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# Ethnomathematics of the Jami Mosque Jingah River as a source mathematics learning

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**Abstract.** Ethnomathematics was a contextual approach that uses the environment and culture. The study aims to explore the relationship between mathematics and the Jami Mosque Jingah River culture in mathematics learning and provides ethnomathematics options as a learning resource for students during the COVID 19 pandemic. This study uses an ethnographic approach, which was an empirical and theoretical approach to obtain an in-depth description and analysis of a culture based on field notes that been obtained from the results of data collection. The results showed that there are a lot of components, ornaments, and objects in the Jami Mosque Jingah River containing many mathematical concepts of lines, vertices, properties, perimeter and area, especially in the field of geometry. During the COVID 19 pandemic, the teacher gave students the task of looking for information and observing pictures of the Jami Mosque Jingah River. that These are the students' activities: (1) identify the types and properties of flat shapes (2) use contextual problems related to these flat shapes, (3) combine flatways at the Jami Mosque Jingah River that can generate creative thinking skills students. For suggestion, mathematics teachers in junior high schools can apply this study's results to improve higher-order thinking skills and become more familiar with their culture.

## 1. Introduction

COVID 19, which is still ongoing, is a continuing pandemic, a respiratory syndrome caused by coronavirus two, and was declared an epidemic by the World Health Organization (WHO) on March 11, 2020. This COVID 19 pandemic affects all activities of human life around the world, no exception. Education World. The consequences of the COVID 19 pandemic in education include many children dropping out of school, inadequate learning facilities, long study periods, parents who terminated from work, and many student duties [1]. Every effort made so that students continue to learn even without attending school. One way is an online learning system by utilizing technology.

This sudden and rapid change is a problem for teachers, students, and even parents because they are not ready for online learning. Teachers who have not mastered technology in online education cannot all students have tools. Not all parents can guide their children to study at home. Another obstacle faced is limited communication and socialization among students; parents must have more time to help their children learn at home, often constrained by a lack of mastering technology. Likewise, faced by teachers, not a few teachers lack mastery of technical skills so that they are denied by teaching online [2].

Learning resources are significant in online learning that connects teachers, students, and parents. Teachers must use learning resources that attract students and parents in the learning process because it needs to be remembered that mathematics is a subject that is not easy because its ideas are abstract, so it needs factual information. Especially with the characteristics of students identified as generation Z



who like freedom of learning, prefer to communicate with pictures, prefer to exist on social media, and others [3].

Concrete learning information on mathematics is completed by utilizing mathematics learning resources that exist in students' daily environment. Ethnomathematics can be used as a source of meaningful mathematics learning where to start with pictures. Ethnomathematics is a term used to express the relationship between culture and mathematics or study cultural aspects of mathematics. Ethno describes all the things that make up a group's cultural characteristics, such as language, code, values, jargon, beliefs, food and clothing, habits, and physical characteristics. Mathematics itself is a cultural product [4];[5].

Ethnomathematics is a recommended learning option for mathematics teachers and helps students strengthen their own culture in the school environment [6]; [7]. Starting from the ethnomathematics of traditional Bugis food and traditional wayang can be used as a source of learning mathematics [8]; [9]. Even ethnomathematics calligraphy and tambourine art t are familiar with Muslim communities can also be used as a source of learning mathematics [10]; [11].

Banjarmasin is an area where the majority of the population is Muslim and the Banjar tribe. The mosque is a building that is familiar to the Banjar people. Mosques were established as places for Muslim communities to gather for religious, educational, and social activities. During the COVID 19 pandemic, mosque managers began a movement to provide free wifi for students who needed it. This was done to help students learn online and teach prayers on time and in the congregation with established health protocols. One of the mosques that have historical value in Banjarmasin was the Jami Mosque Jingah River. The Jami Mosque is one of the halal tourist destinations proclaimed by the local government [12]; [13].

The Jami Mosque Jingah River building's architectural meaning is used as a source of social science learning [14]. Moreover, this mosque building shows a unique characteristic where the architectural character was combined with an analysis of decorative and decorative styles [15], which can be an exciting source of learning mathematics. Meanwhile, the ethnomathematics exploration of mosques has been carried out, such as the Grand Mosque of Central Java, the Songaq Lombok mosque, the Great Mosque of Yogyakarta, the Roudhotul Muchlisin Jember Mosque, the Jamik Bengkulu Mosque which found many mathematical concepts [16]; [17]; [18];[19].

Furthermore, the research that will be carried out will explore the mosque's ethnomathematics, which is the local culture of the Banjar tribe and relates it to mathematics learning in schools. This was done to provide an alternative use of mosques as a learning resource by utilizing local cultural objects. The research aims to explore the ethnomathematics of the Jami Mosque Jingah River and provide ethnomathematics options as a source of learning mathematics during the COVID 19 pandemic.

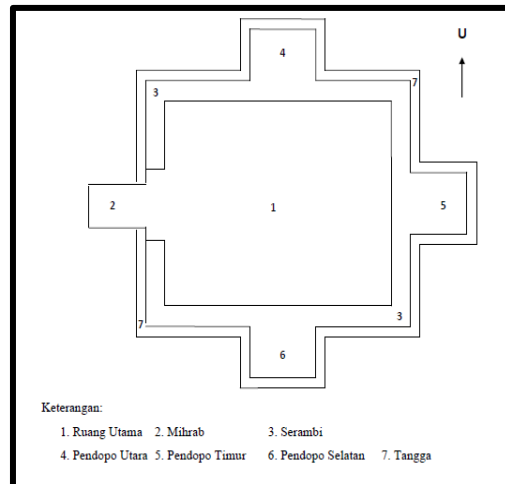
## 2. Method

The research method uses an ethnographic approach to obtain a comprehensive picture and analysis of culture based on field research. The research procedure adopted an ethnographic approach based on four general questions: (1) Where to start the observation (2) How to observe (3) How to find something significant (4) How to understand what is seen [20]. These four questions are the framework in this study. The first step is to make detailed observations at the Jami mosque Jingah River in Banjarmasin and process the documentation of objects suspected of having potential as research objects. The second step identifies the results of observations in depth associated with the focus of the content under study. The third step identifies the scope and objects selected based on stage two and confirmed by the literature study. The final step is to connect reciprocally between content and cultural objects to obtain a mathematical representation of the Jami Sungai Jingah mosque. The mathematical expression of the Jami mosque Jingah River the ethnomathematics of the Jami mosque Jingah River. The ethnomathematics of the Jami mosque Jingah River obtained are a source of learning mathematics for flat shapes.

### 3. Result and discussion

#### 3.1. Ethnomathematic exploration of Jami Mosque Jingah River

The Jami Mosque Jingah River was the second oldest historical mosque in Banjarmasin and was located on approximately 2 hectares. Figure 1 depicts a floor plan of a mosque in the form of a rectangular shape concept.



**Figure 1.** Basic plan of the mosque [15]

Based on Figure 1, it is identified that the main room and the hall are square, while the mihrab and foyer are rectangular. Before entering the mosque room, the front of the mosque alone has many mathematical concepts that can be identified.



**Figure 2.** The front of the Jami Mosque Jingah River Banjarmasin

Figure 2 identifies the concept of symmetry, points, lines, parallel lines, angles, rectangles, squares, trapezoid, triangles, congruence, area, and perimeter of rectangles and triangles, the volume of blocks and half spheres. Then, the mosque part consists of the main room, mihrab, pulpit, foyer, walls, doors, windows, and pillars. There are also many geometric elements at one of the mosque doors, including squares, rectangles, and semicircles, as in Figure 3 below.



**Figure 3.** One of the doors of the Jami Mosque Jingah River, Banjarmasin

One of the mosque doors has the same rectangular shape to be connected with the concept of congruence and symmetry. Furthermore, seven main pillars are supporting the mosque.



**Figure 4.** Main pillar of the Jami Mosque Jingah river

Based on Figure 4, the identified mathematical concepts are congruence, rhombus, congruence, triangle, triangle pyramid, symmetrical. Look at the ceiling of the mosque. You can see a lot of geometric elements such as parallel lines, triangular and rectangular shapes, absent-mindedness, and symmetry, as seen in Figure 5.



**Figure 5.** The ceiling of Jami Mosque Jingah River

Figure 5 above is an example of a part of a mosque that can be used as a source of learning mathematics, especially geometry, which is in line with researchers exploring the ethnomathematics of mosques in Central Java, Yogyakarta, Jember, and Lombok [16]; [17]; [18];[19].

Based on the Jami Mosque Jingah River ethnomathematics exploration, many geometric concepts are found in and around the mosque. These findings are recommended, especially for geometry learning resources in primary and secondary schools that can be used offline or online.

During the COVID 19 pandemic, mathematics learning methods must change, such as changes to the mathematics curriculum that must be made to increase flexibility and technology readiness. Education is expected to be a collaborative effort between the government, teachers, parents, and schools to improve the teaching-learning process's effectiveness and ensure that students can follow it [21]. The following are options for using ethnomathematics as a learning resource during the COVID 19 pandemic.

### 3.2. Options for Learning Resources during the Covic Pandemic 19

Discussion of the research was the learning materials triangular and square shapes for secondary education. First of all, the teacher assigns the students the task of observing the parts, ornaments, and objects on and around the Jami Mosque related to flat shapes.

(1) If students' position is close to the location, they can observe directly to the learning source by applying the established protocol.

(2) If not, then a link can be provided that students can download. Links for pictures and news of the Jami Mosque Jingah River:


<https://www.antaranews.com/berita/875847/mimbar-dan-beduk-jadi-sisa-sejarah-di-masjid-jami-banjarmasin> and [https://banjarmasintourism.com/portfolio\\_page/masjid-Jami-Sungai-jingah](https://banjarmasintourism.com/portfolio_page/masjid-Jami-Sungai-jingah)

The videos viewed from youtube <https://youtu.be/tUVq7bAmZXo> and <https://youtu.be/66pmAstRVug>

Activities provided by the teacher to students

(1) They identify as many types of triangular and quadrilateral shapes that can be observed at the Jami Mosque Jingah River. Next, they must investigate the properties of the specified conditions. The activities given meet the requirements of a scientific approach, such as observing the parts of the mosque, so information is collected to reason and report the results to communicate. This activity was expected to bring out students' creativity, as mentioned [22] that the invention of students has the potential to develop.

(2) They are using contextual problems associated with these shapes. Example: look at the following.



It is known that a display with the words Asmaul Husna will be affixed on the Jami Mosque walls. If the display frame is square and each side of the frame is 25 cm long, the price per meter of wood for the frame is IDR 50,000, then how much would it cost the mosque manager to make 99 Asmaul Husna displays?

The problems above have the potential to explore the problem-solving abilities of students. This prepares students to use mathematics and mathematical thinking patterns in everyday life [23].

(3) Providing joint flat-building problems at the Jami Mosque Jingah River can generate students' creative and critical thinking skills. Learners are given the freedom to divide into several shapes and reasons as seen as Figure 6.



**Figure 6.** The compound building at the Jami Mosque Jingah River (source: personal)

The three options for utilizing the ethnomathematics learning resources of the Jami Mosque have the potential to develop high-level thinking skills of students, which is one of the characteristics of learning in the 21st century. This learning is expected to improve students' mathematics learning achievement [24][25][26][27]. Ethnomathematics activities, which connect mathematics and culture, were very beneficial for students, helps provide a meaningful framework for creative mathematics classes. Students can learn about various people using mathematics in their culture. In identifying ecocultural mathematics about space and geometry, four principles were defined and discussed about the structure of language, lines and reference points, size of space and worldview and interpretation of space as a place. Therefore, outdoor learning with the ethnomathematics approach was right for students. It was to improve the ability to understand mathematics[25][28][29][30][31].

#### 4. Conclusion

Ethno-mathematical exploration of the Jami Mosque Jingah River is a mathematical concept of lines, vertices, angles, properties, perimeter and area of a flat shape: rectangle, square, trapezoid, rhombus, circle, half-spherical volume, blank, symmetrical, ellipse, parallel, parallel lines, congruence, condition of the hexagon. Furthermore, three options were given to use ethnomathematics learning resources during the COVID 19 pandemic.

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