Journal of Honai Math, 7(1), 57-70, April 2024
https:/doi.org/10.30862/jhm.v7i1.444

Ethnomathematical analysis of student activities in associating quadrilateral and triangle concepts

Yika Amaliyah*, Marsigit

Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

* Correspondence: yikaamaliyah.2022@student.uny.ac.id

Received: 4 July 2023 | Revised: 17 April 2024 | Accepted: 6 May 2024 | Published: 15 May 2024

Abstract

Through integrating local culture into learning, students can observe the application of mathematical concepts in real-life contexts. Therefore, this research aims to outline the steps involved in incorporating ethnomathematics of Yogyakarta batik motifs into the teaching of quadrilateral and triangle concepts in mathematics at private junior high schools in Sleman Regency, Yogyakarta. A qualitative case study approach was employed, involving eight seventh-grade students selected through purposive sampling based on specific criteria. Data were collected via observations, document analysis, and interviews. The findings indicated that the implementation of ethnomathematics-based activities using Yogyakarta batik motifs was successful. Students demonstrated positive responses and enthusiasm. The instructional steps for these association activities included: introducing students to Yogyakarta ethnomathematics, presenting examples of batik motifs, explaining the cultural values embedded in these motifs, identifying rectangular and triangular patterns within the motifs, engaging students in creating simple batik designs that incorporate these geometric elements, and discussing and sharing their work.

Keywords: association activities, ethnomathematics, quadrilateral, triangle

Introduction

In educational settings, student-centered learning is essential. According to Hosnan (2014), one approach that exemplifies student-centered learning is the scientific learning approach. Furthermore, Amin & Sumendap (2022) describe this approach as requiring students to actively construct their own knowledge. The scientific learning approach guides students to develop problem-solving skills pertinent to both academic concepts and real-life situations (Pahrudin et al., 2019). On the other hand, Budiyanto et al. (2016) outline five key components of this approach: observing, questioning, gathering information, associating, and communicating. This

research primarily focuses on the associating activities within this framework. Sani (2015) explains that associating activities involve processing collected information through reasoning. Both teachers and students actively engage in these activities, enabling students to categorize various ideas and connect different events, thereby enhancing their memory retention. Finally, Narut & Supradi (2019) add that associating activities allow students to link prior knowledge with new concepts, often through observational activities that lead to knowledge formation.

Association activities in scientific learning can be significantly enhanced by incorporating an understanding of cultural practices within mathematics, a concept known as ethnomathematics. D'Ambrosio (2020) asserts that mathematics is not isolated from culture but is deeply embedded within it, practiced and sustained as a tradition in all facets of cultural life. Ethnomathematics integrates cultural elements into mathematical education, thereby making learning more relevant and meaningful for students. Lisnani et al. (2020) emphasize that this integration helps students perceive the practical applications of mathematical concepts in their daily lives. In the context of Indonesian culture, Yogyakarta batik motifs serve as an excellent example of this integration. These motifs are rich in mathematical concepts, including geometric shapes such as squares, rhombuses, and triangles, which are prevalent in designs like the *nitik*, *gedheg*, and *semen gunung* batik motifs, respectively. These patterns do not only represent artistic expression but also embed historical and cultural narratives of Javanese life, illustrating how mathematics can be a bridge between academic learning and cultural heritage.

The process of incorporating ethnomathematics into classroom instruction involves several stages to ensure meaningful learning experiences. According to Sirate in Hutauruk (2020), this process can be broken down into three main components: learning about culture, learning with culture, and learning through culture. Learning about culture involves students gaining knowledge of cultural practices and their historical significance. Learning with culture utilizes cultural artifacts and practices as tools for understanding mathematical concepts. Finally, learning through culture allows students to apply mathematical reasoning within cultural contexts, thereby solidifying their comprehension and appreciation of both mathematics and culture. In the case of Yogyakarta batik, teachers can begin by educating students on the cultural significance of the motifs, then proceed to identify and analyze the geometric shapes within these designs, and finally encourage students to create their own batik-inspired patterns, integrating the mathematical concepts they have learned. This approach not only enhances students' mathematical skills but also fosters a deeper connection to their cultural heritage, making mathematics both an educational and enriching experience.

In the realm of ethnomathematics-based mathematics learning, research by Dahlan & Nurrohmah (2018) investigated the teaching of linear equations in two variables using cultural values from Lebak Banten Regency. Their findings indicated that while some students were unfamiliar with the traditional foods used in the learning activities, the overall student engagement and motivation were positive. Most students demonstrated a good understanding of mathematical concepts through inductive reasoning. Similarly, Prahmana & D'Ambrosio (2020) highlighted that Yogyakarta batik patterns encapsulate geometric transformation concepts, which can be effectively integrated into school mathematics curricula. This was

further supported by Faiziyah et al. (2020), who used a scientific approach based on the *slobog* batik motifs to teach transformation geometry. Their research showed a notable 17.91% increase in student creativity. Andriani & Septiani (2020) also found that employing Yogyakarta's *ceplok* batik motifs in teaching geometric transformations improved students' conceptual understanding and motivation.

Contrasting with previous studies, the current research aims to delineate the stages of association activities focusing on quadrilateral and triangle competencies through the ethnomathematics of Yogyakarta batik motifs. These association activities are designed to integrate mathematical concepts with the cultural context of Yogyakarta batik, fostering a deeper connection between students' cultural heritage and their academic learning. The approach involves several stages: familiarizing students with Yogyakarta's cultural significance, analyzing the geometric shapes within batik patterns, and engaging students in creating their own designs that incorporate these mathematical elements. This method not only enhances students' mathematical comprehension and problem-solving skills but also enriches their appreciation of the cultural heritage embedded in Yogyakarta batik, making mathematics a more relevant and engaging subject.

Methods

This research employs a case study method with a qualitative approach. According to Rahardjo (2017), a case study is an intensive, detailed, and in-depth examination of a program, event, or activity at the level of an individual, group, institution, or organization, aimed at gaining comprehensive knowledge about the subject. The qualitative approach, as defined by Wahidmurni (2017), seeks to construct a theoretical understanding based on research data, which includes the perspectives, definitions, and interpretations of the participants. Therefore, a case study with a qualitative approach was selected for this research to describe the stages of association activities in mathematics learning focused on quadrilateral and triangle competencies, using the ethnomathematics of Yogyakarta batik motifs.

This methodology allows for intensive, detailed observations and the collection of in-depth information about how association activities in mathematics learning are conducted using the cultural context of Yogyakarta batik motifs. By immersing in the educational setting, the researchers can capture the nuances of how students engage with mathematical concepts through cultural elements. This approach provides a rich, contextual understanding of the learning process, revealing how the integration of ethnomathematics can enhance students' grasp of geometric concepts and their connection to cultural heritage. Such detailed insights are crucial for developing effective teaching strategies that leverage cultural context to make mathematics more relatable and engaging for students.

This research was conducted with seventh-grade students at private junior high schools in Sleman Regency, Yogyakarta, involving a population of 40 students. The study sample comprised 8 students, evenly divided between 4 male and 4 female students, selected through purposive sampling based on specific criteria. The criteria for selecting the sample included

being a seventh-grade student and having a demonstrated interest in batik culture, as determined by the researchers' observations in the classroom. This targeted approach ensured that the participants were not only academically relevant but also culturally engaged, providing a rich context for exploring the integration of ethnomathematics in their learning of quadrilateral and triangle competencies through Yogyakarta batik motifs.

In this study, data collection encompassed three primary methods: observation, document analysis, and interviews. Observations were conducted using observation sheets to directly witness the progression of association activities in mathematics learning within the classroom setting. This allowed researchers to observe firsthand how students interacted with the learning materials and engaged in the various stages of the activities. Additionally, documents were utilized to gather information pertaining to the different stages of association activities implemented during mathematics learning. These documents provided supplementary data to complement the observational findings. Furthermore, interviews were conducted with students to gauge their initial understanding and abilities in classifying quadrilateral and triangular shapes using Yogyakarta batik motifs. Trigger questions were posed to elicit responses that shed light on students' perspectives and proficiency levels.

Following data collection, the subsequent phase involved data analysis to address the research inquiries. The qualitative approach, as delineated by Rijali (2019), guided the data analysis process, which comprised three key steps: data reduction, data presentation, and conclusion drawing. Data reduction involved condensing and organizing the collected data to extract pertinent information relevant to the research objectives. Subsequently, the data were presented systematically, utilizing appropriate techniques such as categorization or thematic analysis to elucidate patterns and themes. Finally, conclusions were drawn based on the analyzed data, facilitating insights into the effectiveness of association activities in enhancing students' understanding of quadrilateral and triangular concepts through the cultural lens of Yogyakarta batik motifs.

Results and Discussion

Based on practical implementation within the school setting, it is evident that learning mathematics, specifically focusing on the competencies related to rectangles and triangles, through ethnomathematics-based association activities utilizing Yogyakarta batik motifs, has yielded positive outcomes. While all students were already familiar with the concept of Yogyakarta batik, their awareness of the specific motifs within Yogyakarta batik was limited. However, their response to integrating cultural concepts into mathematics learning was notably positive and enthusiastic. This was particularly evident during activities involving the creation of batik motifs incorporating quadrilateral and triangular elements, where students exhibited high levels of creativity. This demonstrates their ability to apply mathematical concepts within a cultural context in innovative ways.

Furthermore, the mathematics learning activities, grounded in the ethnomathematics of Yogyakarta batik motifs, not only fostered understanding of quadrilateral and triangular motif

patterns but also nurtured students' problem-solving skills, encouraged creative thinking, and facilitated self-expression. By intertwining mathematical concepts with cultural elements, students were able to perceive mathematics not merely as an isolated skill but as a versatile tool applicable in everyday life and as a significant aspect of cultural heritage. This holistic approach not only enhances students' mathematical proficiency but also fosters a deeper appreciation for the cultural significance of mathematics, reinforcing the interconnectedness between academic learning and cultural heritage.

Association activities conducted in mathematics learning at school, focusing on the competencies related to rectangles and triangles, and drawing upon the ethnomathematics of Yogyakarta batik motifs, encompass a multifaceted approach aimed at engaging students and fostering a deeper understanding of mathematical concepts within a cultural context. These activities typically involve several key components.

Researchers introduced the concept of ethnomathematics and Yogyakarta batik motifs to students

Introducing the concept of ethnomathematics to students holds significant importance as it facilitates their comprehension of the intricate relationship between mathematics and culture within the context of Yogyakarta batik motifs. The researcher elucidated that ethnomathematics serves as a discipline aimed at deciphering how mathematical principles are intricately woven into cultural practices and expressions (Marsigit, 2018). By conveying this concept to students, they are equipped with a framework to appreciate the symbiotic relationship between culture and mathematics. Furthermore, the researcher provided a simplified explanation of how the concept of ethnomathematics can be applied specifically to Yogyakarta batik motifs.

In this instance, the researcher expounded that Yogyakarta batik motifs frequently incorporate the geometric concepts of rectangles and triangles into their designs. Rectangles often serve as foundational elements, manifesting in patterns such as small squares or regular lines, thereby forming the basis of intricate motifs. Triangles, on the other hand, are utilized to create repeated triangular patterns or as angles delineated by batik lines. Through this explanation, students gain insight into how mathematical concepts manifest within the intricate designs of Yogyakarta batik motifs. Additionally, the researcher illustrated this concept by presenting Yogyakarta batik motifs adorned with discernible rectangular and triangular patterns, further solidifying the connection between mathematical principles and cultural expressions.

The researcher showed examples of Yogyakarta batik motifs

At this stage, students were provided with photo sheets featuring Yogyakarta batik motifs, which served as essential visual aids in their exploration of mathematical concepts pertaining to quadrilaterals and triangles. The chosen motifs, including *batik nitik, nam gedheg*, and *semen gunung* motifs sourced from the esteemed Sonobudoyo Museum in Yogyakarta, offered diverse

examples for students to analyze and draw connections between mathematical principles and cultural expressions.

By incorporating these authentic batik motifs into the learning process, students were immersed in the rich cultural heritage of Yogyakarta, while simultaneously engaging with mathematical concepts in a tangible and meaningful manner. The batik *nitik* motif, for instance, showcases intricate patterns formed by repeated geometric shapes, providing a platform for students to identify and analyze the presence of quadrilaterals and triangles within its design. Similarly, the *nam gedheg*, and *semen gunung* motifs offer unique compositions, allowing students to explore the various ways in which rectangles and triangles are utilized to create visually captivating patterns.

Through the utilization of these photo sheets, students were encouraged to actively observe and critically analyze the geometric elements present in each motif. This hands-on approach not only fostered a deeper understanding of mathematical concepts but also instilled a sense of appreciation for the cultural significance embedded within Yogyakarta batik motifs. By bridging the gap between mathematics and culture through these visual aids, students were able to enhance their learning experience and develop a holistic understanding of both mathematical principles and cultural expressions.

The researcher explained to the students the values of cultural elements contained in the batik motifs of *nitik*, *nam gedheg*, and *semen gunung*

Following the insights derived from the Sonobudoyo museum, it is revealed that each Yogyakarta batik motif holds profound cultural significance, offering a window into the rich tapestry of Javanese traditions and customs. The *nitik* batik motif, traditionally worn during the *siraman* ceremony, symbolizes a pivotal moment in wedding rituals, signifying purification and preparation for marital union. Similarly, the *gedheg* batik motif, inspired by woven bamboo, originates from rural communities outside the palace walls, encapsulating the socio-cultural fabric of rural life prevalent in the late 18th to early 19th centuries. This motif not only serves as a testament to the artisanal heritage of these communities but also reflects their ingenuity and resourcefulness in adapting natural elements into artistic expressions.

Furthermore, the mountain cement batik motif, worn during the *panggih* event, embodies the celebratory atmosphere of matrimonial unions, symbolizing the union of the bride and groom as they embark on their journey together. This motif, adorned with cement-patterned *kampuh*, reflects the timeless elegance and grace associated with Javanese wedding traditions, epitomizing the harmonious blending of cultural heritage and aesthetic beauty. By delving into the cultural values embedded within each Yogyakarta batik motif, students gain a deeper appreciation for the intricate symbolism and significance imbued within these artistic creations.

With this understanding of the cultural elements underlying each motif, students are then prompted to identify the patterns of rectangular and triangular shapes woven into the fabric of Yogyakarta batik motifs. This analytical exercise not only sharpens students' observational skills but also fosters a deeper understanding of geometric concepts within the context of cultural expressions, bridging the gap between mathematics and cultural heritage. Through this

interdisciplinary approach, students are empowered to explore the intersectionality of mathematics and culture, enriching their learning experience, and fostering a deeper appreciation for the cultural significance of Yogyakarta batik motifs.

Researchers and students identify the patterns and shapes of rectangles and triangles found in Yogyakarta batik motifs

In the exploration of the *nitik* batik motif, the researcher initiated a discussion with students by posing the question, "What type of rectangular flat shape is found in the *nitik* batik motif?" Most students responded with "square," while a few suggested "rectangle." Subsequently, the researcher clarified that the specific type of quadrilateral present in the *nitik* batik motif is indeed a square flat shape. To reinforce this understanding, students were encouraged to actively participate by identifying and showcasing the square flat shapes within the *nitik* batik motif.

In response to the researcher's prompt, one of the eight students stepped forward to demonstrate the rectangular flat shapes evident in the *nitik* batik motif. Through this interactive exercise, students were afforded the opportunity to apply their knowledge and engage directly with the cultural and mathematical elements present in the batik motif. By actively participating in the identification and visualization of geometric shapes within the motif, students were able to deepen their understanding of quadrilaterals and their significance within the context of Yogyakarta batik motifs. This hands-on approach not only facilitated a more immersive learning experience but also encouraged student engagement and critical thinking skills development.

Figure 1. *Nitik* batik motif

Continuing the exploration, the researcher presented the par *gedheg* batik motif to the students, initiating a discussion by asking, "What type of quadrilateral flat shape is found in the par *gedheg* batik motif?" In response, 4 students identified the shape as a "rhombus," 3 students suggested "square," and 1 student proposed "kite." Following this, the researcher provided

clarification, affirming that the specific type of quadrilateral flat shape present in the par *gedheg* batik motif is indeed the rhombus.

Building upon this understanding, the researcher then prompted students to actively engage with the motif by inviting them to identify and showcase the quadrilateral rhombuses within the par *gedheg* batik motif. By encouraging student participation in this manner, the researcher fostered a collaborative learning environment wherein students could apply their knowledge and analytical skills to decode the geometric elements embedded within the cultural context of Yogyakarta batik motifs. This interactive approach not only reinforced students' understanding of geometric shapes but also deepened their appreciation for the intricate patterns and cultural symbolism inherent in batik art. Through hands-on exploration and guided inquiry, students were empowered to connect mathematical concepts with real-world cultural artifacts, enriching their learning experience and fostering a holistic understanding of mathematics within a cultural context.

Figure 2. *Nam gedheg* batik motif

Continuing the inquiry, the researcher introduced the *semen gunung* batik motif to the students, following the exploration of the *nitik* and *nam gedheg* batik motifs. Once again, the researcher engaged students by posing questions regarding the type of flat shape present in the semen *gunung batik* motif. In unison, all students correctly identified the triangular flat shape as the predominant geometric element within the motif. In recognition of their accurate responses, the researcher commended all 8 students for their participation and understanding.

Following this affirmation, the researcher invited representatives from the student body to demonstrate the triangular flat shapes embedded within the semen *gunung batik* motif. By encouraging student involvement in this manner, the researcher facilitated a collaborative learning environment wherein students could actively apply their knowledge and observational skills to analyze geometric patterns within cultural artifacts. Through this interactive exercise, students were afforded the opportunity to deepen their understanding of triangular shapes and their significance within the context of Yogyakarta batik motifs. Moreover, by showcasing their insights to their peers, students were able to cultivate confidence in their abilities and develop

a sense of ownership over their learning journey. This inclusive approach not only reinforced mathematical concepts but also fostered a deeper appreciation for the cultural heritage encapsulated within Yogyakarta batik motifs.

Figure 3. *Semen Gunung* batik motif

Following the examination of square, rhombus, and triangle flat shapes within the *nitik*, *nam gedheg*, and *Semen Gunung* batik motifs, the researchers proceeded to instruct the students to redraw these shapes on individual white paper sheets. Additionally, students were tasked with identifying and documenting the characteristics of each flat shape. This activity aimed to reinforce students' understanding of geometric shapes and their properties while providing an opportunity for independent application of knowledge.

As students embarked on this task, they were encouraged to carefully recreate the square, rhombus, and triangle shapes observed in the batik motifs, paying attention to details such as side lengths, angles, and symmetry. Furthermore, students were prompted to articulate the defining characteristics of each shape, including the number of sides, angles, and types of symmetry present. By engaging in this hands-on activity, students were able to actively participate in the learning process, reinforcing their understanding of geometric concepts through practical application.

Through this exercise, students not only honed their drawing skills but also developed a deeper appreciation for the inherent properties of square, rhombus, and triangle shapes. By documenting the characteristics of each shape, students solidified their understanding of geometric principles, laying a foundation for further exploration and inquiry in mathematics learning. Moreover, this activity encouraged students to take ownership of their learning by actively engaging with the material and demonstrating their comprehension through independent work.

Researchers provide learning activities to students by trying to make simple batik motifs that contain elements of rectangular and triangular batik motifs

Following students' ability to draw and identify the characteristics of quadrilateral and triangular flat shapes, the subsequent phase entails applying this knowledge to create batik motif designs incorporating these geometric elements. In this creative endeavor, students are afforded the freedom to exercise their artistic expression, combining quadrilateral and triangle elements to craft unique batik motifs. Throughout this process, students are encouraged to think critically and explore various design possibilities, experimenting with size, angle, and orientation to enhance the visual appeal of their motifs.

During this creative exploration, the researcher assumes a supportive role, providing guidance and feedback to assist students in refining their designs. By offering constructive input, the researcher facilitates students' growth and encourages them to iteratively improve their motifs. Through this collaborative exchange, students are empowered to refine their artistic vision, honing their design skills and cultivating their aesthetic sensibilities.

Here are some examples of batik motifs created by two students, showcasing their innovative use of quadrilateral and triangular flat shapes. These designs exemplify the students' creative flair and demonstrate their ability to integrate geometric concepts into visually captivating motifs. Through this hands-on activity, students not only deepen their understanding of geometric shapes but also develop their creativity and problem-solving skills, underscoring the interdisciplinary nature of mathematics and art within the cultural context of Yogyakarta batik motifs.

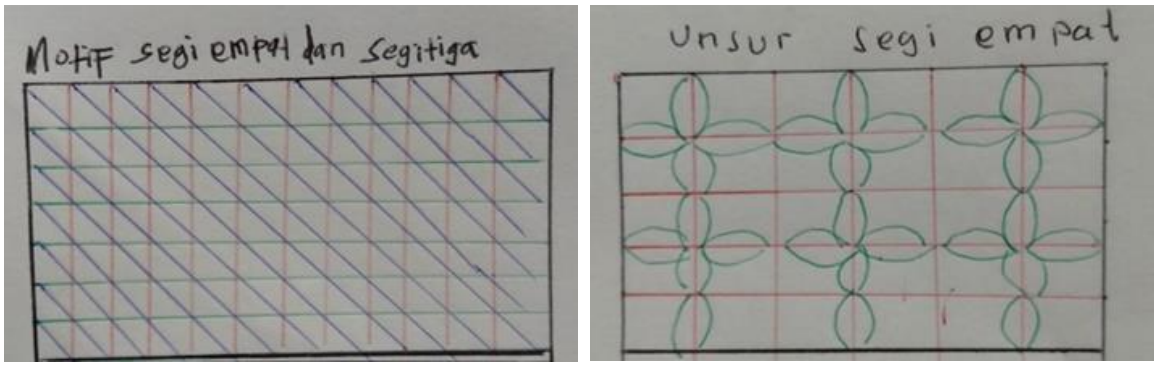

Figure 4. Student-made batik motifs

Researchers and students discuss and share their work

Following the creation of simple batik motifs, both researchers and students engage in group discussions aimed at sharing their work and experiences. During these discussions, students could elucidate the patterns and geometric shapes utilized in their batik motifs, fostering an environment of collaborative learning and knowledge exchange. Additionally, students compare and analyze the differences and similarities between their batik motifs, considering aspects such as shape, size, and layout.

It is observed that many students employ the concept of quadrilaterals in their batik motif designs, often beginning by measuring the length of each side to ensure uniformity in their squares. Each student then infuses their unique creativity into their batik creations, resulting in a diverse array of motifs. Throughout this process, the researcher provides feedback and praise for the students' efforts and creativity, fostering a supportive atmosphere that celebrates individual expression and innovation.

This feedback serves to acknowledge and appreciate students' creative endeavors, reinforcing their confidence and motivation to engage in artistic activities. By recognizing students' achievements and encouraging their creative pursuits, the researcher cultivates a positive learning environment that values and nurtures students' talents and interests. Through group discussions and constructive feedback, students not only deepen their understanding of geometric concepts but also develop essential skills in communication, critical thinking, and self-expression, highlighting the interdisciplinary nature of mathematics and art within the cultural context of Yogyakarta batik motifs.

Conclusion

The study's findings delineate a structured approach to ethnomathematics-based mathematics learning, particularly focusing on Yogyakarta batik motifs and their relation to the competencies of rectangles and triangles. This educational journey unfolds through several distinct stages, each tailored to seamlessly integrate cultural elements into mathematical education. Commencing with the introduction of ethnomathematics concepts, students are guided to grasp the intrinsic connection between mathematics and culture, setting the stage for a rich exploration of Yogyakarta batik motifs. As students delve deeper, they are presented with tangible examples of batik motifs adorned with rectangular and triangular patterns, providing a visual canvas for the application of geometric principles within cultural artifacts.

Moreover, the cultural significance embedded within batik motifs is meticulously elucidated, fostering an appreciation for the artistic heritage and symbolic resonance inherent in these designs. Through guided activities, students hone their observational and analytical skills, identifying and documenting the intricate patterns woven into batik motifs. This hands-on engagement culminates in the creation of simple batik motifs, where students infuse their creativity while applying geometric concepts to craft visually captivating designs. This collaborative learning environment is further enriched through group discussions, where students share their work, exchange ideas, and reflect on their learning experiences.

Throughout this educational journey, students demonstrate not only a keen interest but also an enthusiastic engagement in the learning process. Active participation is evident as students eagerly inquire about the characteristics of geometric shapes, enthusiastically share their insights during discussions, and collaborate with peers in the creation of batik motifs. By seamlessly intertwining mathematical concepts with cultural expressions, this approach transcends traditional disciplinary boundaries, fostering a holistic understanding of mathematics that is deeply rooted in cultural context. Through ethnomathematics-based

mathematics learning, students not only deepen their knowledge of geometric principles but also cultivate a profound appreciation for cultural heritage, thereby embracing a multidimensional approach to education that celebrates diversity and fosters cross-cultural understanding.

Acknowledgment

The authors thank all those who have helped in carrying out the research.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been covered completely by the authors.

References

Amin, & Sumendap, L. Y. S. (2022). *164 model pembelajaran kontemporer*. Bekasi: Pusat Penerbitan LPPM UIN 45.

Andriani, S., & Septiani, I. (2020). Etnomatematika motif ceplokan batik Yogyakarta dalam peningkatan pemahaman konsep matematika siswa. *Delta: Jurnal Ilmiah Pendidikan Matematika*, *8*(1), 81-92. https://doi.org/10.31941/delta.v8i1.966

Budiyanto, M. A. K., Waluyo, L., & Mokhtar, A. (2016). Implementasi pendekatan saintifik dalam pembelajaran di pendidikan dasar di Malang. *Biology Education Conference*, *13*(1), 46–51. Retrieved from https://jurnal.uns.ac.id/prosbi/article/view/5648/5016

D'Ambrosio, U. (2020). An essay on philosophy, mathematics and culture. *Revista Pesquisa Qualitativa*, *8*(18), 571–594. https://doi.org/10.33361/rpq.2020.v.8.n.18.345

Dahlan, J. A., & Nurrohmah. (2018). Integrasi budaya masyarakat dalam pembelajaran matematika: Contoh dalam pembelajaran sistem persamaan linear dua variabel. *Jurnal Penelitian Dan Karya Ilmiah*, *18*(1), 15–31. https://doi.org/10.33592/pelita.v18i1.25

Faiziyah, N., Sutama, Sholihah, I., Wulandari, S., & Yudha, D. A. (2020). Enhancing creativity through ethnomathematics. *Universal Journal of Educational Research*, *8*(8), 3704–3710. https://doi.org/10.13189/ujer.2020.080850

Hosnan, M. (2014). *Pendekatan saintifik dan kontekstual dalam pembelajaran abad 21*. Jakarta: Yudhistira Ghalia Indonesia.

Hutauruk, A. J. (2020). Karakteristik etnomatematika dalam pembelajaran sekolah. In *Prosiding Webinar Ethnomathematics*, *1*(1), 58-62. http://repository.uhn.ac.id/bitstream/handle/123456789/3963/Prosiding-Webinar-Nasional.pdf?sequence=14&isAllowed=y#page=38w

Lisnani, L., Zulkardi, Z., Putri, R. I. I., & Somakim, S. (2020). Etnomatematika: pengenalan bangun datar melalui konteks museum negeri Sumatera Selatan Balaputera Dewa. *Mosharafa: Jurnal Pendidikan Matematika*, *9*(3), 359–370.

https://doi.org/10.31980/mosharafa.v9i3.754

Marsigit, Condromukti, R., Setiana, D.I., & Hardianti, S. (2018). Pengembangan pembelajaran matematika berbasis etnomatematika. *Prosiding Seminar Nasional Pendidikan Matematika Etnomatnesia*, 20-37. Retrieved from https://jurnal.ustjogja.ac.id/index.php/etnomatnesia/article/view/2291

Narut, Y. F., & Supradi, K. (2019). Literasi sains peserta didik dalam pembelajaran IPA di Indonesia. *Jurnal Inovasi Pendidikan Dasar*, *3*(1), 61–69. https://doi.org/10.36928/jipd.v3i1.214

Pahrudin, Agus & Pratiwi, D. D. (2019). *Pendekatan saintifik dalam implementasi kurikulum 2013 & dampaknya terhadap kualitas proses dan hasil pembelajaran*. Bandar Lampung: Ali-Imron Pustaka.

Prahmana, R. C. I., & D'Ambrosio, U. (2020). Learning geometry and values from patterns: Ethnomathematics on the batik patterns of Yogyakarta, Indonesia. *Journal on Mathematics Education*, *11*(3), 439–456. https://doi.org/10.22342/jme.11.3.12949.439-456

Rahardjo, M. (2017). *Studi kasus dalam penelitian kualitatif : konsep dan prosedurnya*. Malang: UIN Maulana Malik Ibrahim Program Pascasarjana. Retrieved from http://repository.uin-malang.ac.id/1104/

Rijali, A. (2019). Analisis data kualitatif. *Alhadharah: Jurnal Ilmu Dakwah*, *17*(33), 81-95. https://doi.org/10.18592/alhadharah.v17i33.2374

Sani, A. H. (2015). Pembelajaran matematika berbasis pendekatan saintifik dan kaitannya dengan menumbuhkan keterampilan berpikir tingkat tinggi. *Seminar Nasional Matematika Dan Pendidikan Matematika UNY*, 57–62. Retrieved from http://seminar.uny.ac.id/semnasmatematika/sites/seminar.uny.ac.id.semnasmatematika/files/banner/PM-9.pdf

Wahidmurni. (2017). Pemaparan metode penelitian kualitatif. *Research Repository UIN Malik Ibrahim Malang*, *87*(12), 149–200. http://repository.uin-malang.ac.id/1984/2/1984.pdf