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Malay Etnomathematic of Riau and Riau Islands: Systematic Literature Review

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Abstract: Ethnomathematics can be used as an approach to mathematics learning in both primary and secondary schools. The study of ethnomathematics is gaining popularity, but few studies still discuss ethnomathematics extracted from the culture of the people in Riau and Riau Islands. They have cultural similarities, namely Riau Malay. The purpose of this study is to describe and provide an overview of the Riau Malay ethnomathematical studies that have been studied from the Riau Malay lands. The method used in this study is Systematic Literature Review (SLR). This study discusses 13 articles published between 2016-2021. The research results show that ethnomathematical studies have not been spread throughout the Riau and Riau Islands regions. The form of culture revealed in this study is still dominated by community activities. Ethnomathematical studies are still dominantly related to the concept of geometry, which means that most of the activities found are Designing. The limitations of some of these studies can serve as further studies for other researchers to explore the ethnomathematics of elements of Riau Malay culture and other Riau Islands.

Keywords: ethnomathematics, Riau Malay and Riau Islands, systematic literature.

Abstrak: *Etnomatematika dapat dijadikan sebagai salah satu pendekatan pembelajaran matematika baik di sekolah dasar maupun menengah. Kajian etnomatematika mulai popular dikaji namun masih sedikit studi yang membahas tentang etnomatemtatika yang digali dari budaya masyarakat di Riau dan Kepulauan Riau yang memiliki kesamaan budaya yaitu Melayu Riau. Tujuan penelitian ini adalah untuk mendeskripsikan dan memberi gambaran mengenai kajian etnomatematika Melayu Riau yang telah dikaji dri tanah melayu Riau. Metode yang digunakan dalam studi ini adalah Systematic Literature Review (SLR). Penelitian ini membahas 13 artikel yang diterbitkan antara tahun 2016-2021. Hasil peneltian menunjukkan bahwa kajian etnomatematika belum tersebar di seluruh dareah Riau dan Kepulauan Riau. Wujud budaya yang diungkap pada penelitian tersebut masih didominas oleh aktivitas masyarakat. Kajian etnomatematika masih dominan berkaitan dengan konsep geometri yang artinya aktivitas yang temukan sebagian besar adalah Designing. Keterbatasna dari beberapa penelitian ini dapat menjadi studi lanjutan bagi peneliti lain untuk menggali etnomatematika dari unsur budaya melayu Riau dan Kepulauan Riau lainnya.*

Kata Kunci*: etnomatematika, Melayu Riau dan Kepulauan Riau, systematic literature review.*

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▪ INTRODUCTION

Ethnomathematics emerged in 1977 and was introduced in International Mathematics Education. D'Ambrosio (1985) states that ethnomathematics aims to describe mathematical practices carried out by specific cultural groups. Rosa and Orey, 2011., Cimen, 2014).) regard ethnomathematics as the study of mathematical ideas in any culture. D'Ambrosio in Rudhito (2020:26) explains that this mathematics can be practiced in cultural groups in urban and rural areas, working groups, children of specific age groups, and local communities.

The study of ethnomathematics is a study that bridges the philosophy of mathematics and mathematics education (Badru, 2020). Ethnomathematics was born as a solution in overcoming problems in teaching mathematics that is still difficult. Riswandha (2020) explains that negative perceptions of mathematics subjects or perceptions of mathematics as relatively complex subjects and negative impressions and experiences of mathematics often hurt both motivation to learn mathematics and the ability to adapt at school. Therefore, a positive attitude towards mathematics formed from the start is an essential factor in learning complex subjects, especially mathematics.

Ethnomathematics is an effort to overcome the problem of proper and quality education, culturally responsive pedagogy (Furuto, 2014). The usefulness of mathematics will be felt by learning mathematics starting from the local student culture. The integrating curriculum provides rich opportunities for students to focus on relevant applications to the real world and make meaningful connections across different disciplines (Bazinet, R., & Marshall, A. M, 2015). In Koentjaraningrat (2000) JJ. Hoenigman divides culture into three forms: first, ideas are abstract and untouchable cultural forms. Second, activity (action) is a form of culture that lives in the habits of the people in an area. Third, artifacts (works) are cultural manifestations that can be seen, touched, and result from human activities in the form of objects.

Indonesia has a rich and diverse culture. One of the distinctive cultures is Riau Malay. Malay is divided into Riau Malay and Riau Archipelago. *Riau Archipelago* is a new province resulting from the division of Riau province based on Law Number 25 of 2002 and is the 32nd province in Indonesia. Thus, the cultures of these two regions have the same characteristics. According to Atan (2020), there are many Malay customs types: art, traditional ceremonies, clothing, buildings, customary law, games, society, and so on. Rosa et al. (2017) stated that Malay culture is one of the pillars supporting national culture. Malay culture has essential values for people's lives that should be kept alive and preserved.

Riau's cultural wealth can be seen, among others, from the diversity of tools and completeness of traditional ceremonies, traditional clothes, from the shape and variety of home decoration, from household tools and equipment, from ceremonies, traditional ceremonies and traditions, from traditional expressions (pepatah petitih, bidal, ibarat, pantun, syair.), like, rhymes, poems) which they inherited from generation to generation. Malay arts are categorized based on historical and professional phases, namely dance, music, weaving, carving, folk theatre, folk games, painting, martial arts, and crafts. In addition to Malay arts, there is also Malay culinary, which is also developing quite well with typical Malay flavors. For example, the uniqueness of these flavors can be felt in the dishes of Tilam Cik Puan, Lontong Sagu Ikan Permata Geok, Es Pisang Tembatu dan Selasih (Anggriany, 2016). In addition, there are also folk games, including congklak, guli, rimau, and so on. Integrating mathematics in culture can indirectly preserve the culture itself and strengthen the character of students.

Ethnomathematical studies can be a reference for teachers in the mathematics learning process, but not many ethnomathematical studies have been taken from the Malay culture of Riau and Riau Islands. Based on the search results of various articles published in national and international journals, various ethnomathematical phenomena of Malay culture have been studied in several areas in Riau and Riau Islands. However, it is necessary to conduct a study to describe what some of these researchers have raised ethnomathematics. This study is helpful to provide an overview of how ethnomathematical studies have been discussed from the Malay culture of Riau and the Riau Archipelago. Furthermore, the results of this study can contribute to other researchers conducting ethnomathematical studies of other elements of Malay culture.

For the study of ethnomathematics to be focused, it is necessary to define the activities and processes that lead to the development of mathematics. Bioshop in Rudhito (2020) concerns six fundamental mathematical activities, namely counting/counting, placing, measuring, designing, playing, and explaining. This fundamental activity serves as a guide for determining whether mathematics exists in a particular culture. Based on the explanation above, the purpose of this study is to describe the ethnomathematics of Riau Malay culture and the Riau Archipelago, which several researchers have studied in terms of cultural aspects, related mathematical concepts, and fundamental mathematical activities found.

▪ METHOD

This is a qualitative descriptive study. The method used in this study is a systematic literature review (SLR) which aims to identify, review, evaluate and interpret all available research. According to Khan et al. (2013), the steps in SLR research are 1) formulating research questions, 2) identifying relevant research, 3) selecting quality research, 4) collecting facts according to research questions, and 5) interpreting the findings. The research questions are 1) what forms of culture have been studied in the ethnomathematics study of Riau Malay culture and the Riau Islands, 2) what are the related mathematical materials that have been lifted from the ethnomathematics of Riau Malay culture and the Riau Islands, 3) what are the fundamental mathematical activities contained in the study. Ethnomathematics of Riau Malay culture and the Riau Islands. In obtaining relevant research, the researcher identified the relevant article titles through keywords: Ethnomathematics of Malay culture or ethnomathematics of Riau people or ethnomathematics of Malay culture of Riau Islands or Riau Malay ethnomathematics. The research used as the study material is the one indexed by Google Scholar from 2016 to 2021. There are still few ethnomathematical types of research on Riau Malay culture and the Riau Islands. Articles were found in several national journals, national and international proceedings, from the search results, obtained 13 articles related to the Ethnomathematics of Riau Malay Culture and the Riau Archipelago. The research facts were collected by tabulating and analyzing the results of each research based on the research questions that had been formulated. Furthermore, the interpretation of the findings is explained in the following section

▪ RESULT AND DISCUSSION

Based on identifying several articles related to ethnomathematics, 13 articles were obtained that have characteristics according to the field being studied. Some things that need to be reported are the title of the study, the name of the researcher, the year of

publication, the name of the journal, and the results of the research. The information is presented in Table 1 below.

Table 1. Identity and Research Results of Riau Malay Ethnomathematics and Riau Archipelago

Research Title, Researcher and Year	Journal/Proceeding	Research result
Etnomatematika Dalam Sistem Pembilangan Pada Masyarakat Melayu Riau (Zulkifli M. Nuh, Dardiri) 2016	Kutub khanah: Jurnal Penelitian sosial keagamaan	The manuscript A vocabulary of the English, Bugis, and Malay language contains translations of numbers in Malay, such as salaksa (ten thousand) and saketi (one hundred thousand). The activity of counting is not only applied to numbers. It is also found in building houses and even related to religious traditions in the form of death feasts (niga hari, nujuh hari, empat puluh dan seratus hari) and births.
Etnomatematika Dalam Ragam Hias Melayu (Astri Wahyuni, Surgawi Pertiwi) 2017	Math Didactic: Jurnal Pendidikan Matematika	In Malay decoration, many things can be learned related to mathematics, one of which is the connection of Malay Carving, which is related to Folding Symmetry material that is learned at the elementary school level.
Etnomatematika Melayu: Pertautan Antara Matematika Dan Budaya Pada Masyarakat Melayu Riau (Hasanuddin) 2017	Sosial Budaya	Ethnomathematical activities in the Riau Malay community are very diverse. Starting from counting, measuring, and various applications in literature, fashion, carving, ship design, and folk games.
Aplikasi Refleksi Dalam Motif Tenun Melayu Riau (Erdawati Nurdin, Ramon Muhandaz,	Prosiding Seminar Nasional Pendidikan Matematika FKIP UIR	The pattern of shapes on the Riau Malay woven motif can be an alternative source of learning mathematics for students, which combines mathematics with the culture that surrounds students (ethnomathematics) related to the concept of reflection (Reflection).

Research Title, Researcher and Year	Journal/Proceeding	Research result
Irma Fitri, Annisa Kurniati, Ade Irma) 2018		
Eksplorasi Etnomatematika pada Corak Alat Musik Kesenian Marawis sebagai Sumber Belajar Matematika (Marina Afriyanty, Nur Izzati) 2019	Jurnal Gantang	In the musical style of Marawis musical instruments, mathematical practices are found, such as geometric shapes in the form of circles and mathematical concepts in the form of reflection, translation, folding symmetry, rotational symmetry, acute angles, and obtuse angles.
Eksplorasi Etnomatematika Pada Ragam Corak Ukiran Khas Melayu Kepulauan Riau (Siti Nurhikmah, Febrian, Mirta Fera) 2019	Jurnal Kiprah	School mathematics concepts in various styles of carvings typical of Riau Archipelago Malays can be applied in learning mathematics in schools, namely: flat and geometric shapes, fractions, comparisons, congruences, symmetry, and geometric transformations.
Ethnomathematics: Design Mathematics Learning At Secondary Schools by Using The Traditional Game of Melayu Riau (Yenita Roza, S N Siregar and T Solfitri) 2019	The 7th South East Asia Design Research International Conference (SEADRIC 2019)	Rimau games are used for geometric transformations. Other researchers use the batik process to find basic mathematical concepts such as counting, measuring, reflection, rotation, and translation to mathematical models covering all the batik process's cultural activities.
Eksplorasi Etnomatematika Pada Tradisi Malam Tujuh Likur	Seminar Nasional Pendidikan Matematika	The mathematical elements contained in this tradition are the installation of lamps associated with the concept of arithmetic sequences, the mention of the number twenty by the Daik community, namely

Research Title, Researcher and Year	Journal/Proceeding	Research result
Masyarakat Daik Kepulauan Riau (Maurinus Jemri Taur, Gregoriant Angelo Bere, Susanti Marsaulina Hole) 2020		"likur" associated with the concept of numbers, gates with Islamic patterns rich in mathematical concepts such as geometric concepts, area and the volume of the rotating object and the concept of transformation (reflection/reflection)
Ethnomathematics Exploration of Jong Sailboat Shape As a Traditional Game in the Riau Islands (Syarmadi Nur Izzati) 2020	Numerical: Jurnal Matematika dan Pendidikan Matematika	The shape of the Jong Sailboat contains mathematical concepts; mathematical concepts are found in almost all parts of the Jong Sailboat, such as the jong body, kate, double kate, kate house, sauk, and sails. In Jong Sailboat, mathematical concepts include geometric ideas on triangles, rectangles, and mathematical concepts in the form of reflection, right angles, trigonometry, straight lines, and slopes.
Ethnomathematics Study: Mathematical Ideas in Malay Weaving Motifs in Pekanbaru City as ABasis for Developing Contextual Learning (Putri Hafilah, Dadan Dasari, and Dadang Juandi) 2020	The 3rd International Conference on Elementary Education (ICEE 2020)	Weaving activities have a mathematical aspect, namely the concept of flat geometry such as squares, rhombuses, parallelograms, circles, and trapezoids.
Eksplorasi Etnomatematika pada Gerakan Pukulan Seni Pencak Silat Kepulauan Riau (Rahmat Wastio Wicaksono, Nur	Jurnal Kiprah	There are ethnomathematical findings in the form of flat triangles, acute, obtuse, right angles, intersecting lines and perpendicular lines.

Research Title, Researcher and Year	Journal/Proceeding	Research result
Izzati, Linda Rosmery Tambunan) 2020		
Etnomatematika pada Makanan Tradisional Melayu Daik Lingga Sebagai Sumber Belajar (Maghfiroh Sa Adatul Muk Minah, Nur Izzati) 2021	Jurnal Eksakta Pendidikan	The concepts contained are circles, cones, right angles and acute angles, parallel lines, folding symmetry, reflection, and rotation.
Etnomatematika: Eksplorasi Konsep-Konsep Matematika Pada Makanan Khas Melayu Riau (Suripah, Marsigit, Rusli) 2021	MATH DIDACTIC: Jurnal Pendidikan Matematika	The mathematical concepts found in typical Riau Malay food are points, lines, angles, chord, triangles, quadrilaterals, regular octagons, circles, rectangular pyramids, cuboid, and similarity.

Several cultural arts were studied in this research, including literature, fashion, carving, music, weaving, rhymes, ship design, Pencak silat, and folk games. In this study, we summarize three forms of culture that have been defined, namely ideas, activities, and artifacts. The percentage of cultural forms found in Riau Malay ethnomathematics and the Riau Archipelago can be seen in Figure 1 below

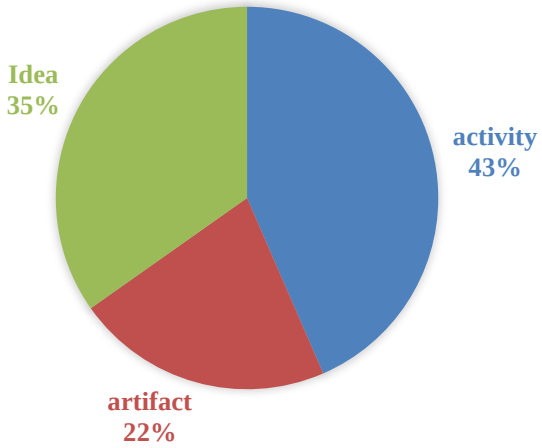

Figure 1. Cultural forms in Riau Malay and Riau Archipelago ethnomathematics research

Based on Figure 1, the dominant cultural titles raised in ethnomathematics are in the form of activities, while the smallest ones are artifacts. We also synthesized the mathematical concepts found in this ethnomathematics research. Based on a review of the article, it can be classified based on mathematical concepts, which can be seen in the following picture:

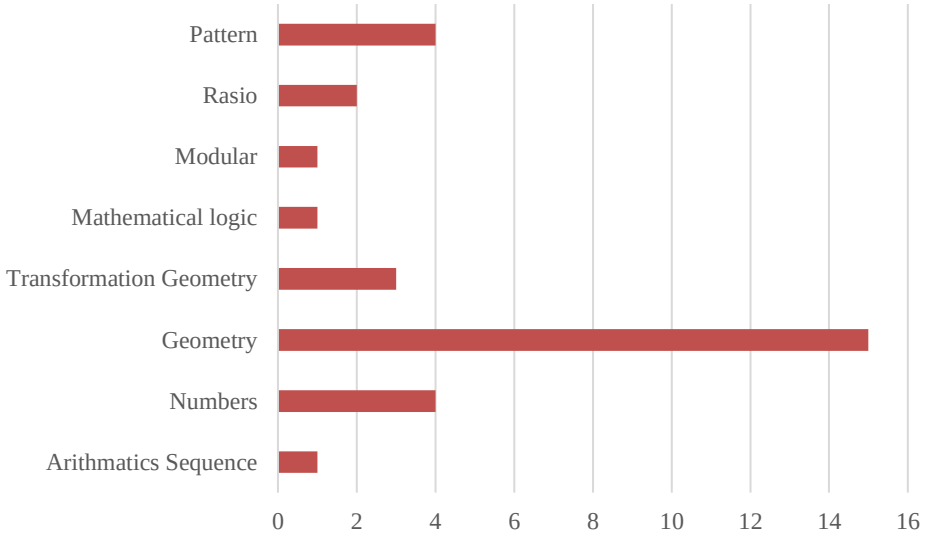

Figure 2. Mathematical Concepts Revealed in Riau Malay Ethnomathematics and Riau Archipelago

Based on Figure 2, it can be seen that the mathematical material related to the study of ethnomathematics is still dominated by geometry. In contrast, the least is related to modular concepts, mathematical logic, and arithmetic sequences. We reveal through these articles the fundamental activity that appears in Riau Malay and Riau Archipelago ethnomathematical research. Found only five of the six fundamental activities that have been defined. The activity that has not been found is locating. The findings regarding these fundamental activities are shown in Figure 3 below.

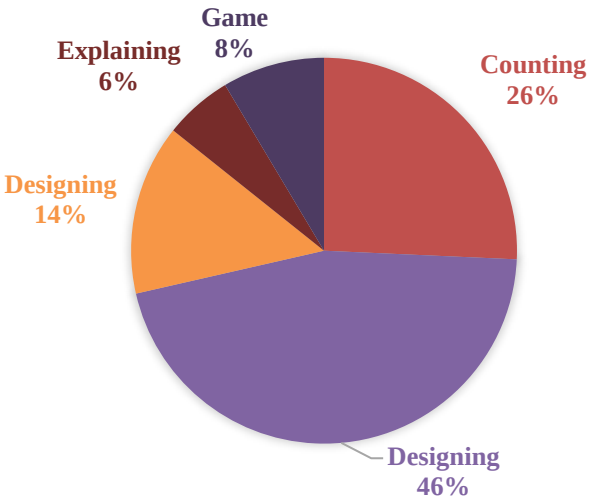

Figure 3. Percentage of fundamental activities of Riau Malay ethnomathematics and Riau Archipelago

Figure 3 above shows that the highest fundamental activity revealed in the Riau Malay and Riau Archipelago ethnomathematical studies to date is Designing, while the lowest is Explaining. The current study of ethnomathematics can be a solution to improve learning problems in schools. The reality that occurs in the classroom is that sometimes teachers teach math concepts different from their daily lives. Ethnomathematics enriches mathematics learning approaches to bridge mathematics with students' lives through their local culture. Of course, this is with the assumption described by Abi (2017) that the ethnomathematics presented in class is already known to students and can help them in learning mathematics.

Wahyuni et al. (2013) stated that cultivating cultural values is very important to support the development of the nation's character. Integrating local cultural values is considered to prevent the negative influence of globalization on the character development of students. This is also following the results of Budiwibowo's research (2016), namely, building national character education through local wisdom culture. Cultural values that develop in a society will always be rooted in traditional wisdom that appears and develops in line with the development of the community itself. Indonesian culture's wealth of values and flavors, especially Malay Riau and Riau Islands, can create unique student character. In addition, presenting ethnomathematics in the learning process can help teachers grow students' love for their culture. Of course, this supports the implementation of the objectives of the curriculum formulation that the 2013 curriculum is oriented to the development of student character education. This is indicated by the integration between subjects and levels of education (Sholekah, 2020). Ethnomathematics is considered to be the only knowledge that might deserve to be included in the school mathematics curriculum. (Knijnik, 2012)

The implementation of ethnomathematics in mathematics learning can also improve students' mathematical literacy. Fajriyah (2018), through his research, states that ethnomathematics plays a role in supporting literacy, especially mathematical literacy. Learning by presenting cultural nuances can construct students' mathematical concepts to learn more fun than usual. Thus the interest and motivation of students will increase so that it can affect student learning outcomes.

Based on the results of this study, there are still many ethnomathematical studies of Riau Malay and Riau Islands that have not been revealed. In Riau, there are 12 regencies/cities, while in the Riau Archipelago, there are 7. The findings of this study open up opportunities for future researchers to uncover ethnomathematics in other urban regencies such as Dumai, Rokan Hulu, Siak, and others. Likewise, for urban districts in the Riau archipelago.

Ethnomathematical studies have not been spread throughout Riau and Riau Islands. If the ethnomathematical study can be studied more broadly and in-depth by further researchers, the information found will be more and more. In an ethnomathematics-based program there exists the need for teachers to identify pedagogical actions in the form of teaching–learning practices (Rosa, M., & Orey, D. C, 2015). The collected ethnomathematical studies can be used as teaching materials in the form of learning supplement books. This information can be used as a guide for teachers in implementing ethnomathematics in the classroom.

▪ CONCLUSION

Ethnomathematics can be a means to help students learn mathematics through their local cultural context. Research on the ethnomathematics of Riau Malay culture and the Riau Islands is still little studied by researchers. Ethnomathematical studies have not spread throughout Riau and Riau Islands. From the aspect of cultural form, ethnomathematical studies that several researchers have studied are still dominant in the form of activity, while the least are artifacts. The related mathematical concepts that have been revealed through these studies are still dominated by geometry. Automatically the fundamental activity of mathematics found is design. Based on the results of this study, it is recommended that educators and researchers in the field of mathematics conduct more and more extensive ethnomathematical research in various districts and cities in the province of Riau and Riau Archipelago

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