ethnomathematics: Ethnomathematics is making sense. Educational Studies in Mathematics, 31(1–2), 201–233. https://doi.org/10.1007/BF00143932

Bidiyah, A., Trisniawati, T., Muanifah, M. T., & Ardhian, T. (2024). Development of ethnomathematics-based educational modules for elementary geometry. Advances in Mobile Learning Educational Research, 4(2), 1160–1172. https://doi.org/10.25082/AMLER.2024.02.010

D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. For the Learning of Mathematics, 5(1), 44–48.

Deswita, H., & Muslim, S. (2021). Malay ethnomathematic of Riau and Riau Islands: Systematic literature review. Jurnal Pendidikan MIPA, 22(2), 216–225. https://doi.org/10.23960/jpmipa/v22i2.pp216-225

Fadhillah, R. R., Putra, Z. H., Zufriady, Jismulatif, & Aljarrah, A. (2025). Exploring ethnomathematics in Malay architecture and traditional hall in Penyengat Island and connecting it to geometry in elementary schools. Jurnal Elemen, 11(1), 50–69. https://doi.org/10.29408/jel.v11i1.27194

Istiningsih, S., Dewi, N. K., Erfan, M., Wulandari, R., & Herlina. (2026). Development of a HOTS-based ethnomathematics module of the Sasambo Tribe on spatial geometry for elementary school students. Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran, dan Pembelajaran, 12(1), 200–212. https://doi.org/10.33394/jk.v12i1.17112

SJP Sosioedukasi
JURNAL ILMIAH ILMU PENDIDIKAN DAN SOSIAL
ISSN: 2086-6135 E-ISSN: 2541-612x
Volume 15 No. 3. September 2026 https://ejournal.unibabwi.ac.id/index.php/sosioedukasi/index

Nieveen, N. M., & Folmer, E. (2013). Formative evaluation in educational design research. In T. Plomp & N. Nieveen (Eds.), Educational design research: Part A: An introduction (pp. 152–169). SLO.

Putri, S. A. M., Putra, Z. H., & Alpusari, M. (2023). Pengembangan modul materi bangun datar berbasis etnomatematika Melayu Kuansing di sekolah dasar. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 12(3), 3309–3329. https://doi.org/10.24127/ajpm.v12i3.6139

Ramadhani, T. M., Putra, Z. H., Fendrik, M., & Ahmad, S. (2025). Integrated development of Malay ethnomathematics: Designing student worksheets on addition and subtraction of integers. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 14(3), 687–701. https://doi.org/10.24127/ajpm.v14i3.9779

Solihin, A., Habibie, R. K., & Rahmawati, I. (2024). Computational thinking with the guided-discovery-learning model using ethnomathematics-based LKPD.EDM in elementary school. DIDAKTIKA: Jurnal Pendidikan Sekolah Dasar, 7(1), 80–93. https://doi.org/10.21831/didaktika.v7i1.75845

Via, F. P. A., Khafid, M., Ellianawati, & Avrilianda, D. (2025). A literature review on the use of ethnomathematics-based student worksheets in elementary school mathematics learning. Jurnal Penelitian Pendidikan, 42(2), 412–417. https://doi.org/10.15294/jpp.v42i2.34853

Yulailah, I., Sari, R. M. M., Zulkarnaen, R., & Aini, I. N. (2026). Comparative study of elementary school students' understanding of geometry concepts through ethnomathematics and conventional approaches. PRISMA, 15(1), 254–263. https://doi.org/10.35194/jp.v15i1.6202

Zuhdi, N. H., & Reflina. (2024). Exploration of ethnomathematics in Riau Malay songket. International Journal of Trends in Mathematics Education Research, 7(1), 25–35. https://doi.org/10.33122/ijtmer.v7i1.316