# The Beauty Looks Of Muaro Jambi Temple As A Source Of Learning: Geometry

Sutrimo, Kamid, Asrial, Bambang Hariyadi

**Abstract:** The focus of this research is to identify the learning model that has the best possibility to teach ethnomathematics of the Muaro Jambi temple in geometry learning. The purpose of this study is to provide solutions for teaching mathematics that can improve creative thinking skills with the Muaro Jambi temple learning resources in geometry learning. This study uses a qualitative approach. The data findings were analyzed using descriptive analysis. Based on the research findings, it can be collected the Muaro Jambi temple which has the potential to be a source of geometry learning. The learning model that has the potential for teaching is a problem based learning model. Teachers should be able to apply ethnomathematical geometry learning with the Muaro Jambi temple with problem based learning. Theoretically, the ethnomathematics of the Muaro Jambi temple can be taught using problem based learning.

**Index Terms:** Ethnomathematics, Temples, Problem Based Learning, Learning Model

## 1 INTRODUCTION

The process of learning mathematics is not just a process of receiving information and skills, but includes the reconstruction of new ideas or knowledge by the mind [1]. Researchers believe that the core of the learning process is the process of knowledge construction. The goal in implementing mathematics learning is that students can understand concepts and form new schemes from the learning process carried out. The process of forming a new schema is done by utilizing the schemas previously owned by students, then linked and linked with the aim of understanding and finding a certain new schema. The formation of this scheme can be done through a problem solving on a concept. Basically students will have an interest in learning and enthusiasm in solving a problem if the problems and learning process provided are meaningful learning related to students' daily lives [2,3]. Learning that is very close to students' lives can stimulate critical thinking skills. As in the development of learning mathematics, students are directed to have high order thinking skills. There are several mathematical abilities that are included in the HOT's, namely the ability to understand mathematical concepts, problem solving, creative thinking, mathematical reasoning, critical thinking, communication, representation and mathematical connections. The improving thinking skills related to the ability to think creatively in solving a problem using the knowledge possessed and making decisions in complex situations [4], thinking critically in receiving various types of information, will increase the level of thinking of students to be higher is the main target of HOTS capabilities [5].


- *Sutrimo is currently pursuing Doctoral program in Mathematics and Science Education at Jambi University, Indonesia. E-mail: Sutrimo621@gmail.com*
- *Kamid is a Lecturer Doctoral program in Mathematics and Science Education at Jambi University, Indonesia. E-mail: kamid.math@unja.ac.id*
- *Asrial is a Lecturer Doctoral program in Mathematics and Science Education at Jambi University, Indonesia. E-mail: asrial@unja.ac.id*
- *Bambang Hariyadi is a Lecturer Doctoral program in Mathematics and Science Education at Jambi University, Indonesia. E-mail: bambang_h@unja.ac.id*


In improving students' creative thinking skills, an innovative learning process is needed or creating a fun and meaningful learning environment for students and their daily lives so that students' interest in learning increases [6-8]. In learning mathematics, one thing that can be done is to integrate and use culture as a medium or object associated with mathematical problems. The mathematical problem that is inherent in people's lives is geometry. Geometry material continues at the lowest to the highest level of education. In the implementation of learning in the classroom, many students have difficulty solving problems in related daily life because students are used to only applying formulas. Therefore, teachers must link mathematical concepts and formulas in students' lives or knowledge that is commonly understood by students, such as culture [9,10]. As has been studied previously that the relationship between culture and mathematics is one of them in the Muaro Jambi Temple area [11,12], namely the concept of geometry in several parts of the temple. The forms of these temples can be used as innovations in learning mathematics so that students can be more interested and can preserve their culture. So, in this case the researcher uses Jambi culture as an integration in the implementation of learning on flat geometry material. Jambi culture is used at the beginning of learning and throughout the learning process so that students can learn using contextual objects and can preserve Jambi culture [13].
The focus in this study is to determine what kind of learning method is suitable for ethnomathematics learning with the Muaro Jambi temple as a source of learning geometry material. It is hoped that by using this Jambi culture, a modification of the learning model will be produced that adds to the variety of learning models that are the choice of teaching teachers in increasing student interest in learning and increasing students' creative thinking skills in mathematics. The formulation of the research problem is how to determine the source of learning ethnomathematics on the geometry?.

## 2. RESEARCH METHOD

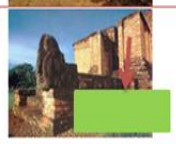
The study uses a qualitative approach. Qualitative approach is a research approach that wants to know the general problems in detail by using narrative language that explains. Researchers used descriptive and ethnographic methods to formulate the problems expressed in the research. Researchers want to construct a learning model that has the potential to be used as a forum for developing Jambi cultural

ethnomathematics learning on geometry material. The research findings were analyzed using descriptive analysis.

## 3. RESULTS AND ANALYSIS

From the results of the study of documentation and literature, it was found the type and shape of the Muaro Jambi temple. Here are some Muaro Jambi temple buildings [14] that can still be found in the area.

Table 1. Identification of Muaro Jambi Temple from the Geometric Side

| No | Temple | Deskription | Picture | Image Related to Mathematics |
|---|---|---|---|---|
| 1 | Candi Kedaton | Kedaton is a temple complex with an area of 45000 m2 with a perimeter fence that limits the size of 215 x 250 m. |  | The picture on the side shows the Kedaton temple where one of the front sides is an irregular triangle shape. The image is a resource for learning mathematics geometry |
| 2 | Candi Gedong 1 and Candi Gedong 2 | Candi Gedong 1 has a plate fence measuring 65 x 85 meters. In this 5525 m2 courtyard stands the main temple and the gate. |  | The picture of the temple on the side if observed on the side will form a flat shape in the form of a trapezoid. |
| 3 | Candi Gumpung | The gumung temple is rectangular in shape with an area of 150 x 146.75 meters. |  | The temple plan when viewed from the top position will form a rectangle. |
| 4 | Candi Tinggi | The high temple complex measures 90.68 m2. on the North and South Sides, and 75.54 m on the West and East Sides. |  | The high temple complex consists of 1 courtyard which has a rectangle. |
| 5 | Candi Kembar Batu | This temple complex consists of the main temple, ancillary, a fence with a gate, and an ancillary temple in the east until it consists of three buildings. |  | The picture on the right shows the twin temples where the structure of the temples is square and congruent |

The six temple models that are possible to be a source of learning, they should be implemented with the right learning model. The learning model is very important for a teacher to learn and add insight that is already known [15]. Because by mastering several learning models, a teacher will feel the ease in implementing learning in the classroom so that the objectives in the learning process can be achieved and completed as expected. The learning model is a conceptual framework that is used as a guide by teachers and provides direction for teachers in teaching to achieve the goals of learning [16,17]. In choosing a learning model, it is also necessary to consider the material to be taught, the level of student cognitive development, and the existing supporting facilities or facilities. The learning model is said to be feasible if it meets the valid, effective and practical criteria. There are five general structures of learning models [18], namely: (a) syntax, which is a systematic series of activities in the model; (b) social system, describing the roles and relationships between teachers and students; (c) the principle of reaction, describing how a teacher should respond to what students do and observe their students; (d) a support system, describing teachers who must have or create conditions that support the application of the model; and (e) influence (instructional impact and accompaniment impact), referring to the effects generated by the model. In addition, the learning model has the main characteristics [19-22], namely; (a) objectives, to help students develop skills and gain a deeper understanding of the specific form of the material; (b) phase, which includes a series of steps aimed at helping students achieve specific learning objectives; and (c) foundation, supported by theory and research on learning. The learning model has the following characteristics: (a) based on certain learning theories; (b) have certain educational goals; (c) guidelines for improving learning; (d) have parts; (e) have an impact; and (f) have an instructional design [23-25]. In learning mathematics, it is necessary to have a concept and structure of learning steps that can improve thinking skills. Creative students through contextual problems or problems in the daily lives of students [26]. The learning process must be designed, structured and in such a way that it is able to construct students' knowledge in solving problems and developing their creativity. The learning model is strongly influenced by the nature of the material being taught, the objectives to be achieved, and the level of student ability. The learning model developed in this study will pay attention to learning materials, student abilities, and objectives to be achieved in learning [28-30]. There are things that teachers need to consider in choosing a learning model, namely: (1) consideration of the objectives to be achieved; (2) considerations related to learning materials or materials; and (3) other non-technical considerations, such as efficiency and effectiveness. The appropriate learning model used in learning mathematics is a learning model that can support students to actively find out concepts and develop their creativity in solving problems that are the learning objectives [31,32]. One of the learning models that can be applied today is Problem Based learning. Problem Based learning model is a learning model that makes problems as the starting point for learning, in problem-based learning students get the opportunity to be able to construct their knowledge through activities to find and solve problems, and then communicate the mathematical ideas they get [33]. Systematics of learning Problem Based Learning is done by the teacher explaining the learning objectives, explaining the equipment needed and motivating students to be involved in the selected problem solving activities [34-35]. The teacher helps students define and organize learning tasks related to the problem (setting topics, assignments, schedules) then the teacher encourages students to collect appropriate information, experiments aimed at getting explanations and problem solving, data collection, hypotheses. The teacher helps students in planning and preparing appropriate work for students to do such as reports and helps them share assignments with their friends [36-38]. Finally, the teacher helps students to reflect or evaluate their investigations and the processes they use. While the steps in the Problem Based learning learning model are as follows.

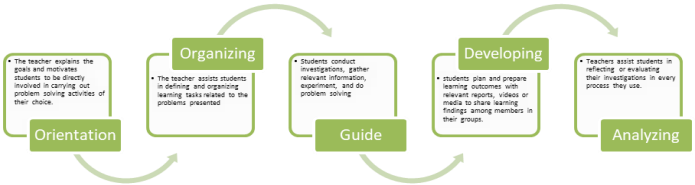



***Figure 1 Problem Based Learning Procedur***

The Problem Based Learning learning model has steps in learning starting with preparing the necessary logistics and then presenting the topic or problem. Followed by students conducting discussions in small groups, looking for solutions to problems from various sources independently or in groups. And finally, students convey solutions to problems in the form of their work in the form of reports and then evaluate what processes they use in groups. Based on the above description and needs analysis, the use of problem based learning and ethnomathematics models should be studied more deeply. The weakness of this model in learning mathematics is that students assume the problems given are complex and not contextual problems in their daily lives so that students lack interest in solving problems. In addition, in the discussion process students tend not to be optimal because the problems solved are non-contextual problems. Therefore, a refinement or modification of the Problem Based Learning model is needed, especially in mathematics so that students can understand a material concept, can solve problems with good enthusiasm and can discuss problem solving well so that they find a particular learning concept [39,40]. As a refinement of the Problem Based Learning learning model, researchers will use culture as an alternative that can be used in developing learning models. By including the cultural context can provide and create meaningful learning to achieve a good conceptual understanding of the scientific information obtained, as well as the application of scientific information in the context of cultural community problems. Cultural communities have many mathematical ideas that can be studied and researched in every context of cultural activities carried out so that they can be used as materials or sources for contextual mathematics learning. Learning mathematics through an ethnomathematical perspective program helps students to know more about reality, culture, society, environmental problems, and themselves by providing mathematical content and pedagogical approaches that enable them to successfully master mathematical problems [41,42]. Elements of culture parallel aspects of mathematics, there are several parts of these aspects of mathematics that relate to learning mathematics. This relationship relates to mathematical concepts learned in formal learning at school. Students can understand mathematics learning more easily and have fun through culture, especially Jambi culture which is collaborated in learning mathematics. Students can integrate culture into mathematics material and know more about their own culture. In this case, the learning process is carried out using culture as a starting point for problems and the process of understanding a mathematical concept. The integration of culture and mathematics in learning can foster the ability of students to develop their creativity and preserve their culture.

## 4. CONCLUSION

From the analysis of the findings, the researcher can conclude that Muaro Jambi Temple has the potential to be used as a learning resource for flat geometry. The standard of eligibility for ethnomathematics learning resources through the Muaro Jambi temple is quite good because the Muaro Jambi temple is an icon of Jambi culture. The development of a learning model that can be adopted is a problem based learning model. Researchers suggest that teachers can use this model in improving HOT's thinking skills in ethnomathematics, although there are still some syntaxes that must be adjusted. Researchers found the uniqueness of the temple as a form of cultural heritage and a form of cultural preservation that is associated with mathematics through ethnomathematics.

## REFERENCES


[1] Polat, Ozgul, Ezgi Aksin Yavuz, and Ayse Betul Ozkarabak Tunc. "The effect of using mind maps on the development of maths and science skills." Cypriot Journal of Educational Sciences 12, no. 1 (2017): 32-45.

[2] MacLeod, Miles, and Jan T. van der Veen. "Scaffolding interdisciplinary project-based learning: a case study." European journal of engineering education 45, no. 3 (2020): 363-377.

[3] Apino, E., and H. Retnawati. "Developing instructional design to improve mathematical higher order thinking skills of students." In Journal of Physics: Conference Series, vol. 812, no. 1, p. 012100. IOP Publishing, 2017.

[4] Widana, I. Wayan. "Higher order thinking skills assessment (HOTS)." JISAE 3, no. 1 (2017): 32-44.

[5] van Laar, Ester, Alexander JAM van Deursen, Jan AGM van Dijk, and Jos de Haan. "Determinants of 21st-century skills and 21st-century digital skills for workers: A systematic literature review." Sage Open 10, no. 1 (2020): 2158244019900176.

[6] Papavlasopoulou, Sofia, Michail N. Giannakos, and Letizia Jaccheri. "Exploring children's learning experience in constructionism-based coding activities through design-based research." Computers in Human Behavior 99 (2019): 415-427.;

[7] Yuanita, Putri, Hutkemri Zulnaidi, and Effandi Zakaria. "The effectiveness of Realistic Mathematics Education approach: The role of mathematical representation as mediator between mathematical belief and problem solving." PloS one 13, no. 9 (2018): e0204847.

[8] Pramestika, Ni Putu Dyah, I. G. A. A. Wulandari, and I. Wayan Sujana. "Enhancement of mathematics critical thinking skills through problem-based learning assisted with concrete media." Journal of Education Technology 4, no. 3 (2020): 254-263.

[9] Fouze, Abu Qouder, and Miriam Amit. "Development of mathematical thinking through integration of ethnomathematic folklore game in math instruction." Eurasia Journal of Mathematics, Science and Technology Education 14, no. 2 (2017): 617-630.

[10] Janica, Ernesto Vega, Hugues Vega Murgas, and Simón Esmeral Ariza. "The Wisdom of our Native American Tribes: The Iku/Arhuaco People. Their Science, Culture and Math as a tribute to an exiting Civilization." In 2019 IEEE Integrated STEM Education Conference (ISEC), pp. 136-141. IEEE, 2019.

[11] Sinuhaji, Tirta Utama, and Suwardi Lubis. "The Participation of Community in Tourism Development of the Muara Jambi Temple Complex, Muaro Jambi Regency." Britain International of Humanities and Social Sciences (BIoHS) Journal 1, no. 2 (2019): 62-71.

[12] Fitriani, Silvia, Asrial Asrial, Kamid Kamid, and Maison Maidon. "Ethnomathematics: Exploration in Traditional Games Jambi." In National Conference on Mathematics Education 2019, vol. 1, no. 1, pp. 170-175. 2019.

[13] Kamid, Sonya Fiskha Dwi Patri, Saharudin, Sofnidar. "Ethnomathematical Analysis of Geometry Form in the Great Mosque of Pondok Tinggi at Sungai Penuh City and Relationship to Mathematics Instructional." Social Science 8 (2020).

[14] Hardiarti, Sylviyani.” Etnomatematika: Aplikasi Bangun Datar Segiempat Pada Candi Muaro Jambi”. Aksioma Vol. 8, No. 2, e-ISSN 2579-7646 (2017)
[15] Okkinga, Mariska, Roel van Steensel, Amos JS van Gelderen, and Peter JC Sleegers. "Effects of reciprocal teaching on reading comprehension of low-achieving adolescents. The importance of specific teacher skills." Journal of research in reading 41, no. 1 (2018): 20-41.
[16] Altan, Servet, Jennie F. Lane, and Erskine Dottin. "Using habits of mind, intelligent behaviors, and educational theories to create a conceptual framework for developing effective teaching dispositions." Journal of Teacher Education 70, no. 2 (2019): 169-183.
[17] Prediger, Susanne. "Investigating and promoting teachers' expertise for language-responsive mathematics teaching." Mathematics Education Research Journal 31, no. 4 (2019): 367-392.
[18] Youssef, Abdou, and Bruce R. Miller. "Deep learning for math knowledge processing." In International Conference on Intelligent Computer Mathematics, pp. 271-286. Springer, Cham, 2018.
[19] El-Tannir, Akram A. "The corporate university model for continuous learning, training and development." Education+ Training (2002).
[20] Svinicki, Marilla D. "A theoretical foundation for discovery learning." Advances in physiology education 275, no. 6 (1998): S4.
[21] Conole, Grainne, Martin Dyke, Martin Oliver, and Jane Seale. "Mapping pedagogy and tools for effective learning design." Computers & Education 43, no. 1-2 (2004): 17-33.
[22] Huang, Yueh-Min, and Po-Sheng Chiu. "The effectiveness of a meaningful learning-based evaluation model for context-aware mobile learning." British Journal of Educational Technology 46, no. 2 (2015): 437-447.
[23] Ivie, Stanley D. "Ausubel's learning theory: An approach to teaching higher order thinking skills." The High School Journal 82, no. 1 (1998): 35-42.
[24] Widana, I. Wayan. "Higher order thinking skills assessment (HOTS)." JISAE 3, no. 1 (2017): 32-44.
[25] Haryati, A. Sri. "The implementation of 21st century learning to improve high level thinking skills through various model." In International Conference on Education, vol. 1, no. 1. 2017.
[26] Apino, E., and H. Retnawati. "Developing instructional design to improve mathematical higher order thinking skills of students." In Journal of Physics: Conference Series, vol. 812, no. 1, p. 012100. IOP Publishing, 2017.
[27] Surya, Edy, and Edi Syahputra. "Improving High-Level Thinking Skills by Development of Learning PBL Approach on the Learning Mathematics for Senior High School Students." International Education Studies 10, no. 8 (2017): 12-20.
[28] Fuad, Nur Miftahul, Siti Zubaidah, Susriyati Mahanal, and Endang Suarsini. "Improving Junior High Schools' Critical Thinking Skills Based on Test Three Different Models of Learning." International Journal of Instruction 10, no. 1 (2017): 101-116.
[29] Widodo, Sri Adi. "Selection of Learning Media Mathematics for Junior School Students." Turkish Online Journal of Educational Technology-TOJET 17, no. 1 (2018): 154-160.
[30] Pardimin, Apriadi, Widhiya Ninsiana, M. Ihsan Dacholfany, Karnawi Kamar, Kamarul Shukri Mat Teh, Miftachul Huda, April Lia Hananto, Muhammad Muslihudin, K. Shankar, and Andino Maseleno. "Developing Multimedia Application Model for Basic Mathematics Learning." Journal of Advanced Research in Dynamical and Control Systems 10, no. 14 (2018): 1347-1356.
[31] Surya, Edy, and Edi Syahputra. "Improving High-Level Thinking Skills by Development of Learning PBL Approach on the Learning Mathematics for Senior High School Students." International Education Studies 10, no. 8 (2017): 12-20.
[32] Kadarisma, G., E. Senjayawati, and R. Amelia. "Pedagogical content knowledge pre-service mathematics teacher." In Journal of Physics: Conference Series, vol. 1315, no. 1, p. 012068. IOP Publishing, 2019.
[33] Aini, Nur Rohmatul, Syafrimen Syafril, Netriwati Netriwati, Agus Pahrudin, Titik Rahayu, and Vicka Puspasari. "Problem-Based Learning for Critical Thinking Skills in Mathematics." In Journal of Physics: Conference Series, vol. 1155, no. 1, p. 012026. IOP Publishing, 2019.
[34] Sewang, Anwar, and Abdul Halik. "Learning Management Model of Islamic Education based on Problem: A Case Study of the Tarbiyah and Adab Department of IAIN Parepare." Talent Development & Excellence 12, no. 1 (2020): 2731-2747.
[35] Yuniara, Pinta, and Edy Surya. "Application of Problem Based Learning to Students' Improving on Mathematics Concept of Ability." International Journal of Sciences: Basic and Applied Research (IJSBAR) 33, no. 3 (2017): 261-269.
[36] Ciarocco, Natalie J. "Traditional and new approaches to career preparation through coursework." Teaching of Psychology 45, no. 1 (2018): 32-40.
[37] Le, Ha, Jeroen Janssen, and Theo Wubbels. "Collaborative learning practices: teacher and student perceived obstacles to effective student collaboration." Cambridge Journal of Education 48, no. 1 (2018): 103-122.
[38] Sailin, Siti Nazuar, and Noor Aida Mahmor. "Improving student teachers' digital pedagogy through meaningful learning activities." Malaysian Journal of Learning and Instruction 15, no. 2 (2018): 143-173.
[39] Sailin, Siti Nazuar, and Noor Aida Mahmor. "Improving student teachers' digital pedagogy through meaningful learning activities." Malaysian Journal of Learning and Instruction 15, no. 2 (2018): 143-173.
[40] Kebritchi, Mansureh, Angie Lipschuetz, and Lilia Santiague. "Issues and challenges for teaching successful online courses in higher education: A literature review." Journal of Educational Technology Systems 46, no. 1 (2017): 4-29.
[41] Carpenter, Thomas P., and James M. Moser. "The development of addition and subtraction problem-solving skills." In Addition and subtraction, pp. 9-24. Routledge, 2020.
[42] Bakhy, Sydykhov, Burkhan Kalimbetov, and Zhanibek Khabibullayev. "Possibilities of mathematical problems in logical thinking. Development of secondary education pupils." Opción: Revista de Ciencias Humanas y Sociales 85 (2018): 441-457.