GPrEEc
Glocal Praxis in Elementary Education
Volume 2 Issue 1 (2026)

Ethnomathematics Exploration of Geometry Concepts for Grade V at the Surabaya Education Museum as a Cultural Heritage

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ARTICLE INFO

Received : 17 June 2026
Revised : 22 June 2026
Accepted : 3 July 2026
Published : 5 July 2026

Keywords:
Ethnomathematics; geometry learning; cultural heritage; student perceptions; elementary education.

ABSTRACT

This study aims to explore concepts of 2D and 3D geometry within the architectural elements of the Surabaya Education Museum a designated cultural heritage site and to describe the perceptions of fifth grade elementary school students regarding these concepts through an ethnomathematical approach. While ethnomathematics research is extensive, studies exploring geometric concepts in cultural heritage buildings while incorporating student perceptions as a mathematics learning resource remain limited. This study employs a qualitative approach using an ethnographic method. Data collection involved direct observation at the museum, in depth interviews with museum management and fifth grade students from SDN Kaliasin I Surabaya, and documentation including photographs and field notes of the research objects. The exploration revealed the application of 2D geometric concepts, such as triangles in the gable, squares in the floor tiles, rectangles in the doors, squares in the windows, and rhombuses in the transom grille ornaments. Regarding 3D geometric concepts, rectangular prisms and cylinders were identified in the main pillar structures, triangular prisms in the corridor roofs, and spheres in the building's pinnacle ornaments. Student perceptions were positive; students were able to recognize geometric objects in a concrete manner and expressed that cultural heritage based mathematics learning created an enjoyable learning atmosphere. These findings demonstrate that cultural heritage sites can serve as contextual learning resources that support the understanding of geometric concepts while fostering students' awareness and appreciation of local cultural heritage.

How to Cite: Putri, N. E., Mariana, N., & Cahapay, M. B. (2026). Ethnomathematics exploration of geometry concepts for Grade V at the Surabaya Education Museum as a cultural heritage. *Glocal Praxis in Elementary Education, 2*(1), 54-69.

Mathematics is a fundamental discipline that plays a crucial role in the development of science and technology. Learning mathematics is a fundamental skill required in the educational process (Rahmaini & Chandra, 2024). Mathematics focuses not only on the use of formulas and arithmetic operations, but also involves understanding concepts, logical reasoning skills, and problem-solving skills, which are essential for students' intellectual development (Wiryana & Alim, 2023). At the elementary school level, mathematics serves as a foundation for students to recognize and understand various concepts related to everyday life and provides preparation for learning at the next level of education (Hayati & Jannah, 2024). However, the results of the 2022 Programme for International Student Assessment (PISA) released by the OECD also show that Indonesian students' mathematical abilities are still low, necessitating more contextual learning to enhance meaningful and enjoyable mathematical concepts.

Geometry is an important part of mathematics learning in elementary schools because it contributes to developing students' logical and spatial thinking skills (Azhirakeisha et al., 2024). Geometry material includes the study of points, lines, angles, planes, space, as well as plane and solid shapes. Students' difficulties in learning geometry occur because learning emphasizes memorizing formulas and formal symbols, so students find mathematics difficult to understand, lack confidence, and consider mathematics learning far from everyday life (Saragih et al., 2025). Therefore, a more contextual learning approach is needed so that students can connect mathematical concepts with their surroundings.

In the constructivist theory proposed by Jean Piaget and Lev Vygotsky, it is explained that knowledge is formed through active learning experiences, students develop their understanding through interactions with the social and cultural environment around them (Witasari, 2024). D'Ambrosio (1985) explains that ethnomathematics is the study of how a cultural group understands, expresses, and uses mathematical concepts in everyday life activities. Ethnomathematics can be applied as a learning approach that is able to link mathematical concepts with local cultural values. Ethnomathematics is an innovation in mathematics learning that provides a more meaningful and interesting learning experience and introduces students to their culture which is gradually being forgotten (Rudyanto, 2019). By integrating mathematics learning with their cultural heritage, students will find the subject more interesting and relevant, while developing a sense of pride and appreciation for their local culture (Wiryanto et al., 2024).

Indonesia has a rich cultural and historical diversity. One tangible manifestation of this cultural wealth can be seen in the cultural heritage that is still preserved as part of the nation's heritage. Cultural heritage is a historical legacy that has high cultural and historical value, and bears witness to the journey of the development of the Indonesian nation over time (Tahiru et al., 2023). Cultural heritage not only has historical value but can also be used as a source of mathematics learning because it contains various geometries that are close to students' daily lives. One such cultural heritage building is the Surabaya Education Museum, which to this day still maintains the character of Dutch colonial architecture. These characteristics are evident in the presence of triangular gables on the facade, a terrace leading to a central courtyard, and the use of large doors and windows.

Based on the results of observations conducted by researchers for the learning process of plane figures is still delivered abstractly. Teachers tend to use forms without real context and only

provide formulas to students without being accompanied by applicable understanding. As a result, students often have difficulty in understanding abstract geometric forms, such as solid figures and angles, due to limited mental visualization abilities (Rampal et al., 2024). The results of observations conducted by researchers at one of the elementary schools located near the Education Museum, found that the teachers interviewed were not yet aware of the concept of ethnomathematics that can be applied to historical buildings or local culture as a source of geometry learning. These findings indicate that the integration of local culture in mathematics learning, especially geometry, is still limited among educators.

Previous research has shown that cultural heritage buildings contain various geometric concepts such as plane shapes, spatial shapes, and geometric transformations. Research by Setianingrum et al. (2025) found the concepts of pyramids, prisms, and cubes in the architecture of temple buildings. Meanwhile, Wahyuni et al. (2024) various geometric concepts such as triangles, rectangles, circles, and solid shapes like cuboids, cubes, and pyramids were also found in the Grand Mosque of Surakarta. However, these studies generally focused on identifying geometric shapes in buildings, with little attention paid to their relationship to student perceptions in learning.

Previous research has generally focused on identifying geometric forms within the context of cultural buildings, without directly linking them to the student learning process. Therefore, the novelty of this study lies in its focus on elementary school students' perceptions of the geometric concepts found in cultural heritage objects at the Surabaya Education Museum. This approach not only explores the geometric shapes present in historical buildings but also examines how students understand and connect these concepts to the material they study in school.

An ethnomathematical approach utilizing the Surabaya Education Museum a cultural heritage site aims to hone the critical thinking and problem solving skills of elementary school students. Engaging with objects within the museum allows students to connect mathematical concepts to the tangible items they observe, thereby enabling a more concrete understanding and visualization of these concepts. By exploring the geometric principles found in the historic architecture, it is hoped that various geometric ideas will be uncovered, serving as contextual and engaging learning resources and media that resonate with the students' own experiences.

METHODS

This research applies qualitative research, using ethnographic and case study approaches. According to Creswell (2015) qualitative research is an in-depth investigative process to individual or group related problem social or aspect life human beings, which are presented in a way whole and complex in form narrative, as well as report information in a way direct from the source with detailed and natural without intervention researcher. In this research, a qualitative approach through ethnographic methods is used to gain a deep understanding of ethnomathematics phenomena in the context of local culture, particularly those related to historic buildings. Meanwhile, case studies are applied to explore how students recognize and understand geometric concepts that appear in these cultural heritage objects.

In this study, the sampling technique employed was purposive sampling specifically, the

deliberate selection of a sample based on criteria aligned with the research objectives. According to Creswell (2015), purposive sampling is a technique in which the researcher intentionally selects participants based on their suitability regarding the research focus and requirements. The study participants consisted of three fifth-grade students from SDN Kaliasin I Surabaya. These three students were selected because they had studied the material on 3D and 2D shapes and were able to articulate their understanding during the interview process.

Data collection was conducted through observation, semi-structured interviews, and documentation. Observations were carried out to identify geometric concepts present in the architectural elements of the Surabaya Education Museum. Subsequently, each student was interviewed individually after observing the museum's features. The interviews aimed to explore how the students recognized, interpreted, and named the geometric concepts they identified within the museum building. The entire interview process was recorded with the participants' consent and subsequently transcribed for data analysis purposes.

The interview guide was developed based on the research objectives regarding ethnomathematics and geometry learning. Prior to its use in the study, the guide was validated by experts to ensure content appropriateness, question clarity, and alignment with the research objectives. The data analysis technique in this study uses a data analysis approach based on the analysis model developed by Spradley. This analysis includes domain analysis to obtain an overview, taxonomic analysis to deepen the research focus, and componential analysis to find data variations. Data were obtained through observation, interviews, and documentation at the Surabaya Education Museum, resulting in in-depth information regarding the ethnomathematics exploration of geometric concepts. And componential analysis to identify data that represents variations or differences in predetermined domains.

RESULTS AND DISCUSSION

Result

This study yielded several findings through a data collection process involving observation, interviews, and documentation during fieldwork. The analysis reveals a key theme: the Surabaya Education Museum stands as a cultural heritage site that preserves the authenticity of its colonial architecture while possessing significant historical value. The museum building showcases Dutch colonial architectural characteristics blended with local Javanese elements and incorporates various architectural features that represent geometric concepts encompassing both two-dimensional shapes and three-dimensional forms.

Observations, corroborated by interviews with tour guides and museum curators, indicate that the majority of the building's structure retains its original form from the colonial era. This authenticity is evident in features such as the stone flooring, window grilles, and various original doors and windows that have been preserved. Renovations were limited to repairing damaged sections, without altering the building's original architectural form or character. Furthermore, the museum holds historical significance, having previously served as a Taman Siswa school. At the rear of the museum stands the "Villa Rivierzicht" (Villa with a River View) inscription, indicating that the area was once a Dutch residential settlement. These findings suggest that the Surabaya

Education Museum serves not only as a site for preserving the history of education but also as a cultural heritage asset representing a blend of historical, cultural, and architectural values. These characteristics make the museum a rich context for exploring geometric concepts within the study of ethnomathematics.

Figure 1. Front of the Surabaya Education Museum

At the very top, in the center of the building, you can see a geometric shape in the form of a triangle. This part is a supporting element for the building's facade, called a *gable*. This section is a supporting element for the face which is located on the front of the building and has a triangular shape that matches the shape of the roof (Tarore et al., 2016). The rectangular shape is also visible in the windows on the front and sides of the building, where the middle part of the window contains glass protected by vertically arranged iron bars

Figure 2. Building Roof Peak Ornaments

The image shows a peak ornament atop a fence or roof of a building. This ornament forms a spherical shape, as the topmost part is round and has a perfectly curved surface with no sides or corners.

Figure 3. Front Pillar of the Museum Figure

Figure 4. Pillar in the Museum

At the front of the museum there are also pillars in the form of tubes and beams with a plain white surface with a position attached to the wall, and decorated with small floral ornaments on the top of the pillars. According to Soegiarto & Rares (2025) columns in the section facade front be one of visual elements that stand out and have function No only as support structure building, but also as symbol strength, order, and majesty.

Figure 5. Front View Door

Figure 6. Rear View of Door

The doors at the Education Museum are a distinctive element of Dutch colonial architecture, possessing their own unique qualities. These doors consist of two layers: a wooden door leaf with a vent or lattice on the outside, and a glass door on the inside. Above them is a transom with a patterned trellis. Geometrically, the door is a vertical rectangle, while the transom window is a horizontal rectangle

Figure 7. *Bovenlicht*

Transom windows are rectangular with decorative iron or metal ornaments that form diagonal patterns like rhombuses and triangles. Transom windows located above windows or entrance doors function to allow cross-ventilation in tropical climates. They can be round, oval, or rectangular and decorated with decorative elements made of wood or metal (Soegiarto & Rares, 2025).

Figure 8. Window with shutters

Figure 9. Window without shutters

These windows are rectangular and neatly arranged in the walls of the building. There are two types of windows: one with a wooden door that can be opened sideways, and the other without.

The use of these double-glazed windows serves a similar function to double-glazed doors: to enhance security while supporting air circulation and natural lighting in the building (Nurtantyo & Wikantiyoso, 2018). Apart from having a rectangular shaped bovenlicht above the door, the Education Museum also has a circular bovenlicht above the window.

Figure 10. Rear of the Education Museum

The rectangular windows on the rear facade of this building are quite large, with glass extending from floor to ceiling. The building's layout is open-plan, creating a cooler atmosphere floor to ceiling. The building's layout is open-plan, creating a cooler atmosphere (Alfatah & Elviana, 2024).

Figure 11. Tiles without motifs

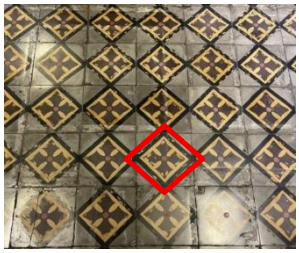

Figure 12. Tiles with motifs

The museum's floor is the original floor that has been preserved to this day. This floor consists of plain and patterned tiles, each tile having a square shape.This arrangement is in accordance with the concept of tiling (*tessellation*), namely geometric patterns arranged repeatedly to cover a flat surface completely without gaps or overlaps (Sukmawati et al., 2015). Each tile has a square base arranged in a regular pattern on the floor. Within it is a rhombus-shaped motif formed by symmetrically intersecting lines and planes, creating a balanced diagonal pattern.

Figure 13. Museum Exhibition Hall Pillars

The use of these pillars demonstrates one of the architectural characteristics that developed during the colonial period. Similar pillar shapes are found not only on the building's front facade but also in the Museum of Education's seminar room. The pillars are elongated, have flat surfaces, and are decorated with vertical lines on their exteriors. The foundation columns or piers serve to support the weight of the upper part of the building so that the weight does not rest entirely on the walls (Aditama & Caesar, 2022).

Figure 14. Library Space

The museum's corridor or wing features a roof shaped like a triangular prism. This shape is evident from the ridge line, which acts as the upper rib, and the two inclined planes that form the vertical sides of the prism. The roof on the corridor or wing of the Education Museum is a gable roof. The gable roof is known as one of the simplest roof shapes. This roof is composed of two roof planes that meet at a peak line called the ridge (Kapita & Mahabella, 2020).

Based on the results of observations, documentation, and interviews, the Surabaya Education Museum is a cultural heritage building that still maintains the characteristics of Dutch colonial architecture with a blend of local Javanese elements. The museum building has various architectural elements that demonstrate geometric concepts, both flat and spatial shapes. The concept of flat shapes is seen in the triangular shape of the gable and roof sections, rectangles on doors, windows, and bovenlicht, squares on floor tiles, circles on ventilation and building ornaments, and rhombuses on ventilation motifs and floor tile patterns. In addition, there are also spatial concepts such as beams and tubes on building pillars, spheres on roof peak ornaments, and triangular prisms on the shape of the museum corridor roof. These various geometric shapes not only function as aesthetic elements of the building, but also have supporting functions, such as air ventilation, natural lighting, security, and support for the building structure.

After exploring the cultural heritage of the Surabaya Education Museum and discovering geometric concepts in its building elements, researchers conducted interviews with fifth-grade students of SDN Kaliasin I to determine their perceptions of these concepts. This activity aimed to assess students' ability to recognize geometric shapes in doors, windows, roofs, floors, and other building ornaments. Furthermore, interviews were conducted to determine students' responses and interest in learning that utilizes the Education Museum as a learning medium, and to determine whether this approach can help students understand the material more easily. **Tables 1–7** present the interview results regarding students' perceptions of the Education Museum building. This study involved three fifth-grade students from SDN Kaliasin I Surabaya as interview participants to gain insight into their ability to recognize geometric concepts in the Surabaya Education Museum building and their perceptions of culture-based mathematics learning. As the three students'

responses showed similar trends, the researcher presents the interview transcript of only one student as representative data in a table format. Meanwhile, the results from the other two students are presented narratively to avoid excessive data repetition. Overall, the three students were able to identify various 2D and 3D shapes within the museum objects and responded positively to mathematics learning linked to culture and the surrounding environment.

Table 1. Interview Results of Front Facade Image

Museum Building	Interview Transcript	Student
	Researcher : From the picture you observed, are there any shapes that you can find? Student : Yes, there is a triangle shape and then there is a ball (pointing to the roof wall and the top ornament of the museum) Researcher: Look closely, what other forms are there? Student : Here, there are cuboid and cylinder shapes (pointing to the pillars of the museum building) Researcher : What shape is the window? Student: Rectangle, sis	

Table 2. Interview Results of Side Facade Drawings

Museum Building	Interview Transcript	Student
 	Researcher: In this picture, what shapes do you think there are? Student : This window is square, sis, then here is a circle (pointing to the windows and ventilation of the museum building), then the door is rectangular, sis. Researcher: Then what shape does the metal ventilation form? Student : Rhombus, sis	

Table 3. Interview Results of Rear Facade Image

Museum Building	Interview Transcript	Student
	Researcher: What shape are the windows here? Student : This is rectangular, sis (pointing to the museum window).	

Table 4. Interview Results: Museum Exhibition Floor Images

Museum Building	Interview Transcript	Student
 	Researcher : What shape are the windows here? Student : This is square, but this is rhombus (pointing to the motif on the floor)	 

Table 5. Interview Results : Picture of the Museum Seminar Room

Museum Building	Interview Transcript	Student
	Researcher : In your opinion, is there a geometric shape in the picture? Student : Yes, this is shaped like a block, sis (pointing to the museum pillar)	

Table 6. Interview Results: Image of Library Space

Museum Building	Interview Transcript	Student
	Researcher : Take a look at the roof of this building, what is there? Student : The shape of a prism.	

Table 7. Interviews Results: Students' Perceptions of Mathematics Learning

Interview Transcript	Student
1. Can you differentiate between flat and spatial shapes in the objects in the museum? 2. Do you think museum buildings can be used to learn mathematics? 3. How do you feel when studying Mathematics related to culture?	1. If a flat shape is like 2 dimensions, if a spatial shape is 3 dimensions, sis. 2. Yes, you can, because there are many forms that can be learned. 3. Happy, then it's quite easy to differentiate, sis.

The interview with the second student revealed that they were able to identify various geometric shapes found in the Surabaya Education Museum building such as rectangles in the doors and windows, triangles in the roof, squares in the flooring, circles in the ventilation, and rhombuses in the transoms and tile patterns as well as three dimensional shapes like rectangular prisms, cylinders, spheres, and prisms within the building's structure. The student was also able to distinguish between two dimensional and three dimensional shapes based on their characteristics. Furthermore, the student noted that the museum could serve as a resource for learning mathematics, as it offers numerous geometric shapes that can be observed firsthand. According to the student, mathematics lessons linked to culture are more engaging and help improve concentration.

Meanwhile, the interview with the third student revealed that they were able to identify various geometric concepts present in the museum building. The student recognized shapes such as rectangles, squares, circles, and rhombuses, as well as solids like rectangular prisms, cylinders, and prisms, within the observed architectural elements. The student could explain the distinction between two-dimensional and three-dimensional shapes based on the presence of volume in the latter. Furthermore, the student suggested that the museum building could serve as a medium for mathematics learning, as it offers real-world examples of both two-dimensional and three-dimensional shapes. The student also responded positively to mathematics instruction linked to culture, noting that it facilitated a better understanding of geometric concepts.

Based on interview results, students find mathematics lessons linked to their culture and environment to be more engaging, enjoyable, and easier to understand. Museums are considered a potential medium for contextual learning, as students can directly observe geometric shapes in real-life settings. Therefore, ethnomathematical exploration at the Surabaya Education Museum offers an alternative mathematics learning method that helps students grasp geometric concepts in a more concrete and meaningful way.

Discussion

The results of research conducted through observation and interviews, it is known that the Surabaya Education Museum, as a cultural heritage building, possesses various geometric concepts that are evident in its architectural elements. These geometric concepts can be found on the building's facade, doors, windows, floors, pillars, roof, and even the building's ornaments. The geometric shapes found in the museum building demonstrate the connection between

mathematical elements and colonial culture and architecture that are still maintained to this day. The connection between culture and mathematics not only broadens the understanding of mathematical concepts but also makes that knowledge more meaningful and easier to apply in everyday life (Pratiwi & Kusno, 2025).

The concepts of flat shapes found include triangles on gables or roof decorations, squares on floor tiles and windows, rectangles on doors, windows, ventilation, and building walls, rhombuses on bovenlicht trellis ornaments and floor tile motifs, and circles on ventilation and building ornaments. Meanwhile, the concepts of spatial shapes found include beams on the main structure of the building and the museum pillars, triangular prisms on the gable roof in the hallway area, tubes on several cylindrical pillars, and spheres on the top ornaments of the fence and the roof of the building. The existence of various geometric concepts shows that the Surabaya Education Museum has the potential as a contextual learning medium that connects mathematical concepts with cultural and architectural elements of cultural heritage buildings.

Thus, the research results show that cultural heritage objects in the Surabaya Education Museum contain various geometric concepts that can be identified in their architectural elements. These geometric concepts not only play a role in structural and aesthetic aspects, but also show the relationship between mathematics, culture, and history in the cultural heritage building of the Surabaya Education Museum. Culture is one of the characteristics of a region's identity. Amid the rapid flow of global culture entering Indonesia, the younger generation has a crucial role in maintaining and preserving local culture, especially cultures that are increasingly less known by the public (Fitriyana & Mariana, 2022).

This study relates to previous research by (Fauziyah & Mariana, 2023), titled "*"Eksplorasi Etnomatematika Konsep Bangun Datar Pada Cagar Budaya Balai Pemuda Surabaya"* and by (Silviana et al., 2024), titled "*"Eksplorasi Etnomatematika pada Bangunan Tua Bekas Karesidenan Pekalongan"*. All three studies examine ethnomathematical concepts within cultural heritage buildings as sources for mathematics learning, particularly regarding geometry. Previous research indicates that various architectural elements such as roofs, pillars, doors, and windows can represent mathematical concepts involving plane figures, three-dimensional shapes, and geometric transformations. Nevertheless, there are differences regarding the objects and the specific focus of the research.

Table 8. Comparison of Geometric Concepts in Cultural Heritage Buildings

Context	Geometry Concept
Cultural Heritage Site Balai Pemuda	Geometric concepts in the form of two-dimensional shapes including triangles, squares, rectangles, rhombuses, trapezoids, octagons, and circles were identified across various architectural elements of the Balai Pemuda building. This study focuses exclusively on the two-dimensional shape concepts present in the structure.
The Old Residency Building in Pekalongan City	Geometric concepts identified in Pekalongan City Old Residential Building include plane figures, solid shapes, and geometric transformations. Plane figures include triangles, rectangles, rhombuses, trapezoids, and semicircles. Solid shapes include pyramids, rectangular prisms, and cylinders, while geometric

Context	Geometry Concept
	transformations include translation (shifting), reflection (mirroring), and congruence.
Museum of Education Cultural Heritage Site	At the Museum of Education, geometric concepts specifically two-dimensional shapes and three dimensional forms can be observed; examples include rectangles in the doors and windows, triangles in the roof structure, and circles in certain ornaments, as well as rectangular prisms, prisms, and spheres within the museum's architectural structure.

Based on the table, it can be concluded that all three cultural heritage buildings incorporate geometric elements into their architecture, yet they possess distinct characteristics. Balai Pemuda excels in the variety of its geometric shapes, the Pekalongan City Residency Building features the most comprehensive geometric concept, while the Museum of Education displays a simpler geometric concept.

The results interviews conducted to student class V of SDN Kaliasin I, obtained description that student own positive perception to draft the geometry contained in objects reserve Surabaya Education Museum culture. Perception the seen from ability student in recognize, mention, and differentiate forms geometry contained in the section museum building. Students capable identify various form get up flat like square, square long, triangles, circles and rhombuses found on doors, windows, roofs and ornaments museum building. Students can also find form get up room like blocks, prisms, cylinders and spheres in the section certain museum building. This is looks from answer capable students show in a way direct parts buildings that have form geometry certain. With Thus, the museum does not only viewed as place storage object historic, but also as source supportive learning understanding draft Mathematics. This approach can help students stay familiar with and preserve their local culture while learning geometric concepts (Setianingrum et al., 2025).

In addition to conceptual understanding, the research also demonstrated a positive student response to mathematics learning linked to culture and the surrounding environment. Most students stated that the learning was "exciting," "enjoyable," and "easier to understand." Students felt more engaged when learning mathematics through direct observation of the shapes found in museum buildings. This demonstrates that the ethnomathematics approach can create a more active and meaningful learning environment because students are directly involved in the process of observing and identifying objects.

Ethnomathematics-based learning through cultural heritage objects at the Surabaya Education Museum also provides a unique learning experience for students. They not only learn mathematical concepts theoretically, but also understand that geometric concepts can be found in everyday life and in cultural buildings in the surrounding environment. This aligns with the goal of the ethnomathematics approach, which connects mathematics learning with local culture to make learning more contextual and meaningful. Ethnomathematics is very suitable for elementary school students because their thinking skills are still concrete, so that mathematics learning linked to culture can help improve mathematical literacy while fostering an appreciation for the nation's cultural heritage (Jannah et al., 2025).

Overall, the results of the study indicate that the perception of fifth-grade students of SDN Kaliasin I towards the concept of geometry in cultural heritage objects at the Surabaya Education Museum is quite good and positive. Students are able to recognize various geometric shapes in the museum building, understand the differences between plane and solid shapes, and show enthusiasm in learning mathematics related to culture. Therefore, the Surabaya Education Museum can be used as an effective learning medium to help students understand the concept of geometry in a more concrete, interesting, and easy to understand way.

CONCLUSION

Based on the results of ethnomathematics exploration research of geometric concepts at the Surabaya Education Museum as a cultural heritage, it can be concluded that the Surabaya Education Museum has various geometric concepts found in the architectural elements of the museum building, including the concept of plane shapes and spatial shapes. The plane shape concepts found include triangles, squares, rectangles, rhombuses, and circles that appear on the roof, doors, windows, ventilation, floors, and building ornaments. In addition, the concept of spatial shapes in the form of blocks, cylinders, prisms, and spheres is also found which is seen in the building structure, pillars, roof, and decorative ornaments of the museum. The existence of these geometric concepts shows that the cultural heritage building of the Surabaya Education Museum has mathematical value that can be used as a contextual learning resource in geometry learning. The museum building also shows the relationship between mathematics, culture, and history.

The perception of fifth-grade students of SDN Kaliasin I Surabaya towards the geometric concepts found in cultural heritage objects at the Surabaya Education Museum showed positive results. Students were able to recognize, name, and differentiate various forms of flat and spatial shapes found in the museum building elements. Students were able to identify flat shapes such as squares, rectangles, triangles, circles, and rhombuses, as well as spatial shapes such as cuboids, cylinders, prisms, and spheres on the doors, windows, roofs, pillars, floors, and ornaments of the museum building. These findings indicate that mathematics learning linked to culture and the surrounding environment can help students understand geometric concepts in a more concrete, interesting, and meaningful way.

This study is currently limited to exploring geometric concepts at the Surabaya Education Museum. Therefore, future research is encouraged to expand the scope of study to include various cultural heritage buildings and to develop ethnomathematical analyses covering mathematical topics beyond the geometry of 2D and 3D shapes such as measurement, geometric transformations, patterns, and numeracy.

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