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Exploration of *Unggan* weaving in *Minang* culture: An ethnomathematics study

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Abstract

Unggan weaving, an original cultural product of the *Sijunjung* people, especially *in Unggan* Village, is widely used as employee, traditional, and school uniforms once a week. However, the use of *Unggan* weaving in mathematics learning has yet to be widely explored. This research aims to reveal the mathematical elements of *Unggan* weaving as a learning vehicle more appropriate to students' culture. This research is qualitative research with an ethnographic approach. Data collection methods use in-depth interviews, documentation, and ethnographic notes. The interview subjects were Ernita, owner of *Unggan* Weaving (R-1), and Masniati, an employee of *Unggan* Weaving (R-2). Data analysis uses the results of interpretation and translation of the phenomena found, as well as based on the results of the informant's conception of the meaning and the informant's original language regarding the focus, which is combined verbally with the researcher's language after in-depth understanding through focus group discussions (FGD). The research results show that *Unggan* woven fabric contains mathematical elements of geometric transformation (translation, reflection, dilation, symmetry) and arithmetic number patterns. The results of this research can be recommended as material for developing school mathematics teaching materials based on local wisdom.

Keywords: ethnomathematics; *Minang* culture; *Unggan* weaving

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Introduction

Indonesia has a diverse culture that stretches from Sabang to Merauke. Each region has customs that are different from one another. For example, in Sijunjung Regency, West Sumatra there is a unique culture of '*Rumah Gadang', 'Bako Adat', 'Talempong Unggan'* and 'Unggan Woven Fabric'. *Unggan* is one of the villages located in Sumpur Kudus District, Sijunjung Regency, West Sumatra Province, which is very good at weaving songket as an additional job to support their family economy (Harsari, 2018). Unggan woven is the name of the weaving industry in *Unggan* Village which is equipped with a building as a meeting and training hall for craftsmen who are interested in learning weaving. People in *Unggan* Village are very familiar with *Unggan* woven fabrics which have been used as clothing at traditional events including official clothing for teachers and employees in West Sumatra. The *Unggan* community strongly upholds the preservation of their own culture (Nahak, 2019).

Although *Unggan* weaving is well known among the people of West Sumatra it has not been widely used as a learning resource, especially to innovate mathematics learning based on local wisdom (Pathuddin & Nawawi, 2021). Even though *Unggan* Weaving can be used as a real example of the application of mathematics in everyday life in accordance with student culture. For this reason, it is necessary to carry out an ethnomathematics study on *Unggan* weaving to explore mathematical material that is suitable for the Minang community. In line with the development of contextual mathematics learning based on culture (Cubillas, 2020; Nur et al., 2021; Sunzuma & Maharaj, 2021) there are several relevant studies, among others, namely research by Abdullah (2017) linking Sundanese culture with the concept of measurement, research by (Kusno et al., 2022) which links Islamic boarding school culture with geometric transformation, research by Kumala et al., (2022) which links kenthongan culture with geometry, and research by (Supiyati et al., 2019) which links Sasak culture with geometric concepts.

Reflecting on Rosa and Orey (2021) and Zaenuri and Dwidayati (2018) writing on the origin of human knowledge, he understands that every culture develops ways, styles, and techniques for doing things in response to the search for explanations, understanding, and learning a phenomenon that occurs in life. Thus ethnomathematics research can be an alternative in holistic education (Kurniawan et al., 2019; Rosa & Orey, 2016) which brings together mathematical ideas and cultural values. This is because mathematical concepts presented in accordance with student culture will be easier to understand and more meaningful to students (Fauzi et al., 2023). Furthermore, Nusantara and Rahardjo (2017) and Peni (2019) revealed that ethnomathematics-based learning can improve students' mathematical concept understanding ability. In addition, Mania and Alam (2021) and Patri and Heswari (2021) stated that the development of ethnomathematics-based learning modules can improve students' thinking skills.

Regarding *Unggan* weaving, there are several previous studies, namely Jamarun and Hamzah (2017) examine the diversity of motifs, Syafriadi et al., (2021) identifying the types of motifs produced, Noerhasmalina and Khasanah (2023) examining the algorithmic aspects of determining consumer purchasing patterns. These studies are still centered on economics and

so far, no one has studied *Unggan* woven fabric in the field of ethnomathematics. For ethnomathematics research related to woven fabrics has also been widely discussed, for example Harahap and Mujib (2022) explores the concept of geometry of flat shapes from Medan Batik cloth, Prahmana and D'Ambrosio (2020) explores transformation geometry material from Jogja Batik, Noerhasmalina and Khasanah (2023) explores transformation geometry from Lampung Batik and Kumala and Tsabitah (2022) explores the concept of geometric from Banyumas Batik. Related to this study, researchers are interested in uncovering mathematical elements of Unggan weaving to enrich the repertoire of contextual mathematics learning based on Unggan culture, Sijunjung, West Sumatra. The results of this research are recommended as strengthening the mathematics learning curriculum based on local wisdom.

Methods

In this research, qualitative methods are used because they explore, discover and describe a phenomenon in human life naturally and in depth. Apart from that, an ethnographic approach is also used to identify and describe cultural objects through field (empirical) and theoretical research (Siddiq, 2019). The ethnographic approach was chosen because it is in line with the aims of ethnomathematics, specifically studying mathematical ideas, processes and techniques in cultures from their original point of view. In this research, observations were made of Minang culture which required researchers to see, hear, speak and act in different and unique ways. This research takes place cyclically so that the stages of data collection, data analysis, data interpretation can be carried out simultaneously and can be carried out repeatedly (Mezmir, 2020).

The ethnographic research procedure was carried out in the following steps: 1) the researcher looked for articles related to Minang culture, ethnomathematics, and relevant mathematical elements; 2) determine informants who know about Minang culture, especially Unggan weaving, its history, motifs and philosophical values; 3) conduct interviews with informants based on prepared interview sheets; 4) make prepared ethnographic notes, 5) carry out the observation stage which is carried out by visiting and observing several motifs that have been selected by the researcher; 6) researchers document artifacts related to research; 7) the researcher analyzes the results of observations, documentation and interviews with the three subjects and then connects them with the results of other ethnomathematics studies on relevant material. The object studied in the research is Unggan woven cloth in Sijunjung Regency, because it has unique and philosophical values that are beneficial for human life. Data collection techniques refer to (Spradley, 2016) ethnographic steps, namely in-depth interviews, documentation and ethnographic notes. In-depth interviews were conducted to collect information directly from informants to find out opinions, understanding, concepts, thoughts and practices in the field. The subjects interviewed in this research were Ernita (R1) as the owner of the *Unggan* weaving craft and Masniati (R2) as the Unggan weaving craftsman. Interviews refer to three principles of ethnography, namely explicit goals, ethnographic explanations, and ethnographic questions. Documentation is a complement to the use of camera-assisted observation methods and interviews in qualitative research. In this case it

relates to photos related to activities and artifacts related to *Unggan* woven cloth. Meanwhile, ethnographic notes include field notes, recording equipment, drawings, artifacts, and other objects that can become data and document the atmosphere in making unggan woven cloth. The data collection instrument in this research was the researcher himself. Researchers play an important role as research instruments in operationalizing all the data collection techniques and tools used, so that new information buildings can be created in reaching the final research findings. Data were analyzed descriptively based on the results of interpretation and translation of the phenomena found, as well as based on the results of the informant's conception of meaning and the informant's native language regarding the focus, which was combined verbally with the researcher's language after in-depth understanding.

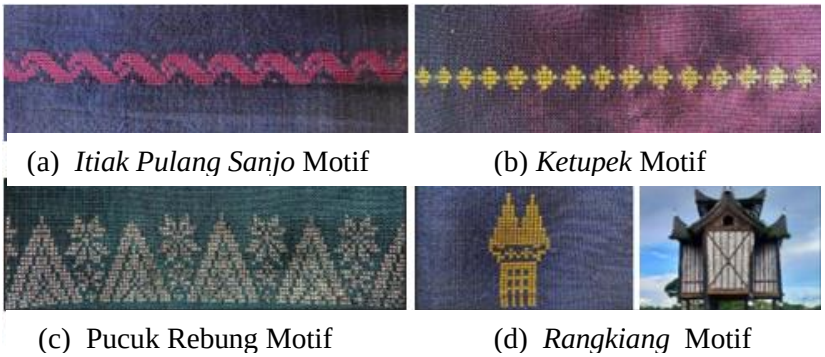
Results

Unggan weaving is a woven craft produced from the *Unggan* area, Sumpur Kudus District, Sijunjung Regency, West Sumatra. *Unggan* weaving is a combination of weaving techniques from the Pandai Sikek area and the Silungkang area, giving birth to *Unggan* weaving. *Unggan* weaving experienced rapid development, both in the form of *songket* weaving and automatic weaving. *Unggan* weaving has distinctive motifs and patterns so that it attracts many people. In 2016, the Sijunjung Regency Government, West Sumatra, patented 30 motifs for the *Unggan* weaving craft. However, among these motifs the most famous are the *Itiak Pulang Sanjo* motif, the *Ketupek* motif, the *Pucuk Rebung* motif and the *Rangkiang* motif. From the researcher's interviews with Ernita (R1), the owner of Unggan weaving, and Masniati (R2), one of the employees of Unggan weaving, Sijunjung Regency, West Sumatra, the following results were obtained:

Researcher	:	What are the Unggan weaving motifs that are popular with consumers?
Masniati	:	There are various Unggan weaving motifs, but those that are much sought after by the public include the Itiak Pulang Sanjo motif, the Ketupek motif, the Pucuk Rebung motif, and the Rangkiang motif.
Researcher	:	Where did the Unggan weaving motifs come from?
Ernita	:	Unggan weaving is the result of her own creativity which is extracted from natural phenomena around her
Researcher	:	Can you explain the origin of the Itiak Pulang Sanjo motif?
Ernita	:	The motif of Itiak Pulang Sanjo is inspired by the natural phenomenon that exists around it, namely the behavior of ducks who always walk together in the afternoon when they enter the cage
Researcher	:	What about the Ketupek motif?
Ernita	:	The Ketupek motif is the simplest and easiest Unggan woven motif to make. The Ketupek motif is also called a supporting motif because it is often used to decorate other motifs
Researcher	:	What about the Pucuk Rebung motif?
Ernta	:	The Pucuk Rebung motif is inspired by young bamboo plants found in the natural environment around Unggan Village, especially on the side of the main road.
Researcher	:	What about the Rangkiang motif?

Ernita	:	The Rangkiang motif is inspired by the Rangkiang building in front of the Gadang house. Rangkiang functions as a storage place for harvested goods in the Gadang house

Furthermore, the documentation results for the *Itiak Pulang Sanjo* motif, *Ketupek* motif, *Pucuk Rebung* motif and *Rangkiang* motif are presented in Figure 1 below:



(a) *Itiak Pulang Sanjo* Motif (b) *Ketupek* Motif

(c) Pucuk Rebung Motif (d) *Rangkiang* Motif

Figure 1. Four Unggan Woven Motifs

1. *Itiak Pulang Sanjo* Motif

The *Itiak Pulang Sanjo* motif is an *Unggan* weaving motif that was excavated from the row incident that occurred when a group of ducks returned home together at dusk. This characteristic of ducks illustrates an attitude of togetherness. This is in accordance with what was emphasized by (Hermandra, 2022), that the motif of *Itiak Pulang Sanjo* means that in society we must live in mutual cooperation and cooperation as shown by *Itik's* behavior which always prioritizes togetherness. The *Itiak Pulang Sanjo* motif teaches people to always comply with applicable regulations. If you pay attention, the *Itiak Pulang Sanjo* motif is composed of parallelogram shapes arranged parallel to the same distance. At each base and end of the parallelogram there are additional lines which as a whole represent the duck's neck and feet. For more details, it can be presented in Figure 2 below:

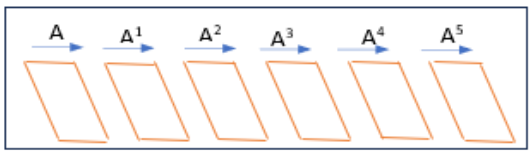


Figure 2a. Parallelogram Translation

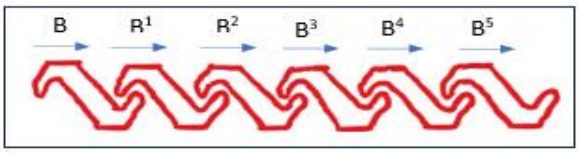


Figure 2b. Translation of *Itiak Pulang Sanjo*

The translation process in Sanjo's itiak return weaving can be seen at point B to the right so that it becomes B^1, point B^1 is shifted again to the right by the same distance so that it becomes B^2 and so on up to Bn. The shift of each point occurs in a straight line with the same direction and distance. For example, point A (x, y) is translated by T to produce point A^1 (x_1, y_1), then in the translation concept this can be expressed as:

$$A\ (x,y) \xrightarrow{\mathbf{T}} A^1\ (x^1,y^1).$$

If A^1 is translated to form A^n, then the translation concept formed can be illustrated as follows:

$$A^1(x^1,y^1) \xrightarrow{T} A^n(x^n,y^n)$$

2. *Ketupek* Motif

'*Ketupek*' in *Unggan* Community terminology means *Ketupat*, so the *Ketupek* motif is extracted from a culinary food called *Ketupat* which is depicted in a rectangular shape in a flat shape. Due to its rectangular shape, *Ketupa*t conveys the moral message of balance in the four corners of nature and controlling one's desires. This is confirmed by Rianti et al. (2018) that *Ketupat* is a symbol of controlling lust. The *Ketupat* motifs have the same pattern as each other which is arranged stretching with the same distance and size from A to A^1, from A1 to A^2 and so on until A^7. This confirms that the *Ketupat* motif is a representation of translation as shown in Figure 3a. Apart from that, if the M diamond motif is reflected on the Y line, it will produce M' of the same size facing each other. For example, M has coordinated points (x, y), then the resulting image is M' with coordinate points (x', y'). This confirms that the Ketupat motif is a representation of reflection as shown in Figure 3b:

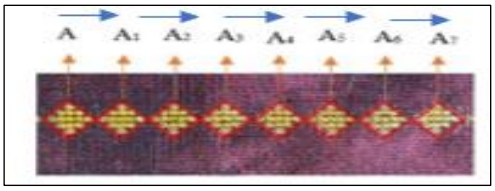


Figure 3a. Translation of the *Ketupat*

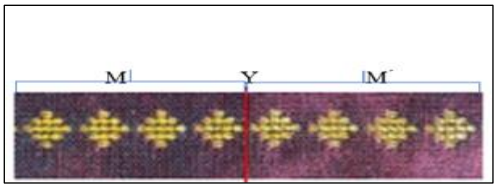


Figure 3b. Reflections of the *Ketupat* Motif

3. *Pucuk Rebung* Motif

Pucuk Rebung means young bamboo. This motif was extracted from the natural surroundings in Unggan village, especially bamboo plants of all ages from young to old. The *Pucuk Rebung* motif means that someone in their life must be useful all the time. This is in accordance with the opinion of Cahyadi (2014) who said that a person must be useful throughout his life like bamboo shoots (young bamboo). The bamboo philosophy describes a useful life starting from young age (bamboo shoots) for food to old age (bamboo) as a need for household tools such as building materials. Furthermore, the Unggan woven cloth with the *Pucuk Rebung* motif can be shown in Figure 4 below:

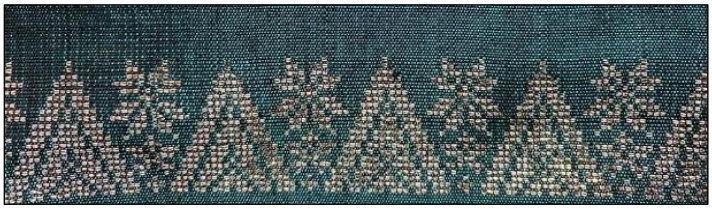


Figure 4. *Pucuk Rebung* Motif

The *Pucuk Rebung* motif consists of a triangular main motif and flower-shaped supporting motifs. The main motif in the form of a triangle consists of 2 layers, namely a large triangle

and a small triangle as shown in Figure 5

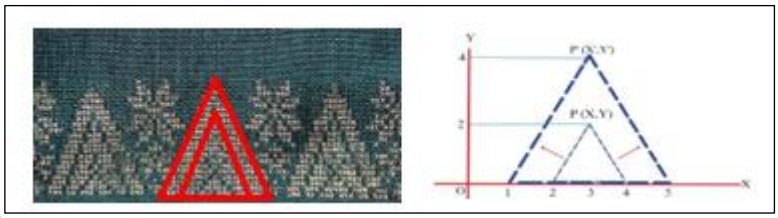


Figure 5. Dilatation of the *Pucuk Rebung* Motif

The triangle shape in the *Pucuk Rebung* motif above is a geometric transformation in the form of dilation. The concept of dilation is found in triangles (1) and (2). In Figure 5 above you can see that triangle (1) has point P(X,Y) and is dilated by pulling the sides of the triangle to produce triangle (2) which has point P'(X',Y'). The *Pucuk Rebung* motif also shows the existence of a translation that transforms the triangle ABC into the triangle A^1 B^1 C^1 and so on until A^n $B^n C^n$, as shown in Figure 6 below.

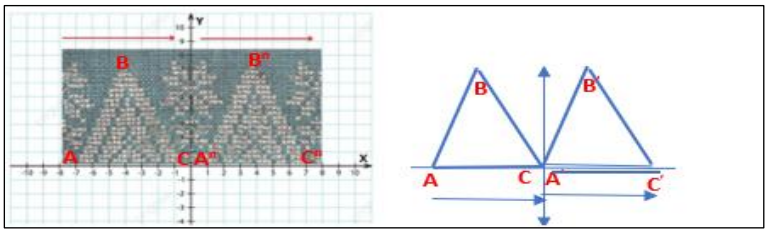


Figure 6. Translation on the *Pucuk Rebung* Motif

Apart from dilatation and translation, the *Pucuk Rebung* motif also represents the occurrence of reflection which transforms triangle ABC into triangle C^1 B^1A^1 which is the same and congruent but located facing each other as shown in Figure 7 below.

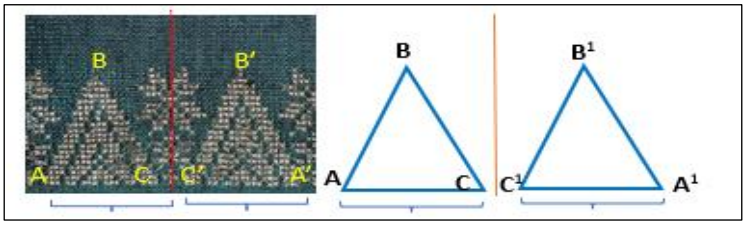


Figure 7. Reflection Consep on *Pucuk Rebung* Motif

Another mathematical element that can be found in the *Pucuk Rebung* motif is the folding symmetry of the triangular motif as shown in Figure 8 below

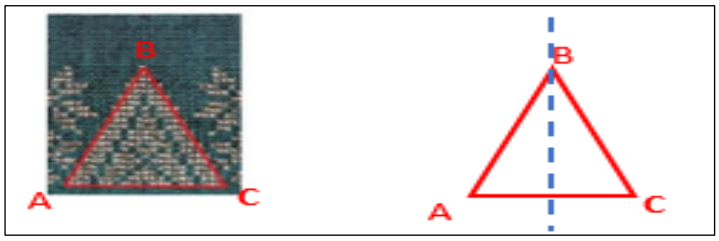
: 

Figure 8. The Concept of Symmetry In The Pucuk Rebung Motif

In Figure 8 above, the folding symmetry that is formed can only be in one direction, namely to the side. This is because the triangle formed is an isosceles triangle. In Figure 8, if the triangular tip of the *Pucuk Rebung* motif is folded with the other end, they will form the same plane. With this characteristic, it can be proven that the *Pucuk Rebung* motif contains mathematical elements in the form of folding symmetry

4. *Rangkiang* Motif

Rangkiang is a harvest storage place used by the Minangkabau people to store rice which is usually found in front of the Gadang house. So the *Rangkiang* motif was excavated from a rice barn building called *Rangkiang*. This is in line with what was stated by Thahirah and Fernanda (2021) that *Rangkiang* is a storage place for agricultural products which is usually used by the Minang people and is often referred to as a rice barn. Furthermore, images of woven cloth motifs and *Rangkiang* buildings are presented in Figure 9 below:

Figure 9. *Rangkiang* Motif dan *Rangkiang* Building

Rangkiang has a roof shape that tapers upwards like a buffalo's horn, the bottom is in the shape of a cube like a house and the bottom is like a block. However, the *Rangkiang* in *Unggan* weaving is depicted in a flat shape with the top part being a line and the body part being a square shape and the bottom part being a rectangular shape. *Unggan* weaving with Rangkiang motifs represents the transformation of folded symmetry as seen in Figure 10 below:

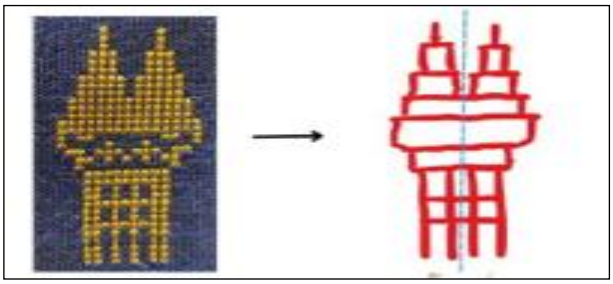


Figure 10. Folding Symmetry in *Rangkiang* Motifs

In Figure 10 above, the folding symmetry is formed only from one direction, namely the sideways direction, because if the motif point is connected to the motif point next to it, a similar image will be formed. Conversely, the *Rangkiang* motif does not have downward folding symmetry because if the image is folded down it does not produce a similar shape. In addition to folding symmetry, *Rangkiang* motifs also represent number patterns that form arithmetic rows and series as presented in Figure 11 below.

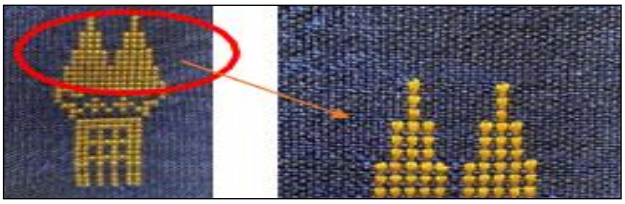


Figure 11. Number pattern in *Rangkiang* Motif

The top of the *Rangkiang* motif forms a number pattern consisting of 3 vertically arranged dots, three rows of one column forming a matrix with order 3x1, in the second part forming a square number pattern consisting of three rows of three columns forming a matrix with order 3x3, while in the third part forming a rectangular number pattern consisting of three rows of five columns forming a matrix with order 3x5. Furthermore, the number pattern formed from the Rangkiang motif is expressed in Figure 12 below:

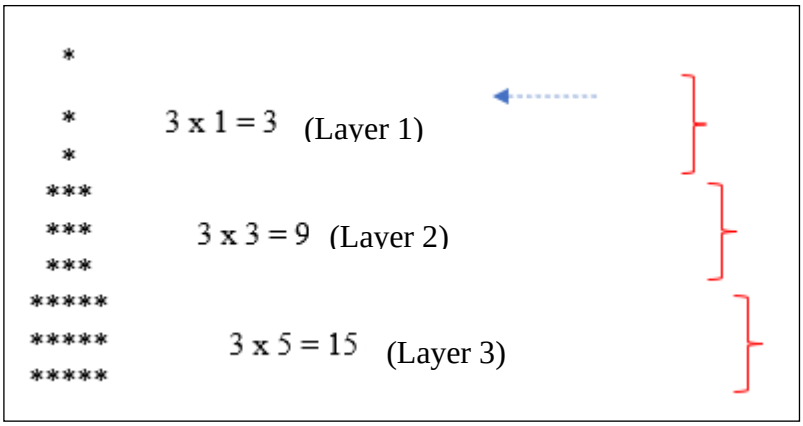


Figure 12. Number Pattern on *Rangkiang* Motif

If you look closely, the number pattern formed in the *Rangkiang* motif forms a three-multiplication number pattern with odd numbers, namely (3x1), (3,3), (3x5), ... so that the number of points at each level can be known. For more details, this pattern can be expressed in Table 1 below:

Tabel 1. The number patterns found on the *Rangkiang* roof

No	Patterns on the Rangkiang Motif	Number of Patterns (*)
1.	3 x 1	3
2.	3 x 3	9
3.	3 x 5	15
…	……	….
N	3 x (2n – 1)	3(2n – 1)

From the patterns formed in Table 1 above, the numbers 3, 9, 15, ... form an arithmetic sequence pattern with the first term a = 3 with the difference between each term b = 6 so that the nth term can be expressed as Un = 3 + (n-1)6 or Un = 6n-3. Meanwhile, when viewed from the arithmetic sequence, the sum to the nth term is Sn = ½.n (3+6n-3) = 3n2.

Discussion

The results of this study reveal the existence of mathematical elements found in the making of *Unggan* weaving motifs, especially geometric transformations and number patterns. These results strengthen the results of Prahmana and D'Ambrosio (2020) research on Jogja Batik and Noerhasmalina and Khasanah (2023) on Lampung Batik. In this study, a number of mathematical relationships with *Unggan* weaving motifs were studied which can be used as a source of inspiration for developing contextual mathematics materials based on local wisdom.

In this case the translational material in *Unggan* weaving is used to design the Itiak Pulang Sanjo motif, *Ketupek* motif, and *Pucuk Rebung* motif. Mirroring material is used to design *Ketupek*, *Pucuk Rebung* and *Rangkiang* motifs. Folding symmetry material is used to design *Ketupek* and *Rangkiang* motifs. Dilation material is used to design *Pucuk Rebung* motifs, and number patterns material is used to design *Rangkiang* motifs. The disclosure of mathematical elements in the *Unggan* weaving motif is a wealth of contextual mathematics based on local wisdom, especially for people who live in Sijunjung Regency, West Sumatra. This material is more meaningful to students because it is built from the students' own culture. This is in accordance with what is stated by Rosa and Orey (2016) and Fauzi et al. (2023) that students' understanding of the material will increase when presented in accordance with their culture.

These findings also answer the demands for differentiated learning-based mathematics material, especially multicultural education. In multicultural education students learn according to their culture (Abduh et al., 2023). This is also confirmed by Parker et al. (2017) that students more easily understand mathematical concepts from their own culture. The implementation in learning is that students need to be facilitated to learn mathematics from their own culture. For example, to study geometric transformations, students from Sijunjung Regency are more appropriate to use *Unggan* weaving media, students from Jogjakarta are more appropriate to use Jogja batik media and students from Lampung are more appropriate to use Lampung Batik media. Apart from that, the findings of this research can also strengthen character education because in every *Unggan* weaving motif there is a moral message that is beneficial for human life. in accordance with the principles of holistic education put forward by Widodo (2019). The

Itiak Pulang Sanjo motif teaches people to always in line with complying with applicable regulations. The *Ketupat* motif provides a moral message of balance in the four corners of nature and control of desires. The *Pucuk Rebung* motif means that someone in their life must be useful all the time. The *Rangkiang* motif gives a moral message to always be ready to face urgent needs.

Conclussion

Ethnomathematics is a contextual and realistic mathematical experience that students encounter every day in their lives. Ethnomathematics can bring students closer to more meaningful mathematics because it is embedded in the students' own culture. Exploring mathematical understanding from experience will bring passion and meaning. In Unggan weaving, it turns out that mathematical ideas can be explored that represent geometric transformations and number patterns as well as the symbolic meaning of motifs that can provide moral messages in life. The *Unggan* woven motifs in question are the *Itiak Pulang Sanjo* motif which represents the concept of translation, *Ketupek* motif, which represents the concept of reflection, *Pucuk Rebung* motif which represents the concept of dilation, and *Rangkiang* motif which represents the concept of number patterns.

The limitation of this research is that it only covers a small portion of the unggan weaving motifs to explore the material of geometric transformations and number patterns. Therefore, other Unggan weaving motifs still need to be explored to strengthen other contextual mathematical materials..

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this manuscript. In addition to this, the authors also maintain the ethics of writing by closing plagiarism, fraud, fabrication and / or falsification of data, publication and / or multiple submissions..

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Author Contributions

Kusno: Idea, editing, formal writing, visualization**; Gelvia Yolanda:** Data collection, data analysis, methodology**; Sri Supiyati:** feasibility analysis, review.

References

Abduh, A., Rosmaladewi, & Andrew, M. (2023). Strategies of implementing multicultural education: Insights from bilingual educators. *International Journal of Language Education*, *7*(2), 343–353. https://doi.org/10.26858/ijole.v7i2.48498

Abdullah, A. S. (2017). Ethnomathematics in perspective of sundanese culture. *Journal on Mathematics Education*, *8*(1), 1–16. https://doi.org/10.22342/jme.8.1.3877.1-15

Cahyadi, I. A. (2014). Eksplorasi motif pucuk rebung dengan teknik olah reka latar pada busana pengantin modern [Exploration of bamboo shoot motifs using background design techniques in modern bridal clothing]. *Jurnal Tingkat Sarjana Senirupa dan Desain*, *1*.

Cubillas, T. E. (2020). Contextualized learning material (CLM) in developing conceptual understanding of grade 7 mathematics. *International Journal of Scientific and Research Publications (IJSRP)*, *10*(3), p9967. https://doi.org/10.29322/ijsrp.10.03.2020.p9967

Fauzi, L. M., Hayati, N., Satriawan, R., & Fahrurrozi, F. (2023). Perceptions of geometry and cultural values on traditional woven fabric motifs of the Sasak people. *Jurnal Elemen*, *9*(1), 153–167. https://doi.org/10.29408/jel.v9i1.6873

Harahap, L., & Mujib, A. (2022). Eksplorasi etnomatematika pada motif batik Medan [Ethnomathematical exploration of Medan batik motifs]. *Journal Ability : Journal of Education and Social Analysis*, *3*(2), 61–72.

Harsari, H. (2018). Pembinaan sentra produksi tenun songket Unggan oleh pemerintah Kabupaten Sijunjung [Construction of the Unggan songket weaving production center by the Sijunjung Regency government]. *Jurnal Ilmu Administrasi Publik*, *1*(1), 154–167.

Hermandra, H. (2022). Motif itik pulang patang pada rumah adat tradisional Minangkabau (Rumah Gadang): Analisis semantik inkuisitif [The motif of the duck returning to Patang on the traditional Minangkabau traditional house (Rumah Gadang): Inquisitive semantic analysis]. *Aksara*, *34*(2), 272-281. https://doi.org/10.29255/aksara.v34i2.827.272--281

Jamarun, N., & Hamzah, H. (2017). Different products weaving handicrafts. *Prosiding: Seni, Teknologi, dan Masyarakat*, 71–75.

Khadijah Ath Thahirah, & Dedi Fernanda. (2021). Tujuan akuntansi pertanian berbasis filosofi Rangkiang [The objectives of agricultural accounting are based on the Rangkiang philosophy]. *Imanensi: Jurnal Ekonomi, Manajemen, dan Akuntansi Islam*, *6*(1), 23–32. https://doi.org/10.34202/imanensi.6.1.2021.23-32

Kumala, F. Z., & Tsabitah, A. N. (2022). Ethnomathematics: Learning geometry from banyumas batik patterns. *Journal of Economy, Education and Entrepreneurship*, *2*(3), 537–551. http://ije3.esc-id.org/index.php/home/article/download/92/94

Kumala, F. Z., Zaenurrohman, Z., Ma'unah, N., & Gunawan, G. (2022). Etnomathematics: Exploration of the art of kenthongan music as a source of mathematics learning. *International Journal of Multidisciplinary Research and Literature*, *1*(5), 606–619. https://doi.org/10.53067/ijomral.v1i5.83

Kurniawan, A., Widodo, S., & Saddhono, K. (2019). *Happiness value inside traditional ceremony of begalan: Research on communication activities ritual wedding*. https://doi.org/10.4108/eai.21-12-2018.2282672

Kusno, K., Setyaningsih, E., & Kusuma, A. B. (2022). Ethnomathematics of Baitu Usyaqil Quran (BUQ) Mosque and Pesantren Darussalam, Banyumas Regency. *AlphaMath :*

Journal of Mathematics Education, *8*(2), 199-208. https://doi.org/10.30595/alphamath.v8i2.15211

Mania, S., & Alam, S. (2021). Teachers' perception toward the use of ethnomathematics approach in teaching math. *International Journal of Education in Mathematics, Science and Technology*, *9*(2), 282–298. https://doi.org/10.46328/IJEMST.1551

Mezmir, E. A. (2020). Qualitative data analysis: An overview of data reduction, data display and interpretation. *Research on Humanities and Social Sciences*, *10*(21), 15–27. https://doi.org/10.7176/rhss/10-21-02

Nahak, H. M. . (2019). Upaya melestarikan budaya indonesia di era globalisasi [Efforts to preserve Indonesian culture in the era of globalization]. *Jurnal Sosiologi Nusantara*, *5*(1), 65–76. https://doi.org/10.33369/jsn.5.1.65-76

Noerhasmalina, N., & Khasanah, B. A. (2023). The geometric contents and the values of local batik in Indonesia. *Jurnal Elemen*, *9*(1), 211–226. https://doi.org/10.29408/jel.v9i1.6919

Nur, A. S., Waluya, S. B., Kartono, K., & Rochmad, R. (2021). Ethnomathematics perspective and challenge as a tool of mathematical contextual learning for indigenous people. *International Journal on Emerging Mathematics Education*, *5*(1), 1-12. https://doi.org/10.12928/ijeme.v5i1.17072

Nusantara, T., & Rahardjo, S. (2017). Ethnomathematics in Arfak West Papua-Indonesia numeracy of Arfak. *International Journal of Scientific & Technology Research*, *6*(9), 325–327.

Parker, F., Bartell, T. G., & Novak, J. D. (2017). Developing culturally responsive mathematics teachers: secondary teachers' evolving conceptions of knowing students. *Journal of Mathematics Teacher Education*, *20*(4), 385–407. https://doi.org/10.1007/s10857-015-9328-5

Pathuddin, H., & Nawawi, M. I. (2021). Buginese ethnomathematics : Barongko cake. *Journal on Mathematics Education*, *12*(2), 295–312.

Patri, S. F. D., & Heswari, S. (2021). Development of ethnomathematic-based on mathematics e-module to improve students' logical thinking skills. *AIP Conference Proceedings*, *2330*(March). https://doi.org/10.1063/5.0043250

Peni, N. R. N. (2019). Development framework of ethnomathematics curriculum through realistic mathematics education approach. *IOSR Journal of Research & Method in Education*, *9*(4), 16–24. https://doi.org/10.9790/1959-0904011624

Prahmana, R. C. I., & D'Ambrosio, U. (2020). Learning geometry and values from patterns: Ethnomathematics on the batik patterns of yogyakarta, indonesia. *Journal on Mathematics Education*, *11*(3), 439–456. https://doi.org/10.22342/jme.11.3.12949.439-456

Rianti, A., Novenia, A. E., Christopher, A., Lestari, D., & Parassih, E. K. (2018). Ketupat as traditional food of Indonesian culture. *Journal of Ethnic Foods*, *5*(1), 4–9. https://doi.org/10.1016/j.jef.2018.01.001

Rosa, M., & Orey, D. (2016). Humanizing mathematics through ethnomodelling. *Journal of Humanistic Mathematics*, *6*(2), 3–22. https://doi.org/10.5642/jhummath.201602.03

Rosa, M., & Orey, D. C. (2021). An ethnomathematical perspective of stem education in a glocalized world. *Bolema - Mathematics Education Bulletin*, *35*(70), 840–876. https://doi.org/10.1590/1980-4415v35n70a14

Siddiq, M. & S. (2019). *Koordinat Vol XVIII No 1 April 2019*. *XVIII*(1), 23–48.

Spradley, J. P. (2016). *The ethnographic interview transcript*.

Sunzuma, G., & Maharaj, A. (2021). In-service mathematics teachers' knowledge and awareness of ethnomathematics approaches. *International Journal of Mathematical Education in Science and Technology*, *52*(7), 1063–1078. https://doi.org/10.1080/0020739X.2020.1736351

Supiyati, S., Hanum, F., & Jailani. (2019). Ethnomathematics in sasaknese architecture. *Journal on Mathematics Education*, *10*(1), 47-58. https://doi.org/10.22342/jme.10.1.5383.47-58

Syafriadi, M., F., & Hasfera, D. (2021). Rancangan indeks nama-nama motif songket khas Unggan Kecamatan Sumpur Kudus Kabupaten Sijunjung [Draft index of the names of typical Unggan songket motifs, Sumpur Kudus District, Sijunjung Regency]. *Al- Ma'arif: Jurnal Ilmu Perpustakaan Dan Informasi Islam*, 163–175. https://www.rjfahuinib.org/index.php/almaarif/article/view/729

Widodo, H. (2019). The role of school culture in holistic education development in Muhammadiyah elementary school Sleman Yogyakarta. *Dinamika Ilmu*, *19*(2), 265–285. https://doi.org/10.21093/di.v19i2.1742

Zaenuri, & Dwidayati, N. (2018). Exploring ethnomathematics in Central Java. *Journal of Physics: Conference Series*, *983*(1), 012108. https://doi.org/10.1088/1742-6596/983/1/012108