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ETHNOMATHEMATICS: CONCEPT OF GEOMETRY AND CULTURAL WISDOM IN THE CONSTRUCTION OF THE MINANGKABAU GADANG HOUSE

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ABSTRACT
This research is one form of effort to show evidence of the relationship between mathematics and culture, especially on the subject of geometry, as well as to show the public that culture has an attachment to mathematics. The purpose of this study was to determine the construction process of the Minangkabau Gadang house and the geometric concepts contained therein. This study used qualitative research methods to describe the rules of cultural wisdom in building Gadang houses and the geometric concepts inside. With literature studies and observations of Gadang houses West Sumatera. The results of this study indicate that the construction of this traditional house turns out to be unwittingly using mathematical concepts to adapt to the environmental conditions in which it was built so that it does not only look at the aesthetics and comfort of living but also the security that the residents of the house get. Of course, it will be different in each regional condition and traditional house.
Keywords: Ethnomathematics, Geometry Concepts, Minangkabau Gadang House

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PRELIMINARY

Culture and education are two things that cannot be separated (Widyastuti, 2021); (Normina, 2017); (Sulistyani et al., 2019)). Culture consists of seven elements including: language system, knowledge, social, technology, economic activity, religion and art (Sumarto, 2019); (Tjahyadi et al., 2019). These seven elements are descriptions of a certain picture of community life, such as the language system that is used as a means of social interaction, while knowledge is the knowledge possessed by the community in maintaining their life, the social element is how the process of forming social groups in society, the technological element in question is a living equipment system such as productive tools and weapons, as well with religion and art which are the customs and beliefs of society.

Therefore, culture has its own role in education. Culture is also a supporting element, and vice versa, education is a process of transferring cultural values (Normina, 2017).

Indonesia is a country rich in culture (Kemendikbudristek, 2020), while it is also known as the country of a thousand islands. It has a lot of cultural heritage, based on 2010 census data, ans consists of 300 ethnic groups and 1,340 ethnic groups (Tim CNN, 2021). Currently, Indonesia is experiencing a cultural shift or setback (Hasanuddin, 2017); (WARDOJO, 2013); (Nahak, 2019), such as the fading of the local language which is not preserved by the current generation, and the scarcity of traditional houses in every region that have turned into modern houses. Thus, the values of wisdom that should be maintained and preserved are sometimes ignored and even abandoned. This is due to the era of globalization which has led to changes in lifestyle and mindset in society (Nahak, 2019). Studying culture through ethnomathematics is an attempt to remember history (Albanese et al., 2017). In addition, knowing what people owned in the past can be an effort to find out what the next generation of the nation can do in the future (Albanese et al., 2017; Johnson et al., 2022). Therefore, researchers want to explore and reintroduce cultural values and local wisdom through the world of education and learning, especially mathematics through an Ethnomathematics approach, especially focused on traditional houses, a an effort to maintain the existing cultural values and cultural heritage.

Learning mathematics has a close relationship with culture (Voigt, 2013; Wilder, 2014). This is in line with the ethnomathematics view which states that culture and mathematics have a very close relationship (Ascher, 2017; Balamurugan, 2015; Rosa et al., 2016), because mathematics is a cultural product (Simamora et al., 2018). Every culture and subculture should develop its own mathematics (Seah et al., 2017; Wilder, 2014). So, mathematics is considered to be universal, containing all human activity, as a cultural product, and mathematics has a history (Febriyandani & Kowiyah, 2021; Ningrum et al., 2019; Wang, 2016). For example, the making of unique batik is currently studied in mathematics in the discussion of the concept of transformation geometry, some roofs are designed using triangles with the hope that apart from protecting from the weather it also functions to drain water down and so on.

The results of previous research stated that the ethnomathematics learning approach can improve the quality of learning because the teacher associates abstract mathematics subject matter with daily life activities in a contextual environment. This is because (1) learning mathematics using an ethnomathematics approach becomes fun and contextual learning; (2) learning mathematics with ethnomathematics can reduce the impression that

mathematics is difficult and abstract and can be replaced with an impression that is fun, real, and easily accessible to students (Simamora and Rokan 2023).

There have been many studies related to culture with mathematics learning. Like a mathematical concept in the Sundanese calendar (Prabawati & Muslim, 2022), mathematical concept in the javanesses calendar (Risdiyanti & Prahmana, 2018; Utami et al., 2019), mathematical concepts contained in agricultural activities (Firdaus et al., 2020), n-side concept of ancient wells in Kaliwadas village, Cirebon (Noto et al., 2018), geometric transformation of the traditional Joglo house (Sulistyani et al., 2019), traditional foods such as *ketupat*, *lepet*, vegetables salad from java (*pecel*) (Gembong et al., 2022; Misbah, 2019), and on mathematical concepts, ancestral cultural traditions on mathematical concepts such as geometric shapes and linear programming (Fatkhurohman et al., 2021; Irfan et al., 2019; Putra et al., 2020). In general, these studies seek to identify the mathematical concepts contained in cultural activities. The hope is that by identifying mathematical concepts in culture, those can be used to develop teaching materials such as worksheet, so that students can reach abstract mathematical concepts.

The approach to learning mathematics that links culture in it is better known as Ethnomathematics. Ethnomathematics is a form of mathematics that is influenced or based on cultural values (Nurhasanah & Puspitasari, 2022). Briefly the initiator of Ethnomathematics explained through his primordial triangle as shown in Figure 1.

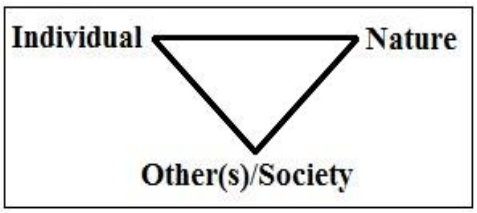

Figure 1. Primordial Triangle Between The Individual, Nature, and Society

Figure 1 explains the process of forming culture that occurs in social life which is formed from the relationship between the individual and nature, the individual and society, society and nature and the reverse cycle which will form a cycle that produces culture and cultural values in it (D'Ambrosio, 2016). Mathematics itself is a science that arises from the cycle of human interaction in society, based on the conditions needed by individuals and society either in certain activities or even in many of their activities. These can be seen in the illustration in Figure 2. (D'Ambrosio, 1985).

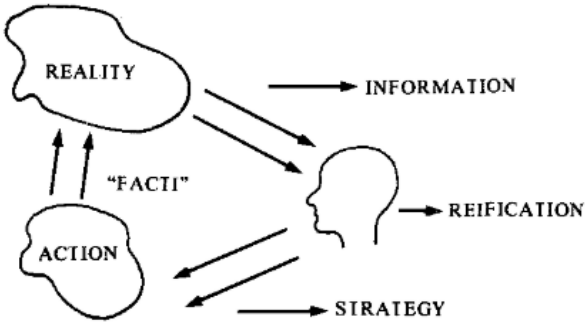

Figure 2. Reciprocity In Society

Figure 2. is also a reciprocal relationship in society between reality, action and individuals who will form the process of thinking mathematically related to culture so that ethnomathematics is formed. Karnillah said that ethnomathematics in Indonesia began with a study on the Baduy community in 2013 who had used and developed mathematics in their social lives even though many of them had not received education (Hidayati et al., 2022). Ethnomatematics also has an important role in the development of literacy (Hidayati et al., 2022), even the role of Indonesian culture can support this and make it easier for students to get to know PISA questions (Susanti, 2016), because Mathematics is a form of culture that is integrated into all aspects of human life so that it is possible to embed mathematical concepts in cultural practices (Maryati & Prahmana, 2019) , Indonesia is a country rich in culture and based on the research results above, ethnomatics can be a good learning method to study.

Therefore, researchers want to explore cultural values and local wisdom contained in the construction process of the Gadang Minangkabau traditional house in a review of mathematics curriculum, especially geometry. The aim is also to simultaneously introduce Indonesian cultural values which are slowly being eroded by globalization with the hope that the results of this research can be a separate study in the science of architecture and residential construction.

METHODS

This research is qualitative research using an ethnographic approach. This approach involved full involvement of researchers, exploration of community culture, and depth of data exposure (Windiani, 2016). Ethnographic research aims to interpret the meaning carried out by a certain group of people (Sunaryanto, 2021).

This research was carried out in Lubuk Sikaping, Pasaman Regency, West Sumatra Province, which is located in the highlands so the condition of traditional houses here is in

the hills. The object of research is the Gadang house of the local Minangkabau tribe. What will be studied is the mathematical aspects of building houses about cultural wisdom.

Data was collected in this study using observation and exploration in the construction process of the Minangkabau Gadang house, through direct observation of the Gadang house, and through in-depth theoretical studies to obtain information related to the cultural wisdom of the Minangkabau people, as well as exploring the information obtained to then pour it into descriptive writing.

The research stage, namely a preliminary study of local culture and community wisdom related to traditional houses. Then make guidelines for the Observation and exploration of traditional houses through interviews. Then make a summary of the information that links existing cultural wisdom with mathematical aspects.

RESULT AND DISCUSSION

Gadang house is the traditional house of the province of West Sumatra, this province itself is located on the west coast in the central part of the island of Sumatra which consists of the lowlands on the west coast and the volcanic plateau formed by the Bukit Barisan. It is also located on the Semangko fault line, at the confluence of two large continental plates, namely Eurasia and Indo-Australia in wich, West Sumatra is one of the earthquake-prone areas in Indonesia (Perkim, 2020).

Apart from being prone to earthquakes in West Sumatra, which are mostly located on the Bukit Barisan, this province is also an area prone to strong winds. Based on these geographical conditions, this article focuses on the structure of the Minangkabau Gadang house building with local wisdom that ables them to adapt to nature.

The structure of the Minangkabau traditional house building when viewed from the geometric concepts used in the building, includes flat shapes, the concept of translational geometric transformations (shifts), rotations, and reflections. The parts of the Minangkabau Gadang traditional house that use the concept of geometry to adapt to environmental conditions are Gonjong, and body of Gadang house.

a. *Gonjong* (roof)

The hallmark of the Minangkabau traditional house is its sloping roof. The part of the roof that soars high is called *gonjong*. The beauty of this roof shape can be seen from a distance so that it displays a style with its own nuances in the Minangkabau region.

Gonjong Traditional Houses are basically the same shape, but if we pay close attention these gonjong have differences with their own characteristics and each of the

various gonjong shapes has a name according to the analogy of the shape. such as, Gonjong Rabuang Mambujuik, Gonjong Alang Babega, Gonjong Bulan Sahari, Gonjong Balah Bu Dus and Gonjong Sapik Kalo.

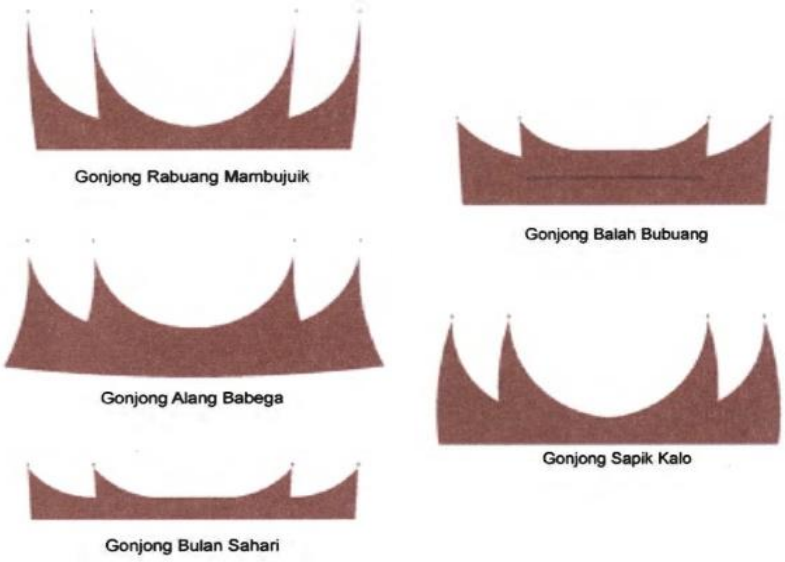

Figure 3. Variety of Gonjong Traditional Houses

The roof of the gadang house which is curved and tapers to the top is a windbreak construction (Ningrum et al., 2019; Rustiyanti, 2016), because many gadang houses stand on a plateau called Darek or mountainous area, where a lot of wind blows all the time. The *tunggang* roof functions to make water flow quickly, because the roof of the gadang house is made of palm fiber. The roof arch which is shaped like part of the side of the circle (circle arc) downwards is used to guide water to flow in one direction on the low part of the roof so that the *tampias* effect does not damage the walls (Afrizon & Dwiridal, 2017; Rahmawati, 2020; Rahmawati & Muchlian, 2019).

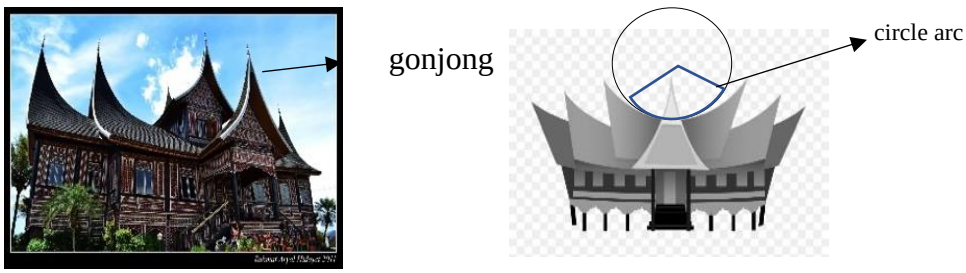

Figure 4. Geometric Shape On Gonjong

From Figure 4, the construction of the roof of the Gadang house, it can be noticed that there is the use of the geometric concept of a circular flat shape. namely first, the almost

semi-circular arch (circle arc) is made with the aim of breaking the strong wind, and secondly, the two roofs that ride in the form of curved sides form part of the side of the ball, which is used so that water flows in one direction when rain comes. This is due to the structure or shape of the circular arc which does not hold back but directs and directs the flow of air or wind outward.

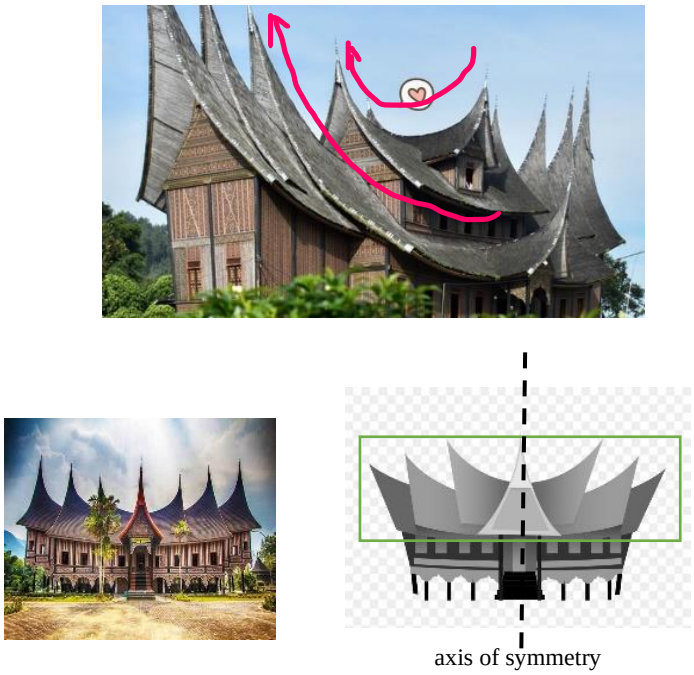

Figure 5. The Concept of Reflection On The Roof of The Gadang House

Then judging from the overall shape of the roof, wich looks symmetrical, the left and right sides are made the same. This is in accordance with the concept of reflection which is part of the transformation geometry. Reflection is determined by a certain line as the axis of reflection (Afrizon & Dwiridal, 2017; Lail et al., 2021). The distance of the initial shape to the axis of reflection is the same as the distance of the image shape to the axis of reflection. This shows balance in shapes that have an axis of symmetry. The use of the reflection concept on the roof of the Rumah Gadang plays a role in dealing with an earthquake, when the shock comes, the lower part of the Rumah Gadang will shift little, while the upper part will maintain its balance. The mathematical concepts used on this part of the roof play a very important role with calculations that adjust to the surrounding natural conditions.

b. Body of Gadang House

The body of the gadang house looks like a trapezoidal shape, small at the bottom and bigger at the top (Basak et al., 2009; Radeka, 1972). This is different from normal house buildings, on the other hand it is wide/large at the bottom and smaller at the top, like the

shape of tower buildings, of course they are made that way so that the building stays balanced. The body of this Rumah Gadang has a mathematical value, the walls are made to form an inverted trapezoid flat shape, and are closed with triangles on top like a ship.

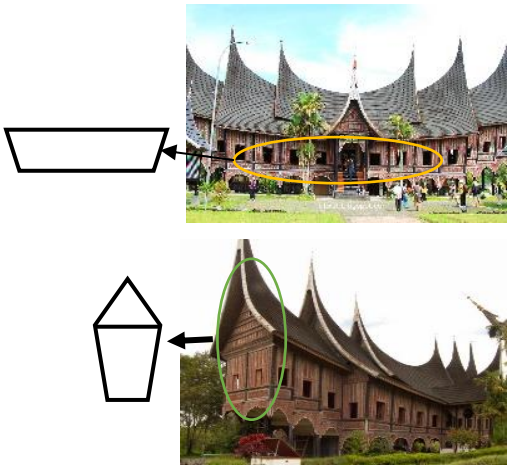

Figure 6. The Concept of A Trapezoidal Build On The Rumah Gadang Body

Rumah Gadang which has a unique shape, different from buildings in general, has a specific purpose. With only a stone foundation that is not planted, the Rumah Gadang must have great pressure. By using a trapezoidal shape, narrowing the bottom and widening the left and right bodies like a ship, the weight of the Rumah Gadang will be distributed and fully supported by the poles. In physics, this is related to the concept of pressure, since Surface that tapers to the bottom will automatically increase the pressure to the ground. Apart from that, a building of this shape will also hold back the wind and divert its energy and propulsion to the ground so that the building does not collapse easily (Fiandi, 2017).

Based on this description, in general the structure of the Rumah Gadang uses geometric concepts that can be applied to learning mathematics, especially geometry. The geometric concept used is the use of a circle or parabola on the roof of the Rumah Gadang, a trapezoidal shape on the body of the Rumah Gadang, a triangular shape on the roof walls, and also the concept of symmetry used in the house is very clear. These geometric concepts are used to maintain the stability of the shape of the house from natural conditions when it is hit by wind or earthquake. Thus the Gadang traditional house of West Sumatra can be used in learning mathematics as a context in introducing geometric shapes or calculating the circumference, area and volume of those shapes.

In addition, the use of culture in learning mathematics can be an innovation in learning. It is hoped that learning mathematics using this culture can be more interesting

and not boring such that students can easily accept and understand mathematical concepts, especially geometry in the Gadang traditional house, West Sumatra.

CONCLUSION

From the discussion above, we can see that in the process of building traditional houses, especially the Gadang traditional house of the Minangkabau tribe, there is cultural wisdom. This is the way for the community to have a house that pays attention to environmental and natural conditions so that it can survive and go hand in hand with the environment. With a unifying concept of cultural elements such as social elements, knowledge, technology, and economic activities, so that in having a place to live, people do not necessarily only see the aesthetics of beauty and luxury. They build houses by taking into account the natural conditions around them, such as when in the highlands they pay attention to strong winds, and so on. Besides that, it also pays attention to their economic life as farmers or others to prepare warehouses for their gardens or agricultural products. It should provide new knowledge, judgment, and perspectives in architectural engineering and civil engineering in home design and construction, by not forgetting the mathematical concept and the strength of the building and the beauty in it.

This research is limited to traditional Gadang houses in the highlands, so it does not show traditional Gadang houses in general in West Sumatra. Because West Sumatra also has city patent districts which are located in the lowlands or near the coast or. In this regard, it is hoped that other similar research can explore these areas.

REFERENCES

Afrizon, R., & Dwiridal, L. (2017). Upaya Menumbuhkan Karakter Peduli Lingkungan Melalui Kajian Konsep Fisika Pada Arsitektur Kearifan Lokal Budaya Sumatera Barat. *Jurnal Eksakta Pendidikan (JEP), 1*(2), 9–16. https://doi.org/10.24036/jep.v1i2.60

Albanese, V., Adamuz-Povedano, N., & Bracho-López, R. (2017). The evolution of ethnomathematics: Two theoretical views and two approaches to education. *Ethnomathematics and Its Diverse Approaches for Mathematics Education*, 6(13), 307–328. https://www.researchgate.net/publication/318678278_The_Evolution_of_Ethnomathematics_Two_Theoretical_Views_and_Two_Approaches_to_Education

Ascher, M. (2017). *Ethnomathematics: A multicultural view of mathematical ideas*. Routledge.

Balamurugan, M. (2015). Ethnomathematics; an approach for learning mathematics from multicultural perspectives. *International Journal of Modern Research and Reviews*, *3*(6), 716–720. https://www.journalijmrr.com/wp-content/uploads/2015/08/IJMRR-175.pdf

Basak, T., Roy, S., & Pop, I. (2009). Heat flow analysis for natural convection within trapezoidal enclosures based on heatline concept. *International Journal of Heat and Mass Transfer*, *52*(11–12), 2471–2483. https://doi.org/10.1016/j.ijheatmasstransfer.2009.01.020

D'Ambrosio, U. (1985). Ethnomathematics and Its Place in the History and Pedagogy of Mathematics. *For the Learning of Mathematics*, *5*(February 1985), 44-48 (in 'Classics'). https://usd.ac.id/fakultas/pendidikan/s2_pen_matematika/f1l3/An%20article%20by%20Ubiratan%20D%27Ambrosio.pdf

D'Ambrosio, U. (2016). The Ethnomathematics Program and a Culture of Peace. *Journal of Mathematics and Culture*, *10*(August), 1–11. https://journalofmathematicsandculture.files.wordpress.com/2016/09/dambrosio-final.pdf

Fatkhurohman, F., Ayuningtyas, A. D., Noto, M. S., & Widodo, S. A. (2021). Etnomathematics: Exploration of Geblek Renteng Batik in Transformation Geometry. *Numerical: Jurnal Matematika Dan Pendidikan Matematika*, *5(2)*, 79–90. https://doi.org/10.25217/numerical.v5i2.1506

Febriyandani, R., & Kowiyah, K. (2021). Analisis Kebutuhan Penggunaan Komik Sebagaimedia Pembelajaran Matematika Materi Pecahan Siswa Kelas Iv Sd. *Js (Jurnal Sekolah)*, *5*(3), 158–164. https://doi.org/10.24114/js.v5i3.26548

Fiandi, C. O. (2017). *Keajaiban arsitektur rumah gadang*. Badan Pengembangan dan Pembinaan Bahasa Kementrian Pendidikan dan Kebudayaan.

Firdaus, B. A. B., Widodo, S. A., Taufiq, I., & Irfan, M. (2020). Studi Etnomatematika: Aktivitas Petani Padi Dusun Panggang. *Jurnal Derivat*, *7*(2), 85–92. https://doi.org/10.31316/j.derivat.v7i2.983

Gembong, S., Krisdiana, I., Suprapto, E., Setyansah, R. K., Widodo, S. A., & Murtafiah, W. (2022). The Effectiveness of Mathematics Learning Based on Javanese Vegetable Salad Context to Improving Students' Higher Order Thinking Skills. *Pegem Egitim ve Ogretim Dergisi*, *13*(1), 84–91. https://doi.org/10.47750/pegegog.13.01.10

Hasanuddin. (2017). Nilai dan Karakter Budaya. *Dialog Budaya Nasional, Kebudayaan sebagai Strategi Penguatan Jati Diri Bangsa*, 1–13. https://doi.org/10.6084/m9.figshare.6855116

Hidayati, F. N., Charitas, R., & Prahmana, I. (2022). Ethnomathematics ' Research in Indonesia during 2015 -2020 Every culture in the world uses and develops mathematical ideas , ways , and techniques in dealing. *Indonesian Journal of Ethnomathematics*, *1*(April), 29–42. https://doi.org/10.48135/ije.v1i1.29-42

Irfan, M., Slamet Setiana, D., Fitria Ningsih, E., Kusumaningtyas, W., & Adi Widodo, S. (2019). Traditional ceremony ki ageng wonolelo as mathematics learning media. *Journal of Physics: Conference Series*, *1175*(1), 012140. https://doi.org/10.1088/1742-6596/1175/1/012140

Johnson, J. D., Smail, L., Corey, D., & Jarrah, A. M. (2022). Using Bayesian networks to provide educational implications: mobile learning and ethnomathematics to improve sustainability in mathematics education. *Sustainability*, *14*(10), 5897. https://doi.org/10.3390/su14105897

Kemendikbudristek, pengelola web. (2020). Kementerian Pendidikan Dan Kebudayaan Republik Indonesia. *Kemdikbud* (pp. 2011–2013). https://www.kemdikbud.go.id/main/blog/2021/08/mengembangkan-warisan-budaya-dengan-riset-dan-teknologi

Lail, I. J., Wijayanti, D., & Kusmaryono, I. (2021). Eksplorasi Etnomatematika dan Filosofi Nilai-Nilai Islam Pada Masjid Agung Kauman Semarang. *Jurnal Pendidikan Sultan Agung*, *1*(1), 16–25. http://dx.doi.org/10.30659/jp-sa.v1i1.13664

Maryati, & Prahmana, R. C. I. (2019). Ethnomathematics: Exploration of the muntuk community. *International Journal of Scientific and Technology Research*, *8*(6), 47–49.

Misbah, M. M. (2019). The Ketupat Eating Tradition on Lebaran Ketupat Day in Java. *2nd Internasional Conference on Culture and Language in Southeast Asia (ICCLAS 2018)*, 8–11. https://doi.org/10.2991/icclas-18.2019.3

Nahak, H. M. I. (2019). Upaya Melestarikan Budaya Indonesia Di Era Globalisasi. *Jurnal Sosiologi Nusantara*, *5*(1), 65–76. https://doi.org/10.33369/jsn.5.1.65-76

Ningrum, H. U., Mulyono, M., Isnarto, I., & Wardono, W. (2019). Pentingnya Koneksi Matematika dan Self-Efficacy pada Pembelajaran Matematika SMA. *PRISMA, Prosiding Seminar Nasional Matematika*, *2*, 679–686. Retrieved from https://journal.unnes.ac.id/sju/index.php/prisma/article/view/29237

Normina. (2017). Pendidikan dalam Kebudayaan. *Ittihad Jurnal Kopertais Wilayah XI Kalimantan*, *15*(28), 17–28. http://dx.doi.org/10.18592/ittihad.v15i28.1930

Noto, M. S., Firmasari, S., & Fatchurrohman, M. (2018). Etnomatematika pada sumur purbakala Desa Kaliwadas Cirebon dan kaitannya dengan pembelajaran matematika di sekolah. *Jurnal Riset Pendidikan Matematika*, *5*(2), 201–210. https://doi.org/10.21831/jrpm.v5i2.15714

Nurhasanah, W. F., & Puspitasari, N. (2022). Studi Etnomatematika Rumah Adat Kampung Pulo Desa Cangkuang Kabupaten Garut. *Plusminus: Jurnal Pendidikan Matematika*, *2*(1), 27–38. https://doi.org/10.31980/plusminus.v2i1.1587

Perkim. (2020). Pola Perkembangan Permukiman Provinsi Sumatera Barat. *Perkim.id*. https://perkim.id/profil-pkp/profil-provinsi/pola-perkembangan-permukiman-provinsi-sumatera-barat/

Prabawati, M. N., & Muslim, S. R. (2022). Etnomatematika:Filosofi dan Konsep Matematis Kalender Sunda. *Mosharafa: Jurnal Pendidikan Matematika*, *11*(3), 369–378. https://doi.org/10.31980/mosharafa.v11i3.1471

Putra, R. Y., Wijayanto, Z., & Widodo, S. A. (2020). Etnomatematika: Masjid Soko Tunggal Dalam Pembelajaran Geometri 2D. *Jurnal Riset Pendidikan Dan Inovasi Pembelajaran Matematika (JRPIPM)*, *4*(1), 10 - 22. https://doi.org/10.26740/jrpipm.v4n1.p10-22

Radeka, V. (1972). Trapezoidal filtering of signals from large germanium detectors at high rates. *Nuclear Instruments and Methods*, *99*(3), 525–539. https://doi.org/10.1016/0029-554X(72)90666-0

Rahmawati, Y. (2020). Pendekatan matematika realistik bernuansa Etnomatematika: Rumah gadang minangkabau pada materi teorema pythagoras. *Jurnal Azimut*, *3*(SMAR), 22–29. https://doi.org/10.31317/jaz.v3iSMAR.636

Rahmawati, Y., & Muchlian, M. (2019). Eksplorasi etnomatematika rumah gadang minangkabau Sumatera Barat. *Jurnal Analisa*, *5*(2), 123–136. https://doi.org/10.15575/ja.v5i2.5942

Risdiyanti, I., & Prahmana, R. C. I. (2018). Ethnomathematics: Exploration in Javanese culture. *Journal of Physics: Conference Series*, *943*(1), 012032. https://doi.org/10.1088/1742-6596/943/1/012032

Rosa, M., D'Ambrosio, U., Orey, D. C., Shirley, L., Alangui, W. V, Palhares, P., & Gavarrete, M. E. (2016). *Current and future perspectives of ethnomathematics as a program*. Springer Nature.

Rustiyanti, S. (2016). Makna Yang Tersirat & tersurat dalam visualisasi bangunan rumah gadang di minangkabau. *Kearifan Lokal Dalam Arsitektur Dan Lingkungan Binaan*, *27*(28), 49-57. http://dx.doi.org/10.21776/ub.sbn.2022.007.01.05

Seah, W. T., Baba, T., & Zhang, Q. (2017). The WIFI study: Students' valuing of mathematics learning in Hong Kong and Japan. *What Matters? Research Trends in International Comparative Studies in Mathematics Education*, 333–354.

https://www.researchgate.net/publication/314218957_The_WIFI_Study_Students%27_Valuing_of_Mathematics_Learning_in_Hong_Kong_and_Japan

Simamora, R. E., Saragih, S., & Hasratuddin, H. (2018). Improving Students' Mathematical Problem Solving Ability and Self-Efficacy through Guided Discovery Learning in Local Culture Context. *International Electronic Journal of Mathematics Education*, *14*(1), 61–72. https://doi.org/10.12973/iejme/3966

Simamora, Minta Ito, and Najwah Rokan. 2023. "Etnomatematika Di Pasar Kamu Sebagai Sumber Pembelajaran Matematika." *OMEGA: Jurnal Keilmuan Pendidikan Matematika* 2(2):01–08. doi: 10.47662/jkpm.v2i2.455.

Sulistyani, A. P., Windasari, V., Rodiyah, I. W., & Muliawati, N. E. (2019). Eksplorasi Etnomatematika Rumah Adat Joglo Tulungagung. *Media Pendidikan Matematika*, *7*(1), 22-28 https://doi.org/10.33394/mpm.v7i1.1537

Sumarto, S. (2019). Budaya, Pemahaman dan Penerapannya. *Jurnal Literasiologi*, *1*(2), 16 144-159. https://doi.org/10.47783/literasiologi.v1i2.49

Sunaryanto. (2021). Etnografi dalam Penelitian Kualitatif. *UIN Syarif Hidayatullah Jakarta*, *42*(8), 1–21. https://www.researchgate.net/publication/351954054_ETNOGRAFI_DALAM_PENELITIAN_KUALITATIF_KONSEP_DAN_DESAINNYA

Susanti, E. (2016). Pengembangan Soal Matematika Tipe Timss Menggunakan Konteks Rumah Adat Untuk Siswa Sekolah Menengah Pertama. *Jurnal Pendidikan Matematika*, *10*(2), 1–22. https://doi.org/10.22342/jpm.10.2.3631.53-74

Tim CNN. (2021). Mengenal 7 Wujud Keragaman Budaya Indonesia dan Contohnya. *CNN Indonesia*. https://www.cnnindonesia.com/edukasi/20210222140901-574-609361/mengenal-7-wujud-keragaman-budaya-indonesia-dan-contohnya

Tjahyadi, I., Wafa, H., & Zamroni, M. (2019). Buku Ajar Kajian Budaya Lokal. Pagan Press.

Utami, N. W., Sayuti, S. A., & Jailani. (2019). Math and mate in Javanese Primbon: Ethnomathematics Study. *Journal on Mathematics Education (JME)*, *10*(3), 341–356. https://doi.org/10.22342/jme.10.3.7611.341-356

Voigt, J. (2013). Negotiation of mathematical meaning in classroom processes: Social interaction and learning mathematics. *Theories of mathematical learning* (pp. 33–62). Routledge.

Wang, H. (2016). *From Mathematics to Philosophy (Routledge Revivals)*. Routledge.

Wardojo, K. (2013). Pergeseran Pandangan Terhadap Nilai Sosial Budaya Dalam Masyarakat Sebagai Akibat Pengaruh Kebudayaan. *Jurnal Equilibrium, 1(1), 45-57.* http://doi.org/10.25273/equilibrium.v1i1.553

Widyastuti, M. (2021). Peran Kebudayaan Dalam Dunia Pendidikan. *JAGADDHITA: Jurnal Kebhinnekaan Dan Wawasan Kebangsaan*, *1*(1), 54–64. https://doi.org/10.30998/jagaddhita.v1i1.810

Wilder, R. L. (2014). *Mathematics as a cultural system*. Elsevier.

Windiani. (2016). Menggunakan Metode Etnografi Dalam Penelitian Sosial. *Dimensi Jurnal Sosiologi*, *9*(2), 87–92. https://doi.org/10.21107/djs.v9i2.3747