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Designing Ethnomathematics-Enriched Teaching Materials for Fostering Mathematical Creative Thinking for Applications in Online Learning Environments

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Abstract

Integrating ethnomathematics into mathematics education holds tremendous promise, fostering a range of positive outcomes. It has shown potential in enhancing students' mathematical creative thinking, problem-solving abilities, active engagement in learning, and fostering a deeper appreciation for cultural diversity. Despite these promising prospects, an evident gap looms large in the literature—specifically, the lack of comprehensive research on developing, validating, and evaluating teaching materials that effectively integrate ethnomathematics content. The study aimed to create teaching materials within the context of ethnomathematics to evaluate students' mathematical creative thinking. This endeavor followed the ADDIE research and development model, encompassing analysis, development, design, implementation, and evaluation. Small-group testing was undertaken involving 10 participants, while field testing involved 35 respondents. The validation process involved both media, and material experts to ensure the suitability of the teaching materials for development. The findings indicated that the teaching materials received validation from experts, confirming their quality and appropriateness. Additionally, student feedback showed that the materials were not only valid but also engaging and intellectually stimulating, meeting the criteria for an effective educational resource. In summary, the development of teaching materials stands out as a valuable asset in evaluating students' mathematical creative thinking abilities. This research contributes to the field of mathematics education, especially in mathematics teaching and learning.

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INTRODUCTION

In the dynamic landscape of mathematics education, the creation of teaching materials enriched with ethnomathematics content emerges as a pivotal strategy to not only enhance mathematical understanding but also to cultivate creative thinking skills (Machaba & Dhlamini, 2021; Palhares & Shirley, 2015). By integrating diverse cultural mathematical practices into educational resources, these materials provide a platform for students to approach mathematical concepts with a creative mindset (Ju et al., 2016). The infusion of cultural contexts stimulates

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curiosity and prompts students to explore alternative problem-solving methods, fostering a climate where creativity thrives. Ethnomathematics-based teaching materials serve as catalysts for igniting creative thinking by challenging students to analyze and adapt mathematical practices from various cultures. This exposure not only broadens their mathematical perspectives but also encourages them to think critically, make connections between seemingly unrelated concepts, and approach problem-solving with flexibility, accessible to students in virtual learning environments (Yiğit & Seferoğlu, 2023). Through the instructional materials provided in the learning environment, students have the opportunity to receive feedback that enhances their performance.

Moreover, the incorporation of ethnomathematics into teaching materials prompts students to view mathematics as a dynamic and evolving discipline deeply connected to cultural contexts (Nuryadi et al., 2023). This shift in perspective encourages them to question, experiment, and engage with mathematical concepts in a way that extends beyond rote memorization, promoting a more profound and enduring understanding (Aleupah et al., 2023; Minarni et al., 2016). In other words, this is important for integrating ethnomathematics into school math, teachers require comprehensive expertise, including specialized knowledge, historical insights into mathematics, educational proficiency to ensure integration quality, and an understanding of the local culture and popular heritage within their environment (Khalil, 2023). In essence, the inclusion of ethnomathematics content in teaching materials enriches the educational experience by not only fostering an appreciation for cultural diversity but also by nurturing the creative thinking skills essential for navigating the complexities of the modern world (Lidinillah et al., 2022; Supriyadi et al., 2022). Moreover, it allows students to recognize the relevance of mathematics in different cultural contexts, fostering a deeper appreciation for diverse perspectives and promoting inclusivity in mathematical education (Roos, 2019). It transforms mathematics education into a dynamic and culturally resonant journey that equips students with the creative acumen necessary for success in diverse and rapidly evolving global environments (Acharya et al., 2021).

Mathematics education continually seeks innovative approaches to enhance students' mathematical proficiency while fostering creative thinking abilities. These skills are important in the 21st century as they underpin innovation, and are effective in enhancing students' performance (Dilekçi & Karatay, 2023). In this pursuit, ethnomathematics, which explores the connections between mathematics and diverse cultural contexts, has emerged as a promising avenue for enriching mathematical pedagogy. At the crossroads of mathematics, culture, and creativity, ethnomathematics offers an intriguing pathway to develop teaching materials that ignite students' mathematical creative thinking (MCT) (Dwidayanti & Suyitno, 2019; Fouze & Amit, 2017). Ethnomathematics is an approach that examines how mathematical ideas and practices are processed and used in daily activities in various cultural groups (D'Ambrosio & Rosa, 2017). Integrating ethnomathematics content into the classroom not only enhances students' understanding of mathematical concepts but also fosters an appreciation for cultural diversity (Brandt & Chernoff, 2015; Mania & Alam, 2021).

Previous studies have shown that students exposed to ethnomathematics-based teaching materials displayed increased motivation, engagement, and creative problem-solving skills (Mania & Alam, 2021). Similarly, ethnomathematics can also be a valuable tool for educators to improve students' mathematical proficiency (Brandt & Chernoff, 2015). Furthermore, ethnomathematics content in the classroom not only enhances students' understanding of mathematical concepts but also fosters an appreciation for cultural diversity (Aikenhead, 2017). Additionally, research-informed that the research uncovers positive student responses to ethnomathematics-based puppet teaching materials in the context of character education, highlighting the feasibility of utilizing cultural elements to reinforce character development. Despite variations in learning achievements, students' perceptions of the educational tool remained consistent, emphasizing the potential universality and effectiveness of ethnomathematics-infused character education materials. Furthermore, research Imswatama & Lukman (2018) shows that teaching resources rooted in ethnomathematics demonstrate effectiveness in enhancing students' problem-solving abilities and fostering critical thinking in mathematics.

However, while previous research has underscored the potential of ethnomathematics, there remains a gap in the literature regarding the development, and assessment of teaching materials with ethnomathematics content, particularly in the context of Lampung, Indonesia to assess the

MCT of students. This research aims to address this gap by designing, validating, and evaluating teaching materials that incorporate ethnomathematics content to assess MCT, with a specific focus on the topics of similarity and congruence.

By building upon the insights and findings of previous studies, this research contributes to the existing body of knowledge by providing a comprehensive exploration of ethnomathematics and its role in promoting creative thinking in the mathematics classroom, especially possibly through online learning. This study aspires to offer valuable insights for educators, curriculum developers, and researchers interested in enhancing mathematics education within diverse cultural contexts.

METHOD

Following the research and development model, which consists of five phases: Analysis, Design, Development, Implementation, and Evaluation (Alodwan & Almosa, 2018; Hadi et al., 2017; Vejvodova, 2015). The ADDIE stages are illustrated in the following Figure 1.

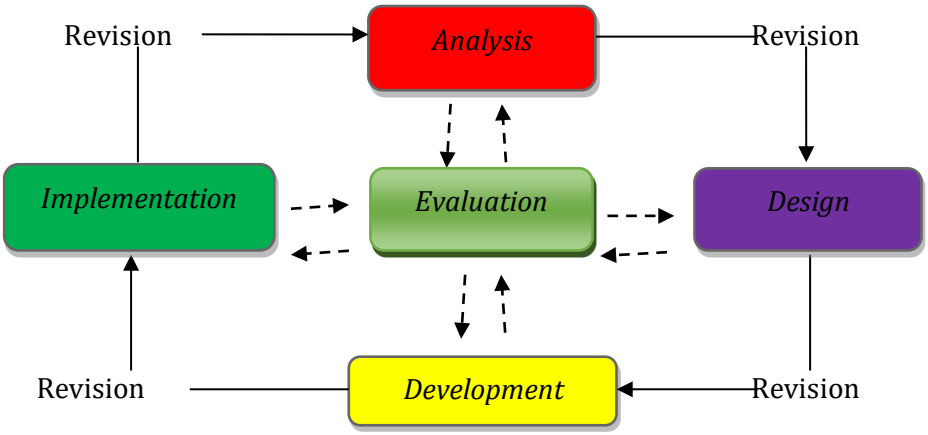

Figure 1. Model ADDIE Stage Flow chart

The explanation of ADDIE steps is as follows (see Figure 2).

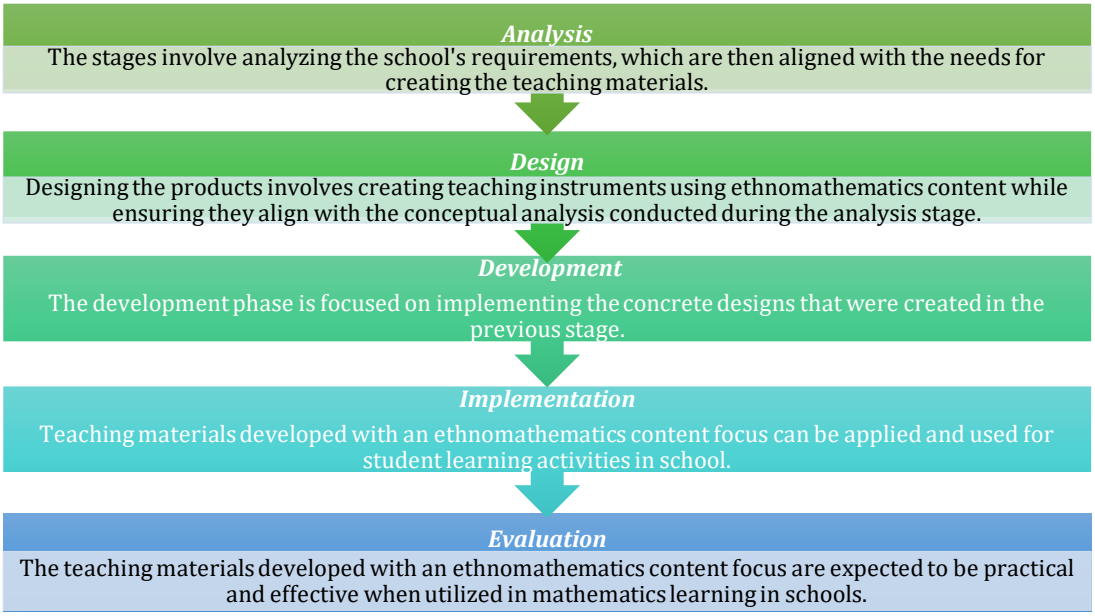

Figure 2. The stages of ADDIE

Each phase plays a crucial role in the research process. The Analysis phase involves identifying research needs, constraints, and objectives, while also specifying learning goals and

determining the target audience. Moving into the Design phase, researchers create a detailed plan outlining how they intend to meet the identified objectives, structure the study, devise instructional strategies, and design assessment tools. Following this, the Development phase involves assembling and creating necessary materials and content according to the outlined plan. This includes resource development, content creation, and prototype development. The Implementation phase puts the research plan into action, executing activities, collecting data, and conducting the research as designed. Finally, the Evaluation phase assesses the effectiveness and efficiency of the research to ensure the objectives were met and identify areas for improvement based on the evaluation results. This structured approach ensures a systematic and comprehensive research process, guiding researchers through each stage precisely and allowing for adjustments and enhancements as needed.

The validation of the data analysis technique involved the input of 3 material experts, media experts, and social studies experts, who rated the technique using a Likert scale consisting of values: 4 (excellent), 3 (good), 2 (fair), and 1 (poor).

Table 1. Scoring validation (Cabigao, 2021)

Quality Score	Criteria	Remarks
$3{,}26 < \bar{x} \leq 4{,}00$	Valid	No Revision
$2{,}51 < \bar{x} \leq 3{,}26$	Moderate	Partial Revision
$1{,}76 < \bar{x} \leq 2{,}51$	Less Valid	Partial Revision & Review Material
$1{,}00 \leq \bar{x} \leq 1{,}76$	Invalid	Total Revision

Moreover, as part of the evaluation process to gauge the allure and effectiveness of the teaching material, an extensive small-group trial was undertaken with 6 participants. Additionally, a broader field testing phase was conducted with 37 carefully selected participants. The selection criteria for both the small-group and field trials were meticulously established, adhering to the parameters outlined in Table 2 (Andari et al., 2020; Komarudin et al., 2020). This table presents comprehensive criteria for attractiveness, categorizing the scores into distinct levels, from 'Very Interesting' to 'Uninteresting.' These scores were employed as a standardized measure to assess and classify the perceived appeal and engagement elicited by the educational material among the participants.

Table 2. Criteria for attractiveness

Score	Criteria
$3,25 < \underline{x} \leq 4.00$	Very Interesting
$2.50 < \underline{x} \leq 3.25$	Interesting
$1.75 < \underline{x} \leq 2.50$	Less Interesting
$1.00 \leq \underline{x} \leq 1.75$	Uninteresting

RESULTS AND DISCUSSION

Based on the results of the development of the similarity, and congruence material in grade 9, the following data was obtained:

Analysis

At this stage, the primary focus was on needs analysis (Netriwati et al., 2022). It was found that students had limited interest in mathematics learning, which negatively impacted their academic performance, particularly in the topic of similarity, and congruence. One reason for the limited interest could be the presentation or teaching method used for these topics. If the teaching style isn't engaging or doesn't meet different learning styles, students may struggle to connect with the subject matter. Moreover, individual student interests and learning preferences play a significant role. Some students might naturally gravitate toward subjects other than mathematics due to personal preferences, interests, or future career aspirations. The perceived difficulty or lack of relevance of these specific mathematical concepts in daily life could also contribute to students'

disinterest. If they don't see the practical applications or connections to real-life situations, they might struggle to engage with the material.

Furthermore, a literature review from the source has also been collected for this research. The curriculum analysis indicated that the learning device development was aligned with the 2013 curriculum. The Core Competency (KI) and Basic Competency (KD) related to the topic of similarity and congruence were by Regulation of the Minister of Education and Culture number 68 of 2013 on the Basic Framework and Curriculum Structure of Junior High School. Moreover, the analysis considered the characteristics of students aged 14-16, who were in the formal operational stage according to cognitive theory.

The survey conducted among respondents shed light on the relationship between mathematics learning, and its integration with daily life and Lampung culture. Out of the 20 participants, 18 respondents, constituting 90% of the group, strongly agreed or agreed that understanding mathematical concepts was facilitated when the material correlated with everyday life. Moreover, all participants were familiar with Lampung cultural forms. When asked about integrating Lampung culture into mathematics learning, 14 out of the 20 respondents, comprising 70% of the group, either agreed or strongly agreed that such integration would enhance the engagement level of mathematics education. These insights underline the potential impact of real-life connections and cultural integration on the efficacy and engagement of mathematics education.

Design

During the design stage, the researchers formulated learning materials in the form of Learning Implementation Plans and Student Worksheets with ethnomathematics-oriented content inspired by Lampung culture (i.e., Tapis Lampung), focusing on the topic of similarity and congruence., with a specific focus on integrating the essence of Tapis Lampung, a cultural artifact, as a foundational resource within the teaching materials. Tapis Lampung holds immense cultural significance within the Lampung community, serving as more than just a fabric or textile. It symbolizes a rich heritage, encapsulating the traditions, beliefs, and historical narratives of the Lampung people (Suherman & Vidakovich, 2022). Beyond its aesthetic value, Tapis Lampung embodies the essence of communal identity and familial ties. Integrating Tapis Lampung into the mathematics curriculum serves multiple purposes. First, it fosters a sense of pride and cultural appreciation among students, creating a deeper connection between their heritage and education. Second, it presents an opportunity to infuse ethnomathematics into the learning process, using Tapis Lampung's intricate geometric patterns as a real-life application of mathematical concepts, especially in the realm of similarity and congruence. By incorporating Tapis Lampung as a foundational resource in teaching materials, educators can enrich the learning experience, making mathematics more relatable, engaging, and culturally inclusive for students. This approach not only enhances understanding but also celebrates the unique cultural heritage of the Lampung community, promoting cultural preservation and appreciation within the educational context.

Development

In the development phase, the researchers created learning materials enriched with ethnomathematics content, notably the Tapis Lampung, into mathematical concepts like similarity, and congruence. This involved infusing traditional cultural motives, patterns, or geometrical designs found in the Tapis Lampung into the educational content to facilitate a deeper understanding of mathematical principles. This stage involved the evaluation by material and media experts.

Material Experts

The validation data for the Learning Implementation Plan can be observed in the following Figure 3. In Figure 3, the validation process conducted by material experts is visually represented. Notably, the highest score was assigned to the "learning steps" component, indicating a strong level of validation for this aspect of the teaching materials. However, it's important to recognize that the "material" component received the lowest score in the evaluation process.

This disparity in scores highlights a valuable opportunity for improvement and enhancement, particularly in the "material" segment. Addressing the concerns or shortcomings identified by the

material experts in this phase can lead to more refined and valuable teaching materials that are better suited for assessing students' MCT.

By taking into account the feedback provided by the experts, and making necessary revisions to the "material" component, the teaching materials can be optimized to effectively evaluate students' MCT. This iterative process of refinement is a fundamental aspect of developing high-quality educational resources.

The continuous improvement of these teaching materials, guided by expert feedback, underscores the commitment to creating valuable tools for the assessment of mathematical creative thinking, which is a pivotal goal in mathematics education. It ensures that the materials are not only validated but also optimized to serve their intended purpose. This iterative approach is fundamental to achieving excellence in educational resource development. The data validation of Student Worksheets can be seen in the following Figure 3.

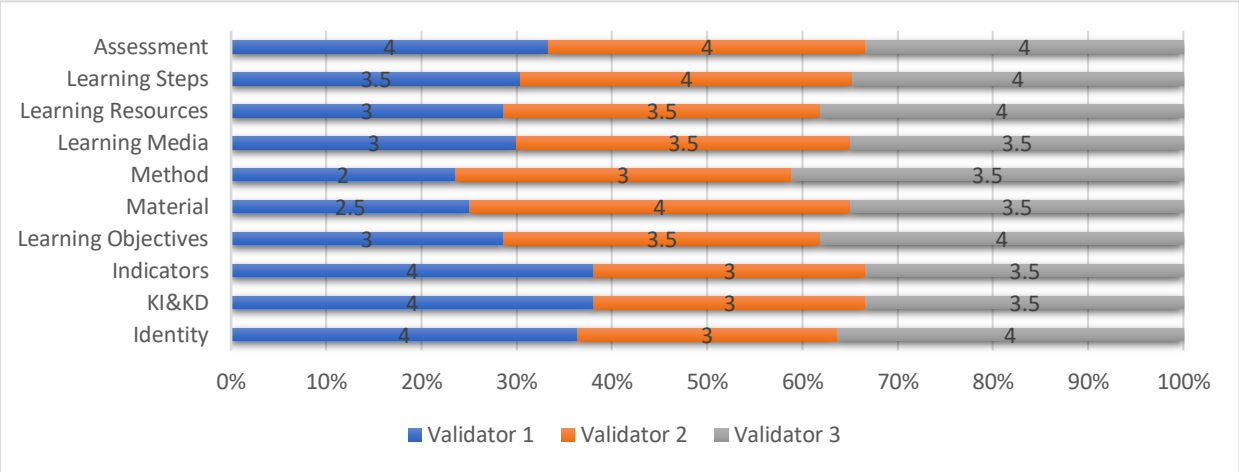

Figure 3. The Average of Learning Implementation Plan Material Experts

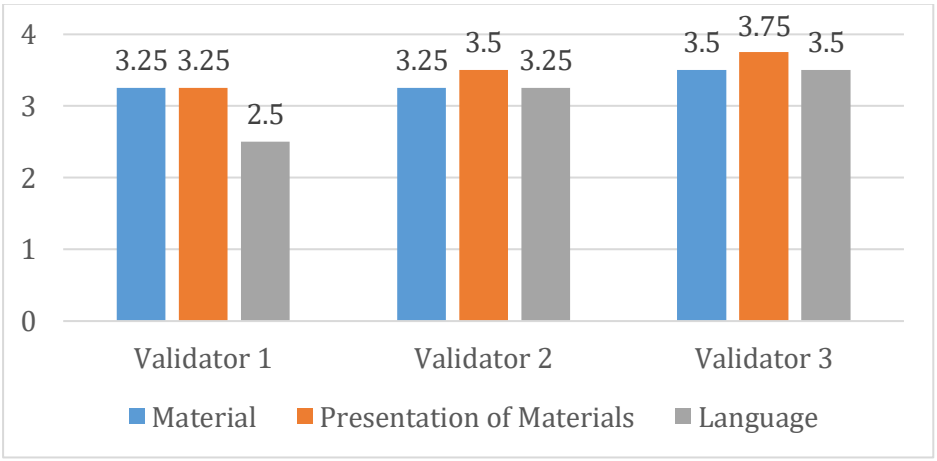

Figure 4. The Average of Material Experts

Figure 4 displays the average scores obtained during the validation of the Student Worksheets by experts. Notably, the highest scores were observed in the "presentation of material" category, as assigned by three different validators (validators 1, 2, and 3). Validator 1 gave a score of 3.25, validator 2 assigned a score of 3.5, and validator 3 rated it with the highest score of 3.75. According to the category table mentioned in the method, the average score falls within the range of 3.26 to 4.00, which corresponds to the "Valid - No Revision" category. Therefore, based on the average scores provided by the validators, the final value for the "presentation of material" category would be considered "Valid - No Revision."

These high scores in the "presentation of material" category indicate a strong consensus among the experts regarding the quality and effectiveness of how the material is presented in the Student Worksheets. It highlights the success of this aspect of the Student Worksheets, reflecting

the clarity and appropriateness of the material's presentation as evaluated by the expert validators (Fiteriani et al., 2022).

This validation process reinforces the quality of the Student Worksheets, particularly in terms of how the mathematical content is presented to students. The positive feedback from the expert validators underscores the effective design and presentation of the materials (Widodo, 2017), contributing to their overall quality and suitability for use in assessing mathematical creative thinking.

Media Experts

The validation conducted by media experts encompassed various aspects, including presentation, local culture content, style variation, and adherence to ISO standards. The details of this validation process are depicted in the following Figure 5.

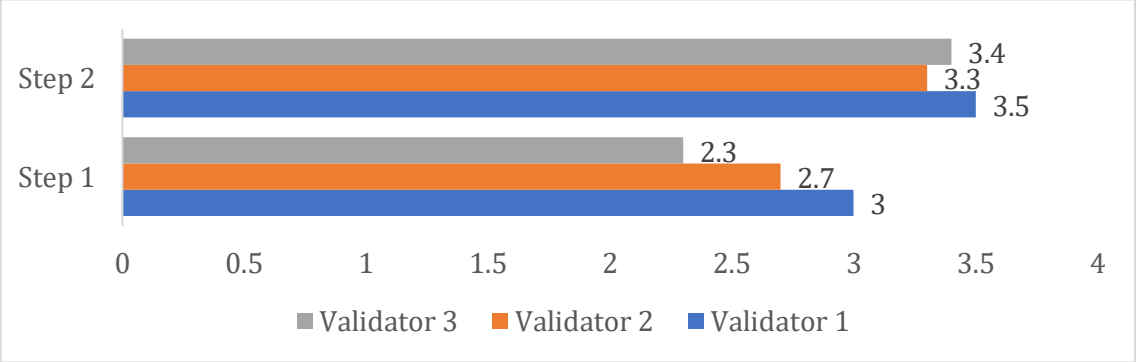

Figure 5. The average of Media Experts

In Figure 5, the average scores for media validation are presented, showing distinct differences between step 1 and step 2, as assessed by three different validators (validators 1, 2, and 3). Validator 1 assigned a higher score for step 2, with an average of 3.4, in comparison to the average score of 2.7 for step 1. Validator 2 and validator 3 also displayed this trend, with higher average scores for step 2 compared to step 1. This discrepancy in scores between step 1 and step 2 suggests that step 2 of the media validation was better received and assessed more positively by all three validators. It is important to consider the implications of this difference, as it may indicate areas where improvements or revisions are needed in step 1 to align it more closely with the favorable aspects of step 2. Overall, this feedback from the expert validators can inform further refinements in the media used for assessing MCT (Rosen et al., 2020; Suherman & Vidákovich, 2022). We also provide some revisions as suggested by the expert. The final revision of the teaching material is displayed in Figure 6 (both in Indonesian and English versions).

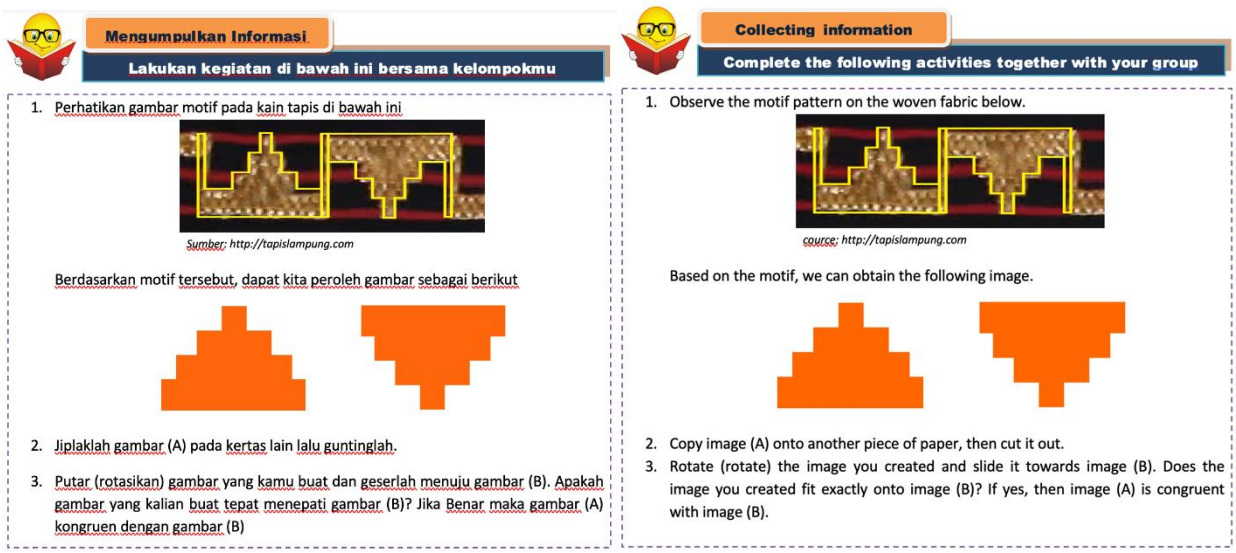

Figure 6. An example of teaching materials

Implementation

To assess the practicality and effectiveness of the developed learning materials, small-group testing was conducted with 10 respondents. During this phase, the distribution and implementation of comprehensive learning materials—consisting of Lesson Implementation Plans and Student Worksheets —were strategically adapted for both traditional teaching settings and online learning environments. The instructional sessions were meticulously structured to introduce the ethnomathematics-oriented content, drawing inspiration from Lampung culture. This tailored approach focused on elucidating the concepts of similarity, congruence, and the cultural significance of Tapis Lampung. In the traditional teaching setting, educators facilitated interactive sessions where students actively participated in problem-solving activities and discussions. They explored the integration of cultural elements into mathematical concepts, leveraging the Tapis Lampung as a visual aid to enhance comprehension. Meanwhile, in the online learning sphere, the materials were adapted for digital platforms, incorporating multimedia elements such as virtual tours, videos, and interactive presentations (Rahmawati et al., 2022). These digital adaptations aimed to maintain engagement and foster a culturally immersive experience despite the virtual setting.

Throughout both instructional formats, valuable feedback was diligently collected from participants, encompassing their experiences, perceptions, and challenges encountered while interacting with the materials. Researchers meticulously analyzed this feedback to evaluate the clarity, relevance, and effectiveness of the learning content in both traditional and online learning contexts. Insights gleaned from this phase offered crucial cues for refining the materials, ensuring their efficacy and adaptability across diverse educational settings, whether in classrooms or virtual learning environments. Subsequently, field testing was carried out with 35 respondents in secondary in Kotabumi, North Lampung, Indonesia. The data gathered from both the small-group and field testing is presented in the following figure.

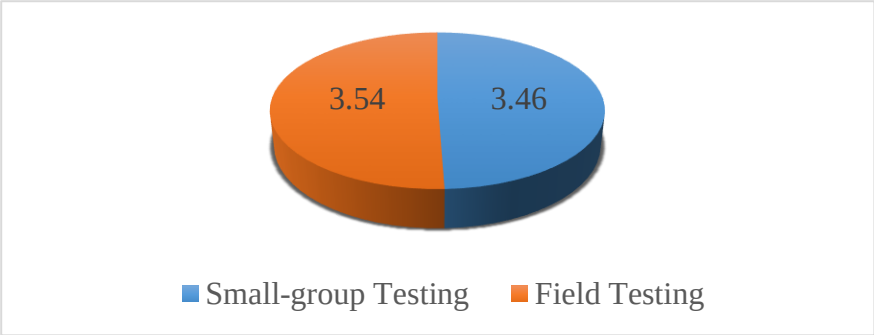

Figure 7. Small-scale and Field Test

As shown in Figure 7, the effectiveness of the product was assessed in both the small-group test and the field test. The average effectiveness score for the small-group test was 3.54, while the field test had an average score of 3.46. These scores indicate that the product was generally perceived as effective in facilitating mathematical creative thinking during both the small-group and field testing. This suggests that the teaching material developed through ethnomathematics content holds promise for enhancing students' MCT abilities (Rosa & Orey, 2018).

Evaluation

The research culminated in the creation of a product known as Teaching Materials through Ethnomathematics Content (TMEC), with the primary goal of enhancing mathematical creative thinking. TMEC aligns with the basic competencies outlined in Indonesia's 2013 curriculum (K-13). The development of TMEC followed the ADDIE development model, encompassing five key stages: analysis, design, development, implementation, and evaluation. Notably, TMEC has already been integrated into the curriculum of Junior High School 3 in Kotabumi, North Lampung, Indonesia.

The design phase involves the preparation of a comprehensive learning device framework. This step includes defining the components of the lesson plan and the student worksheet while ensuring alignment with the curriculum's key competencies and basic competencies. Furthermore,

Lampung cultural elements related to similarity and congruence are incorporated. The learning materials are organized into four sessions, each addressing different aspects, such as congruence, similarity of triangles, similarity of flat shapes, and congruence of triangles. These thoughtful design choices aim to engage students in mathematics and promote creative thinking actively. Integrating Lampung cultural elements into mathematical learning materials on similarity and congruence offers a unique opportunity to contextualize abstract concepts. By linking geometric principles with traditional symbols, patterns, and practices, students can grasp mathematical ideas more tangibly and meaningfully. Visual aids, problem-solving scenarios rooted in Lampung culture, and activities inspired by cultural practices enhance engagement and promote a deeper understanding of mathematical concepts. This approach not only makes mathematics more relatable but also celebrates and preserves Lampung's heritage within the learning process.

In the development stage, the creation and validation of teaching and learning materials are undertaken. Both the Learning Implementation Plan and Student Worksheets undergo validation by three experts in materials and media. The validation process results in the declaration of validity, affirming the suitability of the materials for implementation. Following validation, these learning materials proceed to the implementation stage. They are first tested in small-group trials and later scaled up to large-group trials. The small group trial, involving ten ninth-grade students from Junior High School 3 in Kotabumi, North Lampung, Indonesia, achieved an average score of 3.46, signifying that the materials meet the criteria for being interesting. The large group trial, encompassing 35 students, recorded an average score of 3.54, once again meeting the interesting criteria for interpretation.

Throughout the entire process, evaluations are systematically conducted at every stage, including analysis, design, development, and implementation (Komarudin et al., 2020). These evaluations serve to monitor and document the progress made in each phase. Based on the outcomes of these evaluations, it is evident that the teaching materials developed through ethnomathematics content for the topics of similarity and congruence are both pedagogically sound and captivating for students. Then, ethnomathematics can viable solution as part of the development to evaluate students' competencies (Suherman & Vidakovich, 2022).

The intriguing aspect of this teaching material lies in its integration of ethnomathematics, particularly Lampung cultural elements like the Tapis Lampung, into the learning content focused on similarity and congruence. This approach stands out as it delves into a culturally immersive learning experience, connecting mathematical concepts with the rich heritage of Lampung. Comparatively, previous research primarily focused on either ethnomathematics (Ditasona, 2018; Imswatama & Lukman, 2018; Nuryadi et al., 2023) as a standalone subject or mathematical concepts in a generic context without specific cultural integration. In contrast, this innovative teaching material intertwines the essence of Lampung culture within the mathematical curriculum, offering a unique blend that fosters cultural appreciation alongside mathematical comprehension. It aims not only to enhance mathematical understanding but also to promote cultural awareness and appreciation (IJdens, 2019), setting it apart from conventional teaching methods by providing a holistic and culturally enriched learning environment (Allen et al., 2016; Bermudez et al., 2023).

The integration of ethnomathematics content into teaching materials offers a unique context for exploring mathematical concepts and enhances creative thinking. Ethnomathematics introduces diverse problem-solving methodologies drawn from various cultural practices (Fouze & Amit, 2017, 2019; Rosa & Gavarrete, 2017), empowering students to explore multiple strategies when tackling mathematical challenges. Additionally, cultural artifacts like the Tapis Lampung provide visual and tangible representations of abstract mathematical concepts, making mathematical ideas more tangible and relatable, and fostering curiosity and creativity among learners. The cultural relevance embedded in ethnomathematics encourages heightened engagement in learning, as students recognize connections between mathematics and their cultural context (Parker et al., 2017; Wager, 2012), contributing to a more interactive and stimulating learning environment (Bower et al., 2015; Lin, 2018; Oonk et al., 2022). Furthermore, exposure to diverse mathematical perspectives nurtures adaptability and critical thinking as students navigate unconventional methods in mathematical problem-solving (Naresh, 2015; Rosa & Orey, 2016).

LIMITATION

This study primarily focused on the development and evaluation of teaching materials enriched with ethnomathematics content, specifically in the context of Lampung culture and the mathematical topics of similarity and congruence. The research was conducted with a limited sample size, restricting its generalizability to broader student populations. Additionally, while the materials were validated for effectiveness and engagement, their long-term impact on students' mathematical creative thinking (MCT) remains unexplored. Future studies should consider a more diverse cultural and educational context, larger sample sizes, and longitudinal assessments to further validate and expand the applicability of these findings.

CONCLUSION

Through the rigorous process of research and development, this study has yielded substantial findings and conclusions. The integration of ethnomathematics content into learning materials has proved to be an exceptional tool for nurturing students' MCT, with a specific focus on the topics of similarity and congruence. An in-depth evaluation by material experts confirmed the high quality of the Lesson Plan, awarding it an impressive average score of 3.5. Similarly, the Student Worksheet was deemed highly feasible, receiving an average score of 3.15. The assessment conducted by media experts reinforced these results, with an average score of 3.03, validating the product's overall high feasibility.

Moreover, both small-group testing and field testing have consistently affirmed the engaging nature of these learning materials. In the small-group testing phase, students provided an average rating of 3.46, while the field testing yielded an average rating of 3.54. These scores demonstrate that students found the materials captivating, and stimulating, meeting the criteria for an engaging educational resource.

The study has revealed promising outcomes regarding the effectiveness of TMEC in nurturing MCT within the domains of similarity and congruence. However, it's important to acknowledge some limitations that could pave the way for future research endeavors. Firstly, the research primarily focused on a specific segment of mathematical concepts—similarity and congruence—within ethnomathematics content. Expanding the investigation to encompass a broader spectrum of mathematical topics or different cultural contexts could provide a more comprehensive understanding of the impact of ethnomathematics on diverse mathematical domains. Furthermore, the study predominantly targeted a specific student demographic or educational setting. Future research could benefit from a more diverse sample size or exploring the implementation of ethnomathematics in various educational environments to assess its effectiveness across different student populations or cultural backgrounds. Additionally, while the study highlighted the positive reception and engagement of students with TMEC, a longitudinal study could offer insights into the sustained impact of ethnomathematics integration on students' MCT over an extended period. Long-term observations could reveal the durability and lasting influence of such teaching materials on students' creative thinking in mathematics. Moreover, exploring the professional development of educators in integrating ethnomathematics content into their teaching practices could be an area of further investigation. Understanding the challenges, training needs, and best practices for educators to implement ethnomathematics in their teaching effectively could significantly enhance its application and impact

In summary, the development of TMEC has exhibited remarkable potential for enhancing students' mathematical creative thinking, specifically within the realm of similarity, and congruence. These findings underscore the effectiveness and promise of TMEC as a valuable addition to the landscape of mathematics education, promising to inspire and engage students in the learning process.

AUTHOR CONTRIBUTIONS

RAK conceptualized the study and led the development of teaching materials. SS contributed to the design of the ADDIE model framework and coordinated the validation process with experts. KK conducted data analysis and provided critical insights into the cultural integration of Lampung

ethnomathematics. MZ supported the methodology and contributed to the theoretical foundation of the research. IK reviewed the manuscript and provided international perspectives to enhance the study's global relevance. Together, the authors collaborated to ensure the study's robustness and its significant contribution to mathematics education

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