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Development of Ethnomathematics-Based Student Worksheets to Improve Conceptual Understanding

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ABSTRACT

Conceptual understanding is essential in geometry, yet many students struggle with rotation concepts due to a lack of contextual learning materials. This study aims to develop ethnomathematics-based student worksheets (LKPD) by integrating the Serampang Dua Belas dance movements as a rotation representation. The worksheets were tested on 37 ninth-grade students at an Islamic junior high school in Serdang Bedagai Regency using the ADDIE development model. Validation results from subject matter and media experts scored 89% (highly valid), while teacher and student responses indicated 89% (efficient). Effectiveness was demonstrated with an N-Gain of 0.77 (high category), and 82% of students scored ≥75. These findings confirm that the developed LKPD is valid, practical, and effective, offering an innovative learning tool that bridges mathematics with local culture and has the potential to be adapted to other cultural and mathematical contexts.

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1. INTRODUCTION

The Mathematics education at the junior high school level still faces challenges in attracting students' interest while deepening their understanding of concepts [1]. This is due to the lack of innovation in learning, which tends to be monotonous, one-way, and lacking context [2]. One relevant approach to bridge the gap between mathematics education and the reality of students' lives is ethnomathematics, which integrates cultural elements into mathematics education [3], [4]. Ethnomathematics is one approach that can link culture and education to make it easier to understand [5], [6]. This approach has been proven to increase student engagement and conceptual understanding through concrete contexts close to the local culture [7], [8]. Ethnomathematics can be integrated into teaching materials [9].

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One mathematical concept still difficult for students to understand is geometric transformation, particularly rotation [10]. According to a report by Puspendik, only around 37% of junior high school students in Indonesia answered questions related to rotation correctly in the AKM, indicating their weak understanding of the concept and spatial visualization. This situation aligns with findings from [11] that most students struggle with rotation material because it requires high abstraction and visual representation skills. Therefore, a contextual approach tailored to students' abilities and characteristics is needed to make the material easier to understand [12].

Several previous studies have integrated ethnomathematics into teaching materials, for example, batik motifs for flat shapes [13], traditional Maluku cakes for spatial shapes [14], and Asta Tinggi architecture in geometry [15]. However, these studies have not contextualized regional dance movements as a medium for visualizing the concept of rotation. In fact, the exploration results [16] show that the Serampang Dua Belas dance's movement patterns contain the rotation principle that can potentially be integrated into learning. Thus, the novelty of this research lies in developing student worksheets (LKPD) based on ethnomathematics through the movements of the Serampang Dua Belas dance to understand rotation contextually and engagingly, while preserving local culture.

Based on previous research by Ainiyah and Loviana [17], students can more easily understand rotation material through student worksheets (LKPD). Student worksheets are one of the teaching materials that can increase student interaction in the learning process [18]. Based on observations at one MTsS in Serdang Bedagai district, it was found that teachers did not utilize student activity sheets because the school did not provide them. The learning process only relied on textbooks and exercises from teachers, which made learning one-sided and monotonous, thus reducing students' interest in learning and making it boring. Teachers only used the lecture method during learning, making students less actively involved in teaching and learning. Lectures still dominated learning without giving students space to discuss or express their ideas [19]. In line with the study's results [20], learning is dominated by lectures and practice questions, without encouraging student activity and collaboration. Ethnomathematics-based student worksheets help students understand mathematical material in a cultural context close to their lives and attract their interest in learning [21], [22]. Ethnomathematics-based student worksheets effectively facilitate understanding of rotation material by linking learning to a cultural context close to students' lives.

Based on this background, this study focuses on whether the ethnomathematics-based worksheets for the Serampang Dua Belas dance developed for the rotation material are valid, practical, and effective for improving the conceptual understanding of junior high school students.

2. METHOD

This study used the Research and Development (R&D) method [23] with the ADDIE development model approach [24], namely Analysis, Design, Development, Implementation, and Evaluation, as shown in Figure 1.

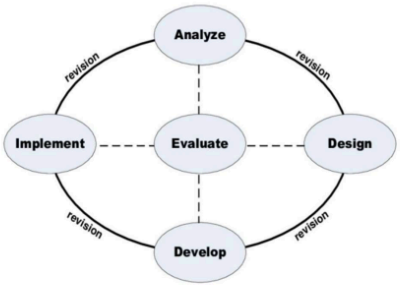


Figure 1. ADDIE development model [24]

Table 1. Validity, practicality, and effectiveness tests

Aspect	Type	Implementation	Subject	Data Analysis
Valid	Validation by subject matter experts and media experts	Filling out the validation sheet for the feasibility of student worksheets (subject matter experts and media experts)	Two subject matter experts Two media experts Subject matter experts and media experts are mathematics education lecturers from one of the state universities in Medan.	Likert scale and descriptive
Practical	Small and large group trials	Teacher response questionnaires and student response questionnaires	37 students from the MTsS 9 students in the small group trial and 28 students in the large group trial One mathematics teacher from one of the MTsS in Serdang Bedagai District	Likert scale and descriptive
Effective	Implementation	Student worksheets were used in the large group trial, which had previously conducted a pre-test and administered a post-test after the lesson.	28 students who participated in the large group trial	Classical Mastery and N-Gain Test

The ADDIE development model was chosen because it has systematic stages ranging from needs analysis to evaluation, and is flexible for use in the context of learning tool development. Compared to other models, such as Borg & Gall, which is more

complex, or the 4D model, which is more concise, ADDIE is considered more balanced in supporting the development of ethnomathematics-based LKPD. The analysis stage includes problem identification and needs analysis. The design stage involves developing a preliminary student worksheet (LKPD) draft. The development stage produces a valid LKPD through assessment by subject matter experts and media experts. The implementation stage tests the practicality and effectiveness of the product in learning. The final stage, evaluation, assesses the quality of the LKPD throughout all stages of the research. The aspects of validity, practicality, and effectiveness are presented in Table 1.

This trial was conducted at one MTsS in Serdang Bedagai District. Table 1 shows that it was done on teacher responses and small and large group trials to see the practicality. During the development stage, the validity of the LKPD was obtained through assessment by two subject matter experts and two media experts who are mathematics education lecturers at a state university in Medan. Content validity was obtained through a Likert scale-based validation sheet.

The implementation stage was carried out through small-group and large-group trials. The small group trial involved nine students to assess the readability of the product, while the large group trial was conducted on 28 students to assess the effectiveness of learning through pre-tests and post-tests. Overall, this study involved 37 ninth-grade students at MTsS in Serdang Bedagai Regency, consisting of 20 males and 17 females aged 13–14. Participants were randomly selected from classes with heterogeneous mathematical abilities, thus representing the actual conditions in the school. In addition, one mathematics teacher was also involved in the practicality test by filling out a teacher response questionnaire.

Data analysis of validity and practicality using the Likert scale and descriptive analysis to determine assessment categories. The effectiveness of the LKPD was analyzed through a classical completeness test with a minimum passing grade (KKM) of ≥ 75 at the school and an N-Gain test to compare pre-test and post-test scores. The N-Gain category criteria were determined based on Hake (1999), namely high ($g > 0.7$), medium ($0.3 \leq g \leq 0.7$), and low ($g < 0.3$). Thus, the increase in students' conceptual understanding can be seen from the N-Gain category obtained after using the LKPD.

3. RESULTS AND DISCUSSION

3.1. Results

This section covers the initial analysis, validity, practicality, and effectiveness of the student worksheets, followed by a discussion of the research results.

3.1.1. Preliminary Analysis

Interviews with mathematics teachers at MTsS Serdang Bedagai Regency showed that learning still relies on textbooks without any student worksheets or cultural integration, and teachers are not familiar with the concept of ethnomathematics. Limited learning media make geometric transformation material difficult to teach, while students consider the learning monotonous, abstract, and lacking in context. This has prompted the development of ethnomathematics-based student worksheets using the Serampang Dua

Belas dance to improve understanding of rotation and the relevance of learning to local culture.

3.1.2. Validity of Student Worksheets

The LKPD validation was conducted by two subject matter experts and two media experts. The average assessment score was 89%, which is considered highly valid. The averaged assessment results are presented in Table 2.

Table 2. Validation Results

No.	Validator	Average Percentage
1.	Material	89%
2.	Media	88%
Average Percentage		89%

The aspects assessed include the suitability and accuracy of concepts, clarity of material, relevance to everyday life, accuracy of language, and suitability of media design (illustrations, layout, and text-image proportions). These results indicate that the LKPD is suitable as teaching material at the next stage.

Figure 2. LKPD content

Figure 2 shows one of the learning activities in the student worksheet that integrates the ethnomathematics of the Serampang Dua Belas dance and, after watching the Serampang Dua Belas dance video, makes it easier to understand the material on rotation.

3.1.3. Practicality of Student Worksheets

Practicality tests were conducted through questionnaires for teachers and students. The average assessment result was 89%, with a category of very practical. Teachers assessed the LKPD as practical, interesting, and helpful for the learning process, while students assessed the LKPD as easy to understand, visually appealing, and containing ethnomathematical elements that motivated them. This indicates that the LKPD is suitable for use in rotational learning. The averaged assessment results are presented in Table 3.

Table 3. Questionnaire Response Results

No.	Validator	Average Percentage
1.	Teacher	90%
2.	Students	88%
Average Percentage		89%
Category		Very Practical

One example of an activity in this student worksheet that encourages students to discover the concept of rotation from the Serampang Dua Belas dance video that has been shown can be seen in Figure 3.

Figure 3. Activity in the Student Worksheet

Figure 3 shows that "Let's Identify" directs students to find mathematical concepts contained in the movement patterns of the Serampang Dua Belas dance. First, students are directed to watch a video of the Serampang Dua Belas dance so that they can answer the "Let's Identify" activity. After watching the video, students will find the rotation concept in the Serampang Dua Belas dance.

3.1.4. Effectiveness of Student Worksheets

The effectiveness of the student worksheets was measured through pre-test and post-test results in a large group trial (28 students). The results of the classical mastery assessment, which have been averaged, are presented in Table 4.

Table 4. Classical Mastery Results

No.	Description	Number of Students
1.	∑ Students who passed	23 Students
2.	∑ students	28 Students
Classical Completion Rate of Students		82%

The classical mastery results show that82% of students scored ≥ 75, exceeding the school's minimum passing grade. To reinforce the assessment, an N-Gain test was conducted to measure the improvement in students' conceptual understanding, as presented in Table 5.

Table 5. N-Gain Score

No.	Description	Score
1.	Lowest N-Gain Score	0,26
2.	Highest N-Gain Value	1
3.	Average N-Gain Score	0,77
4.	Percentage of N-Gain Score	78%
5.	Effectiveness Category	Effective

In addition, the N-Gain analysis showed an average score of 0.00000.77, which falls into the high category [25], indicating a substantial increase in conceptual understanding. The distribution of N-Gain scores showed that most students were in the moderate to high category. The study results showed that the LKPD met the validity, practicality, and effectiveness criteria. These findings align with the research objectives: to produce theoretically appropriate learning products that can tangibly improve students' conceptual understanding.

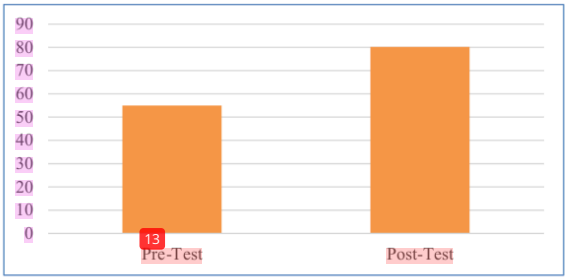


Figure 4. Average pre-test and post-test scores of students

This graph shows an increase in the average score from 55 (initial test) to 82 (final test), indicating an increase in conceptual understanding after using the ethnomathematics-based Serampang Dua Belas Dance Student Worksheet.

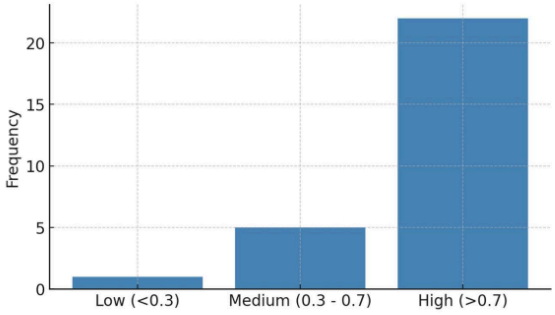


Figure 5. Student N-Gain Categories

The graph shows that most students are in the medium-high category, which is indicated by the average N-Gain value of 0.77 (high category), which shows the effectiveness of LKPD in improving understanding of the concept of rotation.

3.2. Discussion

This study shows that ethnomathematics-based student worksheets can improve students' conceptual understanding. In line with the research [21], ethnomathematics-based student worksheets make it easier for students to learn mathematics through cultural contexts that are familiar to them. The worksheet is ethnomathematics-based. Students can understand the concept of rotation implemented in the Tari Serampang Dua Belas student worksheet. In implementing this ethnomathematics-based student worksheet, students are assisted by watching a video of the Serampang Dua Belas dance, shown during class learning. Observing the Serampang Dua Belas dance encourages students to understand the rotation concept, as shown in Figure 6.

Figure 6. Observing the movement patterns of the Serampang Dua Belas dance

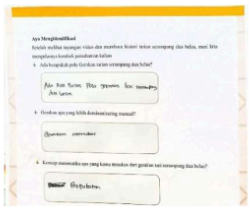
Figure 6 shows the researcher and students using the Serampang Dua Belas ethnomathematics-based student worksheet and observing movement patterns through video questioning. This student worksheet implements activities that are close to everyday life. In activity 1, students are invited to observe objects around them that contain rotation, as shown in Figure 5.

Figure 7. Activities in the LKPD

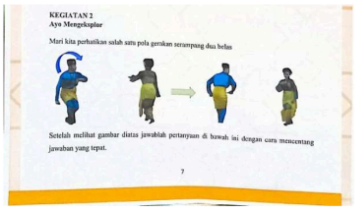
Based on Figure 7, in activity 1, students are invited to observe objects they often encounter in their daily lives related to the concept of rotation as an initial trigger. With this, students will begin to be interested in discovering the mathematical concepts in these objects. During the use of this product, students are also guided in finding their own understanding and are allowed to ask questions during its use, as shown in Figure 8.

Figure 8. Use of LKPD in researcher guidance

The use of these student worksheets also remains under the supervision, guidance, and direction of teachers or researchers during the research period. These student worksheets can increase students' interest in learning because they are not monotonous, in line with research [26]. In activity 2, "Let's Explore," students began to relate the Serampang Dua Belas dance to understanding rotation. After watching the Serampang Dua Belas dance video, students were asked to answer questions. The students' answers can be seen in Figure 9.



(a)



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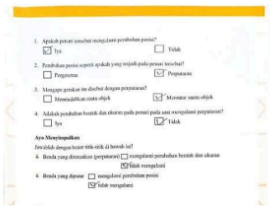
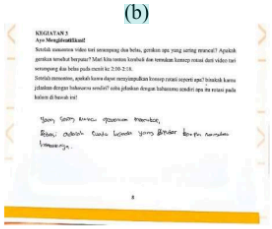


(c)



(d)

Figure 9. (a), (b), (c), (d) Students' answers

As seen in Figure 9, the students' answers show their ability to apply and relate the concept of rotation to their daily lives, such as in the Serampang Dua Belas dance pattern. [27] states that understanding the application of mathematical concepts in everyday life is important so that students can see the connection between the material they are learning. Emphasizing conceptual understanding can also help students apply mathematics in solving real-world problems.

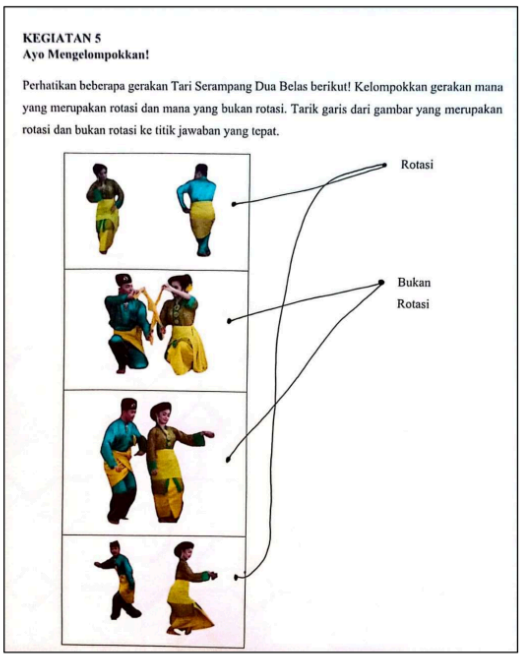


Figure 10. Students' answers in activity 5

As seen in Figure 10, a question directs students to classify examples and non-examples of rotation from the Serampang Dua Belas dance movements. From the students' answers, it can be seen that they can correctly identify examples and non-examples of rotation. This shows that the students have a good understanding of mathematical concepts. The research results determined that the student worksheets were effective [28]. The effectiveness of using the worksheets based on learning completeness reached 85% (score ≥75), with a 57% increase in learning outcomes. LKPD is suitable for use in the classroom, in line with other ethnomathematics research showing 92–94% validity, reinforced by [29]'s findings of 87.3% for engklek-based LKPD. The study results indicate that the ethnomathematics-based LKPD for the Serampang Dua Belas dance can improve students' understanding of rotation. The circular movements of the dance provide a concrete

visualization of rotation, while the activity of watching videos provides a visual and kinesthetic learning experience that makes abstract concepts easier to understand. However, this study has limitations: a small sample size, involving only one school in one region, and a short trial period. The implication is that teachers can use locally-based worksheets to make learning more interesting and relevant, while curriculum developers can use them as an innovation in preparing teaching materials and teacher training. In the future, research can be expanded to other cultural contexts or different geometry materials to test its scalability and consistency of effectiveness.

4. CONCLUSION

The ethnomathematics-based worksheet for students on the Serampang Dua Belas dance has proven valid, practical, and effective in improving understanding of rotation. This research contributes to mathematics education by showing that integrating local culture can bridge abstract concepts to make them more concrete and contextual. This student worksheet can be implemented in the curriculum and serve as a reference in teacher training to develop ethnomathematics-based teaching materials. Its potential can also be expanded to other schools and regions by adapting it to local cultures and applying it to different geometry materials.

REFERENCES

[1] M. A. R. Sari, Farida, R. W. Y. Putra, and S. Maulidin, "Pengembangan Bahan Ajar Gamifikasi Bernuansa Islami dan Lingkungan Pada Materi Bangun Datar Tingkat SMP/MTs Untuk Meningkatkan Pemahaman Konsep Matematis," *TEACHER: Jurnal Inovasi Karya Ilmiah Guru*, vol. 4, no. 3, pp. 103–115, 2024.

[2] Hafis, Buhaerah, and Kasmirah, "Implementasi Media Pembelajaran Berbasis Augmented Reality Untuk Meningkatkan Pemahaman Konsep Geometri Siswa," *DIKMAT: Jurnal Pendidikan Matematika*, vol. 5, no. 2, pp. 1–8, 2024.

[3] S. Safriyanti and Y. Yahfizham, "Ethnomathematics Exploration of Museum Gedung Arca (State Museum of North Sumatra)," *Mathline : Jurnal Matematika dan Pendidikan Matematika*, vol. 8, no. 1, pp. 29–47, 2023, doi: 10.31943/mathline.v8i1.358.

[4] C. A. Rodríguez-Nieto, M. L. Pabón-Navarro, B. M. Cantillo-Rudas, Sudirman, and V. F. Moll, "The potential of ethnomathematical and mathematical connections in the pre-service mathematics teachers' meaningful learning when problems-solving about brick-making," *Infinity Journal*, vol. 14, no. 2, pp. 419–444, 2025, doi: 10.22460/infinity.v14i2.p419-444.

[5] H. A. Hasibuan and R. U. Hasanah, "2D Geometry Concepts at Al-Mashun Great Mosque: An Ethnomathematics Exploration," *Edumatika : Jurnal Riset Pendidikan Matematika*, vol. 5, no. 1, pp. 45–55, 2022, doi: 10.32939/ejrpm.v5i1.1248.

[6] M. Y. Mahendra and R. U. Hasanah, "Etnomatematika terhadap Proses Pembuatan Kue Lapis Pelangi," *Euclid*, vol. 10, no. 2, p. 406, 2023, doi: 10.33603/e.v10i2.8576.

[7] T. Marsya, A. Fauzan, and E. Musdi, "Development of Geometry Learning Tools Integrated Transformation of Ethnomathematics of Jambi Batik," *Jurnal Penelitian Pendidikan IPA*, vol. 9, no. 12, pp. 10506–10511, 2023, doi: 10.29303/jppipa.v9i12.6096.

[8] I. Risdiyanti and D. Sulisworo, "Developing Student Book Based on Ethnomathematics to Improve Studentâ€TMs Critical Thinking Skill," *(Jiml) Journal of Innovative Mathematics Learning*, vol. 4, no. 1, pp. 1–11, 2021, doi: 10.22460/jiml.v4i1.p1-11.

[9] H. Luthfi and F. Rakhmawati, "Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Etnomatematika pada Materi Bangun Ruang Sisi Lengkung Kelas IX," *Jurnal Cendekia : Jurnal Pendidikan Matematika*, vol. 7, no. 1, pp. 98–109, 2022, doi: 10.31004/cendekia.v7i1.1877.

[10] C. Ma'rifah and A. Qohar, "Keaktifan Siswa pada Penerapan Penggunaan Media Pembelajaran Papan Rotasi (Partasi) Materi Transformasi Geometri," *Briliant: Jurnal Riset dan Konseptual*, vol. 5, no. 4, p. 698, 2020, doi: 10.28926/briliant.v5i4.525.

[11] N. Djaman, N. Hidayah, M. Toti, R. Rustam, and N. C. P. Dewi, "Analisis Pemahaman Konsep Matematis Siswa pada Materi Lingkaran Melalui Penerapan Model Pembelajaran PjBL Berbasis STEAM dengan Media Kincir Air," *Venn: Journal of Sustainable Innovation on Education, Mathematics and Natural Sciences*, vol. 4, no. 2, pp. 89–101, 2025.

[12] S. A. Sagala and R. U. Hasanah, "Ethnomathematics Exploration At The State Museum Of North Sumatra," *Mathline : Jurnal Matematika dan Pendidikan Matematika*, vol. 8, no. 1, pp. 123–136, 2023, doi: 10.31943/mathline.v8i1.364.

[13] L. Choeriyah, A. Qohar, and S. Subanji, "Student Creative Thinking Analysis in Ethnomathematics Based Inquiry Learning on Transformation Materials," *EDUTEC : Journal of Education And Technology*, vol. 4, no. 4, pp. 585–597, 2021, doi: 10.29062/edu.v4i4.218.

[14] P. B. Purba, "Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Etnomatematika Kue Tradisional Maluku Pada Materi Bangun Ruang," *Pedagogy: Jurnal Pendidikan Matematika*, vol. 10, no. 2, p. 228, 2025, doi: 10.33087/phi.v9i1.442.

[15] K. Aini, A. Wahab, and M. M. Ar, "Numeracy Literacy Skills and Pancasila Student Profiles through the Implementation of Ethnomathematics-Based STEAM," vol. 17, pp. 535–545, 2025, doi: 10.35445/alishlah.v17i1.6048.

[16] S. Salamah, B. Ginting, and A. Rahman, "Ethnomathematics in Serampang XII Dance by Deli Malay Ethnic Group : An Exploration," vol. 6927, no. 2, pp. 115–123, 2024.

[17] N. Ainiyah and S. Loviana, "Pengembangan Lembar Kerja Peserta Didik (Lkpd) Berbasis Etnomatematika Pada Materi Transformasi," *Al-'Adad: Jurnal Tadris Matematika*, vol. 3, no. 2, pp. 243–256, 2024, doi: 10.24260/add.v3i2.3530.

[18] F. F. Said, A. Susanto, and N. P. Utami, "Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbantuan Canva yang Efektif," *Jurnal Ilmiah Soulmath : Jurnal Edukasi Pendidikan Matematika*, vol. 11, no. 1, pp. 85–98, 2023, doi: 10.25139/smj.v11i1.6020.

[19] A. P. Lubis and S. Maysarah, "Pengaruh Model Pembelajaran Kooperatif Tipe Think Pair Share terhadap Kemampuan Komunikasi dan Pemecahan Masalah Matematis The Influence of the Think-Pair-Share Cooperative Learning Model on the Mathematical Communication and Problem-Solving Abilities," vol. 13, pp. 92–101, 2025.

[20] T. Wulandari and Yahfizham, "Pengembangan Lembar Kerja Peserta Didik Berbasis Permainan Kelereng pada Materi Sistem Persamaan Linear Dua Variabel Development of Student Worksheets Based on Marble Games in Two-variable Linear Equation Systems," vol. 13, pp. 69–80, 2025.

[21] T. Prayoga, G. N. S. Agustika, and N. W. Suniasih, "E-LKPD Interaktif Materi Pengenalan Bangun Datar Berbasis Etnomatematika Peserta Didik Kelas I SD," *Mimbar Ilmu*, vol. 27, no. 1, pp. 99–108, 2022, doi: 10.23887/mi.v27i1.44777.

[22] U. T. Pangestuti, D. Sulistyaningsih, and E. A. Purnomo, "Pengembangan E-LKPD Berbasis CORE Pendekatan Etnomatematika pada Materi Relasi dan Fungsi Siswa Kelas VIII," *Jurnal Ilmiah Profesi Pendidikan*, vol. 10, no. 2, pp. 1002–1013, 2025.

[23] Sugiyono, *Metode Penelitian & Pengembangan (Research and Development)*. Bandung: Alfabeta, 2020.

[24] W. Dick and L. Carey, *The Systematic Design of Instruction 9th Edition*. Glecview, Illionis: Glecview, Illionis: Scot, Foresman and Company., 1996.

[25] R. R. Hake and J. Reece, "Analyzing Change/Gain Scores," 1999. [Online]. Available: https://api.semanticscholar.org/CorpusID:141123847

[26] A. Landong *et al.*, "Pengembangan Media Pembelajaran Berbasis Budaya Jawa Dengan Pendekatan Realistic Mathematics Education Untuk Menumbuhkan Minat Belajar Siswa Kelas 3 SD," *AR RUMMAN - Journal of Education and Learning Evaluation*, vol. 45, no. 1, pp. 1–17, 2023.

[27] Y. W. Purnomo, R. Nabillah, T. A. Aziz, and S. A. Widodo, "Fostering Mathematical Connections and Habits of Mind: a Problem-Based Learning Module for Elementary Education," *Infinity Journal*, vol. 13, no. 2, pp. 333–348, 2024, doi: 10.22460/infinity.v13i2.p333-348.

[28] A. H. Nasution, Yahfizham, and T. J. Siregar, "Pengembangan LKPD Berbasis Pembelajaran Visual Thinking Pada Materi Bangun Ruang Sisi Lengkung," *Relevan: Jurnal Pendidikan Matematika*, vol. 4, no. 4, 2024.

[29] N. Shabira and E. Andhany, "Pengembangan LKPD Berbasis Etnomatematika Untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis Siswa," *Euclid*, vol. 10, no. 1, pp. 147–165, 2023.

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