

Canva-based GEOTROSO Media: Integrating Ethnomathematics to Enhance Elementary Students' Problem-solving Skills

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ABSTRACT

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This research addresses the limited use of local culture and interactive media in elementary mathematics learning, which affects students' problem-solving abilities. The study aims to develop an interactive Canva-based presentation media with ethnomathematics content, called GEOTROSO, to enhance students' mathematical problem-solving skills in two-dimensional shapes. The novelty of this study lies in combining local cultural artifacts, interactive digital navigation, and problem-solving missions within one learning platform designed to guide students through contextual exploration, formula discovery, and solution reflection. The research employed the ADDIE development model, involving 12 students in a limited trial and 33 students in a large-scale trial. Instruments included expert validation sheets for content, media, and language; practicality questionnaires for teachers and students; and pretest-posttest problem-solving tests. Data were analyzed using descriptive statistics, Shapiro-Wilk normality testing, paired-samples t-test, and effect size analysis. Validation results showed very feasible quality (scores: media = 3.96; content = 3.92; language = 4.00). Practicality was rated very practical by students (mean 3.77) and teachers (mean 3.43). Effectiveness analysis revealed a significant improvement from pretest (mean 51.76) to posttest (mean 80.82), with a Sig. = 0.000 < 0.05. The findings indicate that GEOTROSO is feasible, practical, and effective for elementary mathematics learning to enhance student's problem solving skills. This study implies that integrating ethnomathematics and digital tools like Canva can support contextualized and engaging problem-solving instruction.



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A. INTRODUCTION

In elementary school, mathematics is a core subject, and one of the expected competencies is problem-solving skills. As stated by NCTM (2000) that mathematics education aims to develop mathematical reasoning, mathematical representation, mathematical relationships, mathematical communication, and mathematical problem-solving skills. Polya (1973) defines problem-solving as a set of skills involving identifying problems, formulating solutions, implementing those solutions, and evaluating the results. Problem-solving skills help build students' confidence in addressing real-world problems (Schreiber, 2025). This highlights the importance of problem-solving as part of the higher-order thinking skills needed to address the challenges of 21st-century change (OECD, 2024).

Indonesia also faces these challenges, but several studies indicate that students have poor problem-solving skills in real-world contexts. Results from the PISA (Program for International Student Assessment) study reveal serious issues regarding Indonesian students' problem-solving skills, with Indonesian students ranking below the OECD average in mathematical literacy, and showing a downward trend over the years, with scores of 379 in PISA 2018 and 366 in PISA 2022 (OECD, 2019, 2023). In addition, data from the Indonesian National Education Report shows numeracy proficiency at the elementary school level based on the National Assessment (*Asesmen Nasional* (AN)); in the 2022 AN, 46.67% of students achieved above the minimum proficiency level, while in the 2023 AN, the figure was 62.62% (BSKAP, 2023, 2024). These figures indicate students' difficulties in solving contextual problems, which stem from a lack of understanding of the questions, errors in selecting the appropriate strategy to solve the problems, difficulties in the calculation process, and low comprehension skills (Nugroho et al., 2025; Riyadi et al., 2021; Sulistyani et al., 2021).

An elementary school located in Jepara, Central Java, which was examined in a preliminary study, showed a similar trend. Problem-solving skills pose a serious challenge, as only 30% of fifth-grade students were able to answer advanced geometry problems (such as multi-step or open-ended problems), and the average score on geometry problem-solving tasks was only about 51 out of 100. These figures indicate that most students rely on rote procedures and struggle to apply mathematical concepts to context-rich situations that require reasoning and creativity.

Based on preliminary research, several factors contribute to students' poor problem-solving skills. One of these is an irrelevant teaching approach; observations indicate that instruction tends to be teacher-centered, relying on lectures and textbook exercises. The use of visual and interactive media is minimal, and the learning materials employed often fail to incorporate local cultural contexts that could connect mathematical concepts to students' real-life experiences. As a result, mathematics instruction becomes less meaningful and fails to encourage students' active engagement in solving problems independently. Given these challenges, there is an urgent need for innovative educational strategies that strengthen students' conceptual understanding and problem-solving skills by making mathematics instruction more engaging and relevant to their lives.

Ethnomathematics offers a number of advantages for addressing these challenges. Ethnomathematics emphasizes the relationship between mathematical processes and culture (D'Ambrosio, 1997). Ethnomathematics essentially seeks to explain human ideas, practices, and knowledge within diverse cultural contexts (D'Ambrosio, 2018). Ethnomathematics makes an important contribution in several areas of knowledge because it reflects the relationship between cultural heritage and mathematics (Rosa & Orey, 2021). In mathematics classrooms, cultural integration fosters a multicultural perspective on the concepts and methods being taught (Batiibwe, 2024). Furthermore, this can help strengthen the connection between students' experiences and the learning material, and support the creation of a more inclusive and meaningful learning environment (Stone et al., 2025).

The cultural context in Jepara, Central Java, serves as a rich resource for mathematics education. Several studies have shown the potential of Troso ikat weaving from Jepara to support mathematics education, as its diverse patterns incorporate geometric concepts such as

triangles, squares, circles, and geometric transformations (Noviyanti & Basir, 2025; Salma et al., 2022; Shufa & Wijaya, 2022). In addition, other studies have also shown that the Joglo house, a distinctive architectural style of Central Java, incorporates complex geometric concepts (Faiziyah et al., 2024; Setyaningrum & Untarti, 2024). The results of this study indicate that the cultural context in Jepara, Central Java, holds strong potential for use as a support for mathematics learning. However, there is a gap between these findings and their implementation or application in mathematics teaching practice, particularly in developing problem-solving skills.

Previous studies have shown that ethnomathematics and interactive media technology can support mathematics learning. The integration of culture into mathematics supports the development of teaching practices that authentically address cultural perspectives, learning materials, and technology-enhanced learning environments, with the aim of deepening students' understanding and engagement in problem-solving (Musdi et al., 2026; Zuliana et al., 2025, 2026; Zuliana & Nugroho, 2025). Meanwhile, interactive media technology can foster collaborative and communicative mathematics learning, support conceptual understanding and problem-solving, and have a positive impact on students' mathematics achievement (Amaliyah et al., 2026; Güler et al., 2022; Juandi et al., 2021; Ran et al., 2022). The use of digital media in mathematics instruction improves performance on tasks requiring contextual reasoning compared to traditional print materials (Kaplar et al., 2021). In addition, the use of educational media through appropriate technology has been shown to increase student motivation, social interaction, and engagement in mathematics learning (Mathers et al., 2025; Villasmil, 2024).

However, the previous studies discussed above focused more on conceptual understanding than on structured problem-solving processes. In addition, the integration of local cultural contexts into interactive media that explicitly trains students to identify problems, plan strategies, execute solutions, and evaluate results remains limited. Therefore, there is a need for learning media that not only presents cultural content, but also transforms it into guided problem-solving experiences. GEOTROSO addresses this gap by integrating Troso weaving and Joglo house contexts into an interactive Canva-based platform designed to systematically support elementary students' problem-solving skills.

The novelty of this study lies in the development of the GEOTROSO platform—an acronym for Geometry in Troso Weaving (*Geometri dalam tenun Troso*)—which integrates ethnomathematics and digital technology and is specifically designed to enhance students' problem-solving skills. GEOTROSO is essentially an interactive presentation and learning module developed on the Canva platform, using traditional Troso woven fabric motifs as the primary source of geometric visuals and elements of local Joglo house architecture as a supporting context. The use of Troso motifs provides authentic examples of geometric shapes (such as rectangles, triangles, and circles) as well as symmetry that students can observe and manipulate within the learning platform, thereby connecting textbook geometry concepts with tangible cultural artifacts. The application of the Joglo house context (e.g., floor plans or decorative patterns) further grounds mathematical problems in real-life contexts that are familiar to students.

Therefore, the focus of this study is to develop and evaluate an interactive Canva-based GEOTROSO medium with ethnomathematics content as a tool to improve elementary school students' mathematical problem-solving skills. Specifically, this study aims to determine: (1) the feasibility of the GEOTROSO media as assessed by subject matter experts and media experts, (2) the practicality of the GEOTROSO media based on student and teacher responses, and (3) the effectiveness of the GEOTROSO media on students' problem-solving performance in plane geometry (perimeter and area topics), as measured through comparative tests and observations.

B. METHODS

This study employs a Research and Development (R&D) approach using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). This model was chosen because it provides a systematic and structured framework for developing interactive learning materials that are valid, practical, and effective. The ADDIE model serves as a guiding framework for complex situations, making it an effective tool for developing educational products and other learning resources (Branch, 2009; Creswell & Guetterman, 2021). The product developed in this study is an interactive presentation tool based on Canva called GEOTROSO, which integrates ethno-mathematical content from Troso weaving motifs and Joglo houses in Jepara. The resulting product will be tested for its feasibility, practicality, and effectiveness, as shown in Figure 1.

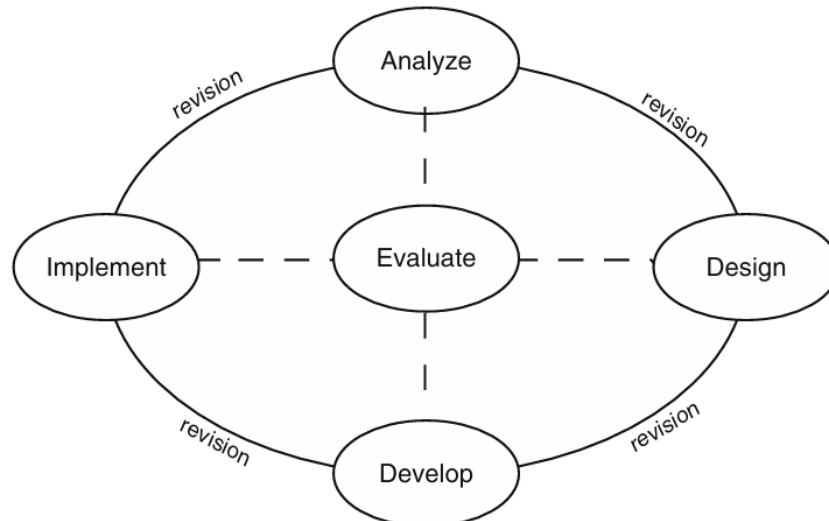


Figure 1. The ADDIE model (Branch, 2009)

As shown in Figure 1, the research procedure for the ADDIE model consists of five stages: analysis, design, development, implementation, and evaluation (Branch, 2009). During the analysis phase, the researchers identified issues in the field through observations and interviews focused on the learning process, teacher skills, students' prior knowledge, and the curriculum used. During the design phase, the researchers developed a preliminary product design, beginning with the formulation of learning objectives aligned with the curriculum, the mapping of competencies, and the development of the product's design structure—namely, the GEOTROSO media. During the development phase, the researcher refined the GEOTROSO media

design and sought validation from experts regarding content, language, and media. During the implementation phase, implementation of GEOTROSO were conducted on a limited trial, followed by a large-scale trial. Finally, during the evaluation phase, the researcher conducted an evaluation based on feedback from the implementation results, as well as an assessment of the GEOTROSO media's effectiveness in enhancing problem-solving skills.

This study involved participants consisting of 12 fifth-grade students at SDN Tanggultlare (limited-scale trial), 33 fifth-grade students at SDN 1 Jondang and SDN Kalianyar (large-scale trial), and 27 fifth-grade students at SDN Sowon Kidul (question trial). The instruments used included an expert validation sheet, student and teacher practicality questionnaires, and a problem-solving test. The test instrument was developed based on Polya (1973) theory of problem-solving, which includes four indicators: identifying the problem, formulating a solution strategy, implementing solution steps, and evaluating the results obtained. Content validity was established through expert judgment from media, content, and language validators. The practicality questionnaire and problem-solving test were reviewed for clarity, relevance, and alignment with indicators before implementation

The data were analyzed using descriptive and inferential statistics. The mean scores of the expert validation sheet and the practicality questionnaire were used to determine the categories of feasibility and practicality. The normality of the test data was assessed using the Shapiro–Wilk test. The effectiveness of GEOTROSO was analyzed using a paired sample t-test. Additionally, the effect size (Cohen's *d*) was calculated to determine the magnitude of the medium's influence on students' problem-solving skills.

C. RESULT AND DISCUSSION

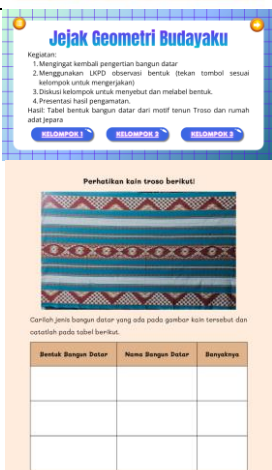
1. GEOTROSO Media Design

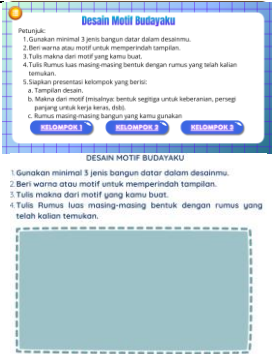
The initial stage of media design development began with an analysis issue in the field. Based on the results of the analysis at SDN Tanggultlare, conducted through observation and interviews, several issues were identified: (1) students' difficulty in understanding the concepts of perimeter and area, (2) the limited availability of interactive media, and (3) the lack of integration of technology and relevant cultural contexts to support students' problem-solving skills. Interviews with students reinforced these issues, revealing that students often merely memorized formulas mechanically. This approach is not aligned with the curriculum in use—the *Merdeka* Curriculum—which is intended to emphasize contextual learning and problem-solving. The results of this problem analysis indicate the need for media innovation, which subsequently formed the basis for the development of the GEOTROSO design, as shown in Table 1.

The development of GEOTROSO is based on a step-by-step approach to content design, starting with basic geometric concepts and progressing to more complex problem-solving tasks integrated into cultural narratives. For example, the initial section of the media introduces shapes and formulas through Troso patterns, while subsequent sections present open-ended problems or stories involving local cultural scenarios that require students to apply these concepts to find solutions. This step-by-step, context-rich design aims not only to make learning more engaging and meaningful for students but also to systematically build their problem-

solving skills, ranging from understanding problems within their context, devising strategies, to solving problems and reflecting on the solutions found.

Table 1. GEOTROSO Media Design

Component	Design	Description
Home page		The homepage showcases the media's distinctive features. Its main theme is "Geotroso's Adventure" (<i>Petualangan Geotroso</i>) which features images of Trosro weavings and a Joglo house as the cultural context used in the media.
Main Menu		The main menu displays several options available on the platform. These options include video, comic, objectives, groups, missions 1–4, conclusion, and reflection. All of these options will support the entire learning process that students go through.
Information and instructions		This section provides information about the media developer. It also includes instructions on how to use the buttons on the media and what they do.
Video		This section features an instructional video on the Trosro weaving process. This video will help students develop a basic understanding of the cultural context that will accompany their learning.
Comic		This section contains a story about the making of Trosro woven fabric, presented in the form of a comic. The comic's design incorporates illustrations, characters, and dialogue arranged with the aim of making it easy for elementary school students to understand.
Mission 1		Mission 1 is titled "Traces of My Cultural Geometry" (<i>Jejak Geometri Budaya</i>). In this part of the mission, images of a Joglo house and Trosro fabric are presented. Students are tasked with analyzing the types of two-dimensional shapes found in the images of the Joglo house and Trosro fabric. The results of this analysis will be presented in a worksheet that students must complete.

Component	Design	Description
Mission 2		Mission 2 is titled "Exploring Cultural Heritage" (<i>Jelajah Warisan Budaya</i>). In this part of the mission, students will play an interactive game that helps them explore the formulas for the area and perimeter of two-dimensional shapes. This helps students learn the formulas for the area and perimeter of two-dimensional shapes in a contextual way. The results of this exploration are presented in a worksheet that students must complete.
Mission 3		Mission 3 is titled "Measuring Our Ancestral Heritage" (<i>Mengukur Warisan Leluhur</i>). In this mission, images of a Joglo house and Troso woven fabric of specific dimensions are presented. Students are asked to identify the types of two-dimensional shapes depicted in the Joglo house and the Troso woven fabric patterns, and to calculate their areas and perimeters. Students must also complete the worksheet based on their calculations.
Mission 4		Mission 4 is titled "Designing My Cultural Motifs" (<i>Desain Motif Budaya</i>). In this mission, students are asked to create designs using the two-dimensional shapes they have learned. Students are also asked to explain the meaning behind their designs and to calculate their area and perimeter. A worksheet is provided for students to complete as part of this mission.
Conclusion and reflection		In this section, students are asked to summarize and reflect on the learning activities they have completed. Their reflections should include their feelings, their level of understanding, and the activities that were most meaningful to them.

Based on Table 1, the GEOTROSO platform was designed with students' needs in mind, specifically the technological and cultural contexts relevant to learning mathematics and developing problem-solving skills regarding the perimeter and area of two-dimensional shapes. The technology used to create the GEOTROSO design is Canva. The cultural contexts used are Troso weaving motifs and the Joglo house, as seen in the homepage design. Additionally, there is a main menu displaying features to support student learning, namely videos and comics, as well as four main missions to be completed during the learning process.

The videos and comic designs in GEOTROSO help students gain a relevant cultural context. Students are guided to understand the steps involved in making Troso weaves. This understanding is crucial as the starting point for students to complete the four main missions in the learning process: (1) Exploring Geometry in Troso Fabric, which involves students identifying two-dimensional shapes in Troso motifs and Joglo houses; (2) Exploring Cultural

Heritage, where students play an interactive game based on Canva Code, fill out observation tables, and derive formulas for perimeter and area; (3) Measuring Ancestral Heritage, where students calculate the perimeter and area of cultural objects; and (4) Designing My Cultural Motif, where students design a new motif in Canva, calculate its area, and explain its cultural significance.

2. Feasibility of GEOTROSO

The feasibility of the GEOTROSO media was evaluated by three experts: a media expert, a content expert, and a language expert. The results of the evaluation by the three experts are shown in Table 2.

Table 2. Expert Validation Results of GEOTROSO

No.	Validator	Average Score	Conclusion	Suggestion
1.	Media expert	3.96	Very feasible	Add navigation buttons for each menu
2.	Content expert	3.92	Very feasible	Detail the material more explicitly
3.	Language expert	4.00	Very feasible	Already good and appropriate

Based on Table 2, it is evident that the GEOTROSO platform meets the criteria for feasibility in terms of media, content, and language. This is evidenced by the evaluation results from the three experts, with an average score of 3.96 from the media expert, an average score of 3.92 from the content expert, and an average score of 4.00 from the language expert. The interpretation of the average scores given by the three experts falls into the “very feasible” category.

Nevertheless, experts have offered suggestions for improving the media platform. First, media experts recommend adding navigation buttons for each menu. Second, content experts suggest providing more in-depth explanations of the material presented. As for the language expert, they assessed that the language used is already good and appropriate, so no suggestions are needed. The suggestions from the media and content experts have been implemented by the researcher; as a result, the GEOTROSO media has been improved in accordance with the provided suggestions, making it very feasible and ready for implementation with students.

3. Practicality of GEOTROSO

The practicality of the GEOTROSO teaching aid was assessed based on feedback from teachers and students during a limited trial study at SDN Tanggultlare. A total of 3 teachers and 12 fifth-grade students participated in evaluating the practicality of the GEOTROSO teaching aid for the mathematics learning process regarding the perimeter and area of two-dimensional shapes. The results of the practicality assessment are shown in Table 3 and Table 4.

Table 3. Practicality results from teachers (N=3)

No.	Score Obtained	Score	Category
1.	Lowest score	3.25	Practical
2.	Highest score	3.60	Very practical
3.	Average score	3.433	Very practical
Overall media category			Very practical

Table 4. Practicality results from students (N=12)

No.	Score Obtained	Score	Category
1.	Lowest score	3.45	Very practical
2.	Highest score	3.90	Very practical
3.	Average score	3.675	Very practical
Overall media category			Very practical

Table 3 shows teachers' responses regarding the practicality of the GETROSO media for use in instruction. The ratings given range from a low of 3.25 (classified as "practical") to a high of 3.60 (classified as "very practical"). The average score was 3.433, classified as "very practical." Based on this, the practicality of the GETROSO media, as determined by all the ratings given by teachers, falls into the "very practical" category.

Table 4 shows students' responses regarding the practicality of the GEOTROSO media in supporting their learning activities. The ratings given range from a low of 3.45 (in the "very practical" category) to a high of 3.90 (in the "very practical" category). The average score is 3.675, also in the "very practical" category. Based on this, the practicality of the GEOTROSO media, as determined by all the ratings given by the students, falls into the "very practical" category. The results of this practicality test show that both students and teachers consider GEOTROSO to be "very practical." Students emphasized its ease of navigation and engaging activities, while teachers highlighted the integration of Troso motifs and the Joglo house, which makes learning about perimeter and area more contextual.

4. Effectiveness of GEOTROSO

The effectiveness of the GEOTROSO medium was assessed based on the results of a large-scale trial study involving 33 fifth-grade students at SDN 1 Jondang and SDN Kalianyar. This trial study aimed to evaluate the effectiveness of the GEOTROSO medium on students' problem-solving skills, as evidenced by a comparison of the mean pretest and posttest scores using a paired sample t-test. The results of this effectiveness test are shown in Table 5.

Table 5. Paired sample t-test results (N=33)

Test type	Mean	SD	t-value	Sig. ($\alpha=0.05$)
Pretest	51.76	7,89	12,36	0,000
Posttest	80.82	8,34		

Table 5 shows the results of the paired-sample t-test for students' problem-solving skills. There is a difference in the mean problem-solving scores, from 51.76 on the pretest to 80.82 on the posttest. This difference in means is significant, as indicated by Sig. $< 0.05 = 0.000 < 0.05$. The effect size (Cohen's $d = 3.34$) indicates a very large effect, confirming that GEOTROSO has a strong practical impact on students' ability to solve mathematical problems. The improvement in students' problem-solving ability is illustrated in Figure 2. In Figure 2, the bar chart shows an increase in the average problem-solving ability of students from the pretest to the posttest.

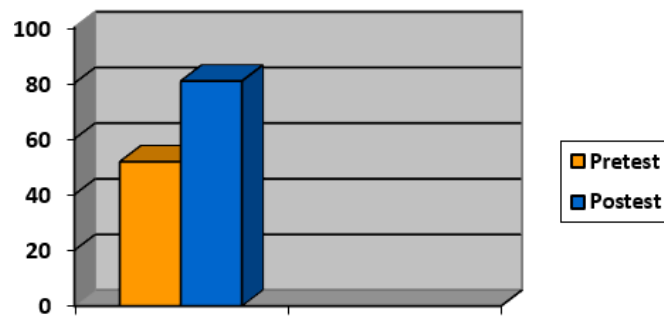


Figure 2. Improvement of mean scores from pretest to posttest

Based on the results presented, the validation findings from the experts indicate that GEOTROSO is classified as very feasible. This supports the view that systematic development models such as ADDIE ensure instructional quality through structured and proven stages (Branch, 2009). These findings are consistent with studies demonstrating the effectiveness of the ADDIE model in developing instructional materials based on cognitive theory (Artman, 2020). Based on existing research, the ADDIE model has been shown to provide a systematic framework for the development of media products such as pop-up books, e-modules, educational games, and interactive media (Aditya & Hiltrimartin, 2024; Bulkani et al., 2026; Lukman & Setiani, 2025; Saryadi & Sulisworo, 2023; Sintawati & Margunayasa, 2021; Sumadi et al., 2022). Similar validation results were reported for ethnomathematics-based modules that achieved a high feasibility rating. For example, a study conducted by Putri & Junaedi (2022) which indicates that the development of ethnomathematics-based e-modules using the inquiry-based learning model is highly feasible. Another study by Kumala et al. (2024) makes a similar claim, stating that educational games developed using an ethnomathematics approach have received very high ratings from experts for use in geometry instruction.

In addition, GEOTROSO is considered very practical by both students and teachers. This Canva-based platform has been shown to increase classroom interaction and student engagement, stimulate creativity, and boost students' motivation to learn mathematics (Jamaludin & Sedek, 2024; Oktania & Hidayat, 2024). In addition, Canva-based media has also proven to play a significant role in supporting students' foundational literacy and digital literacy (Agustiani et al., 2025; Widiyati et al., 2025). This is because Canva's interactive navigation and menu features make it easier for students to use, thereby increasing their active engagement during the learning process. In line with this, GEOTROSO's structure—which incorporates videos and comics, four missions, and conclusions and reflections—serves as a vital support for student activities while learning geometry, particularly regarding the area and perimeter of two-dimensional shapes. GEOTROSO's intuitive navigation, interactive games, and flexible access via both printed worksheets and digital links demonstrate its practicality for classroom use.

Regarding effectiveness, the significant difference between pretest and posttest results indicates that the integration of ethnomathematics into the GEOTROSO platform enhances students' ability to solve mathematical problems. This suggests that the cultural context in GEOTROSO—specifically the Joglo traditional house and Troso woven fabric—plays a crucial role in helping students gain relevant and contextual understanding of geometry, particularly the area and perimeter of two-dimensional shapes. Culture-based contextual learning has been

shown to support abstraction in mathematics, and local motifs have proven effective as learning resources (Prahmana & D'Ambrosio, 2020). This is consistent with other research indicating that learning that incorporates cultural contexts helps students make complex generalizations about mathematical structures, thereby serving as a powerful driver for the development of students' mathematical abilities and character (Hunter & Miller, 2022; Risdiyanti & Prahmana, 2021; Zuliana et al., 2025). Consistent findings regarding improvements in students' problem-solving skills have also been reported in the development of ethnomathematics-based e-modules and interactive learning games (Anggara et al., 2023; Hulaipah et al., 2025; Paramita et al., 2024).

GEOTROSO can enhance problem-solving skills because each feature is designed to follow the stages of mathematical thinking. The Troso motif and Joglo context provide students with concrete representations of two-dimensional shapes, making abstract problems easier to understand. Videos and comics help build initial schemas and reduce cognitive load as students identify key information in problems. Interactive games and mission-based tasks encourage students to actively identify problems, choose strategies, and verify answers, in line with Polya's steps. Reflection features and custom motif design help students evaluate their results, ensuring that learning extends beyond the final answer to the reasoning used.

What makes GEOTROSO unique is the incorporation of Jepara's cultural artifacts—Troso weaving motifs and Joglo houses—into an interactive Canva platform enhanced with Canva Code. Previous research on the development of media that integrates ethnomathematics has largely relied on static media such as worksheets or pop-up books (Devioni et al., 2025; Indriani et al., 2024; Mailili et al., 2025). In contrast, GEOTROSO offers an interactive digital exploration that allows students to manipulate, cut, flip, and assemble geometric shapes to rediscover the formulas for perimeter and area.

The implications of this study highlight GEOTROSO's potential to promote 21st-century competencies, including problem-solving, cultural literacy, and digital literacy. These competencies are essential for modern education, and realistic, context-based learning can strengthen numeracy skills (Fauzan et al., 2024; OECD, 2024). Therefore, teachers can adopt GEOTROSO to contextualize mathematics learning and motivate students through local culture. Future studies could expand its application to other mathematical topics, involve a larger and more diverse student population, and conduct comparative analyses with alternative digital platforms to refine best practices and further validate ethnomathematics as a transformative pedagogy.

D. CONCLUSION AND SUGGESTIONS

This study concludes that GEOTROSO—an interactive Canva-based resource that combines Troso weaving motifs and Jepara Joglo houses—is feasible, practical, and effective in improving elementary school students' mathematical problem-solving skills in plane geometry. Expert validation confirms the suitability of the content, medium, and language; feedback from teachers and students indicates that the medium is highly practical; and significant improvement from the pretest to the posttest demonstrates its effectiveness.

This study contributes an innovative ethnomathematics-based digital learning model by demonstrating that GEOTROSO can connect local cultural heritage with structured problem-solving instruction in elementary geometry. Beyond being feasible, practical, and effective, GEOTROSO shows that culturally grounded interactive media can support students in understanding mathematical concepts, selecting solution strategies, and evaluating answers more meaningfully. The study also contributes pedagogically by offering a learning design that integrates digital engagement, cultural relevance, and higher-order thinking in one platform. These findings suggest that ethnomathematics-informed digital media can serve as a promising approach for strengthening elementary students' mathematical problem-solving skills.

However, this study has several limitations. The pilot study was conducted in a limited context and involved a relatively small number of participants, so the generalizability of the findings is limited. Future research could expand the implementation to a wider range of schools and subjects, as well as examine the long-term impact of integrating ethnomathematics and interactive Canva-based presentations into mathematics education.

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