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Study of Ethnomatematics *Sendratari Ramayana* at the Ramayana Ballet in Prambanan Temple

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ABSTRACT

The ethnomathematics learning approach is used to preserve culture in schools. In addition, it also makes it easier for students to understand abstract mathematical concepts. The culture studied was the Ramayana ballet in the Prambanan temple area. According to Bishop, this research aims to discover fundamental aspects of mathematics. The author used a qualitative approach and a literature study to collect data. In comparison, the data collection technique used in this research is library data collection obtained from literature studies that contain related sources and references. The data analysis techniques used in this research are data collection, reduction, and conclusion. The research results are 1) counting, number of accessories, and angles formed. 2) location and floor pattern. 3) measurement, duration, stage area. 4) designing, floor pattern properties, jarik motifs. 5) playing, the way dancers do not collide, and the provisions of the storyline. 6) explaining the Ramayana storyline and costume meaning.

Keywords: Ethnomathematics, Prambanan Temple, Sendratari Ramayana.

ABSTRAK

Pendekatan etnomatematika digunakan untuk melestarikan budaya di sekolah. Selain itu, juga memudahkan siswa untuk memahami konsep matematika yang abstrak. Budaya yang diteliti adalah sendratari Ramayana di kawasan candi Prambanan. Menurut Bishop, penelitian ini bertujuan untuk menemukan aspek-aspek fundamental dari matematika. Penulis menggunakan pendekatan kualitatif dan studi literatur untuk mengumpulkan data. Sedangkan teknik pengumpulan data yang digunakan dalam penelitian ini adalah pengumpulan data kepustakaan yang diperoleh dari studi literatur yang memuat sumber-sumber dan referensi terkait. Teknik analisis data yang digunakan dalam penelitian ini adalah pengumpulan data, reduksi data dan kemudian penarikan kesimpulan. Hasil dari penelitian ini adalah; 1) hitungan, jumlah aksesoris, dan sudut yang terbentuk. 2) lokasi, dan pola lantai. 3) pengukuran, durasi, luas panggung. 4) perancangan, properti pola lantai, motif jarik. 5) memainkan, cara penari tidak bertabrakan, dan ketentuan alur cerita. 6) menjelaskan, alur cerita Ramayana, makna kostum.

Kata Kunci: Etnomatematika, candi prambanan, sendratari ramayana.

INTRODUCTION

Indonesia, as a multicultural country, is very diverse. According to Suwandi and Rohmadi (2013), the Indonesian population consists of different ethnic groups that adhere to various religions and beliefs and have and use a variety of languages. These differences are not apart from the

emergence of cultural differences formed. Culture is a whole that encompasses forms of social technology, ideology, religion, art, and other things that are all part of social heritage (Inrevolzon, 2013). Based on this understanding, it can be understood that culture can be embodied in thoughts, artefacts, and social activities. However, with the advancement of the times, traditional dances are not much in the interest of older people, even as the successor generation of the nation has almost lost its sustainability.

One of the efforts that can be made to preserve this culture is to introduce and enhance it through school learning. Education and culture are things that go side by side and are inevitable. Culture-based education is a model of an educational approach that prioritizes the activities of students with different cultural backgrounds (Dalle Topang et al., 2022; Fitzpatrick, 2022; Kana'iaupuni et al., 2010). This education can be applied in an ethnomathematical approach. Ethnomathematics can be understood as mathematics applied and developed within a particular cultural group, identified as a tribe of the national community, a working group, children of a certain age, and the professional class (d'Ambrosio, 1997; Machaba, & Dhlamini, 2021; Rosa et al., 2016). Applying an ethnomathematical approach to learning is expected to be a reservoir for students to get to know and preserve the culture (Abah et al., 2020; Susilo & Widodo, 2018). This approach is also likely to help students understand abstract mathematical concepts better, as ethnomathematics can provide visualizations of the mathematics concepts studied (Albanese et al., 2017; Buchori et al., 2022).

Mathematical learning comes not only from reading books but also through society's culture. One of the solutions to contextual learning is through ethnomathematics. Ethnomathematics-based contextual learning is a contextual approach to cultural contexts to associate student understanding with mathematical learning towards formal mathematics (Sopyan, 2022). Besides that, Prastowo et al. (2022) consider ethnomathematics as the study of the relationship between mathematics and sociocultural contexts, showing how mathematics is produced, transmitted, disseminated, and specialized in different cultural systems.

The culture that will be studied in this study is the culture of *Sendratari Ramayana*, which is found in the tourist area of the temple of Prambanan. The *Sendratari Ramayana* performance blends dance, drama, and dialogue. In today's era of technology, it's evolving very fast. Today's generation prefers to play gadgets and games more engaging than traditional shows (Waluyo & Rosmawati, 2021). These impacts must be filtered as well as possible. Today's cultural existence, especially the *Sendratari Ramayana*, is becoming less in the interests of the society, especially of the younger generation. So, there's a need to preserve this culture through this research. Through this research, the author seeks to enhance and preserve the *Sendratari Ramayana*, making it a source of mathematics learning.

Based on several ethnomathematics studies related to ballet, such as Ethnomathematics in *Kejei* Dance as Rejang Lebong Culture (Destrianti et al, 2019), Exploration of Ethnomathematics in Plate Dance Movements (Gazanofa & Wahidin. 2023), and Exploration of Ethnomathematics Concepts in Traditional Dance Movements of the Lio Tribe (Naja et al., 2021). The researcher raised the Ramayana Ballet at Prambanan Temple as a research topic. Through the performance of the art

of *Sendratari Ramayana*, in addition to presenting its visual aspects or artistic and aesthetic values, it also has a meaning or positive values that can be used as a guide and implemented in everyday life (Elvandari, 2020). Besides that, this study aims to discover the fundamental mathematical aspects of the Ramayana Sendratari, like dance moves, costumes, and accessories used in dance. Naja et al. (2021) conducted several previous studies on dance ethnomathematics.

METHOD

This research uses a qualitative method with a library study approach (library research). Qualitative research is a way to know (something) where a researcher collects, organizes, and interprets information obtained from humans using the eye or an ear as a filter (Saldana & Omasta, 2016; Suwarsono, 2016). The study of libraries is a theoretical study and other references relating to values, cultures, and norms that evolve in social situations (Sugiyono, 2017). A library study is conducted to study relevant literature about the problem being studied. Through this study, the target is teachers and students. Through this study, the intended targets are teachers and students. It provides relevant information and concrete recommendations for teachers and students to improve the effectiveness of mathematics learning. The information collection technique used in this research is the collection of library data from a library study containing sources and related references (Nazir, 2003). The data analysis techniques used in this study are data collection, reduction, and conclusion. The data analysis techniques used in this research are data collection, reduction, and conclusion. Data reduction is literature selection, focusing, simplifying, classifying, and processing initial data (Yusuf, 2014). Conclusions in qualitative research are temporary and will change if more accurate (valid) evidence is found to support data collection.

RESULT AND DISCUSSION

The Prambanan Temple complex is in the Prambanan, Sleman, and Klaten districts. This complex is unique because the entrance is in the Sleman administrative territory, and some are in the Klaten administrative area. According to the first theory, the word Prambanan is derived from the term "the *Brahman*" there are also other terms that say that the temple Prambanan comes from the Java language "*mban*", which means holding or responsibility that refers to the Hindu god who has the power to rule the world. The Prambanan Temple is a World Heritage Site protected by UNESCO. Research on the Ramayana Ballet at Prambanan Temple is also relevant in ethnomathematics. Some ethnomathematics research related to ballet, such as Ethnomathematics in Kejei Dance as Rejang Lebong Culture (Destrianti et al., 2019), Exploration of Ethnomathematics in Plate Dance Movements (Gazanofa & Wahidin. 2023), and Exploration of Ethnomathematics Concepts in Traditional Dance Movements of the Lio Tribe (Naja et al. 2021). Shows that mathematical concepts can be found in dance movements and structures. *Sendratari Ramayana* Prambanan was founded on the idea of GPH Djatikoesoemo in 1961. At the beginning of the performance, the singer used the name of the *Ramayana* Ballet, but around 1962, Dramawan Anjar Asmara changed it to *Ramayana* Singer. Its founding, *Sendratari Ramayana*, is expected to increase Indonesian tourism to foreigners. This concert is performed only from May to October on the open stage (open water), from January

to April, and from November to December on the closed stage (Trimurti) (Soedarsono,1999). *Sendratari Ramayana* is a show that blends dance and drama without dialogue (Soedarsono, 1978). The story of *Ramayana* based on Hindu virtues that adapted to the culture of Java made the *Ramayana Sendratari* packed into a unique dance that raised the character of Rama Wijaya as a hero (Harminto, 2023).

Apsari (2012) said the show *Sendratari Ramayana* originally consisted of six episodes: (1) *Hilangnya Dewi Sita*, (2) *Hanuman Duta*, (3) *Hanuman Obong*, (4) *Pembuatan Jembatan Menuju Alengka*, (5) *Gugurnya Kumbakarna*, *and* (6) *Ujian Kesetiaan Sita* or *Sita Obong*. In 1961, it felt less of an interest to the audience than episodes 2 and 4 were summarized. Since 1967, the *Sendratari Ramayana* show has consisted of four episodes: (1) *Hilangnya Sinta*, (2) *Hanuman Duta*, (3) *Gugurnya Kumbakarna*, and (4) *Api Suci Sinta*.

The Fundamental Aspects of Mathematics in Sendratari Ramayana

Based on the results of the literary studies carried out obtained fundamental aspects according to the Bishop in the *Sendratari Ramayana*:

Counting

Sendratari Ramayana's ethnomathematics on the counting activity in this study is like counting the number of accessories used by the dancers Rama Wijaya and Sinta in the performance of *Sendratari Ramayana* as in Figure 1.

Figure 1. Placement of dancer accessories (Rini & Dewi, 2015)

Based on Figure 1, the accessories used by the player Rama Wijaya consisted of *panji* pants, *uncal*, *tinggel*, *klat bahu*, *irah-irahan, sumping, endong panah, epek timang, jarik, boro samir, stagen cinde, sampur, draperi, gelang, kalung karset, keris*. Based on the data obtained, the number of accessories worn by Rama Wijaya can be determined, as shown in Table 1.

Table 1. Ethnomathematics on the number of accessories of Rama dancers

Accessories Location	Many Accessories	Description
Head accessories	2 (two)	*irah-irahan, sumping*
Hand accessories	2 (two)	*Klat bahu, gelang*
Neck accessories	1 (one)	*Kalung karset*
Shoulder accessories	1 (one)	*Endong panah*
Waist accessories	10 (ten)	*Celana panji, uncal, epek timang, jarik, boro,samir, stagen cinde, sampur, draperi, keris*

Feet accessories	1 (one)	*Tinggel*

Based on Table 1, knowing how many accessories are worn, one can use the whole number summing operation as follows: The number of accessories worn by the dancer Rama Wijaya $= 2 + 2 + 1 + 1 + 10 + 1 = 17$ (seventeen).

Sinta's dancers wear accessories like *meka, slepe, sampur, jarik klithik, irah-irahan, sumping, subang, jewel necklaces*, and *jewellery bracelets* (Rini & Dewi, 2015). Based on Figure 2, the dancer of Sinta, the number of accessories worn can be described as in Table 2.

Table 2. Ethnomathematics on the number of accessories of Sinta dancers

Accessories Location	Many Accessories	Description
Head accessories	3 (three)	Irah-irahan, sumping, sumbang
Hand accessories	1 (one)	Gelang
Neck accessories	1 (one)	Kalung
Shoulder accessories	1 (one)	Meka
Waist accessories	3 (three)	Slepe, sampur,jarik
Feet accessories	0 (zero)	-

Based on Table 2, the total number of accessories worn can be determined by summing the whole numbers: The number of accessories worn by a Sinta dancer $= 3 + 1 + 1 + 1 + 3 + 0 = 9$ (nine). In addition, ethnomathematics on the counting activity of the Ramayana Sendratari determines the angle formed on the Sinta disappearance scene, as shown in Table 3.

Table 3: Ethnomathematics in Ramayana Ballet

Dance moves	Formed Angles
	Sinta's dancer: Right hand: Acute angle Left hand: Acute angle Feet: Obtuse angle Rama's dancer: Right hand: Acute angle Left hand: Acute angle

Figure 3.1. The angle formed on the dancer
(Dejogjaadventure, 2020)

Dance moves	Formed Angles
 Figure 3.2. The angle formed on the dancer (Marta, 2012)	Laksmana's dancer: Left hand: Obtuse angle Right hand: Straight line Feet: Obtuse angle Sinta's dancer: Left hand: Obtuse angle Right hand: Obtuse angle Feet: Obtuse angle Rama's dancer: Left hand: Obtuse angle Right hand: Straight line Feet: Obtuse angle
 Figure 3.3. The angle formed on the dancer (Marta, 2012)	Sinta's dancer: Left hand: Acute angle Right hand: Straight line
 Figure 3.4. The angle formed on the dancer (Marta, 2012)	Laksmana's dancer: Left hand: Right Angle Right hand: Obtuse angle Feet: Acute angle

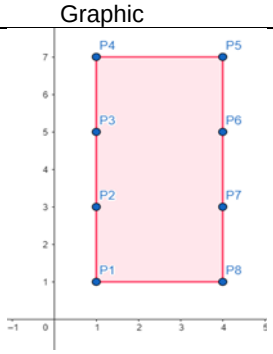
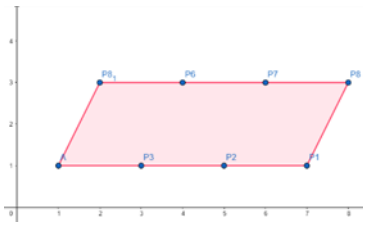
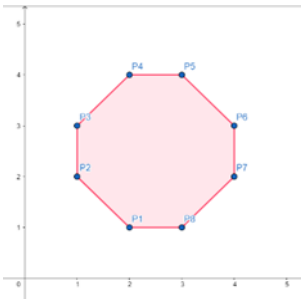
The dance moves illustrated in Figures 3.1 to 3.4 demonstrate various angles formed by different parts of the dancers' bodies. In Figure 3.1, Sinta's dancer forms acute angles with both the right and left hands, while the feet create an obtuse angle. Similarly, Rama's dancer forms acute angles with both hands. Moving on to Figure 3.2, Laksmana's dancer shows an obtuse angle with the left hand, a straight line with the right hand, and obtuse angles with the feet. In the same figure, Sinta's dancer forms obtuse angles with both hands and feet, while Rama's dancer forms obtuse

angles with the left hand, a straight line with the right hand, and obtuse angles with the feet. Figure 3.3 shows Sinta's dancer forming an acute angle with the left hand and a straight line with the right hand. Finally, in Figure 3.4, Laksmana's dancer forms a right angle with the left hand, an obtuse angle with the right hand, and an acute angle with the feet.

Locating

Locating includes setting the pattern of the floor that is present in the scene of Sinta's disappearance. In this scene, a flat building pattern and lines are formed on each floor pattern. The pattern formed is a circular floor pattern, as well as a flat building in the form of a square long, eight-fold, a combination of a long square and triangle, and parallelograms.

Table 4. Ethnomathematics on Ramayana Ballet Floor Patterns

Picture	Graphic	Pattern
 Figure 4.3. Formed floor pattern (Jogja Archive, 2020)	 Figure 4.5. Floor pattern chart rectangle	Floor patterns 1 Rectangle
 Figure 4.2. Formed floor pattern *(*Jogja Archive,2020)	 Figure 4.6. Parallelogram floor pattern graph	Floor patterns 2 Parallelogram
 Figure 4.3. Formed floor pattern (Jogja Archive, 2020)	 Figure 4.7. Octagonal floor pattern chart	Floor patterns 3 Octagon

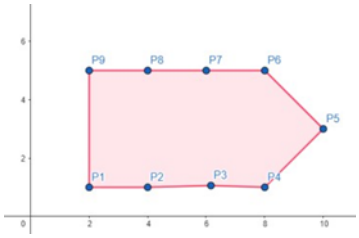
Picture	Graphic	Pattern
 Figure 4.4. Formed floor pattern (Jogja Archive, 2020)	 Figure 4.8. Combined build floor pattern graph	Floor patterns 4 Rectangle and isosceles triangle

Table 4 presents various floor patterns found in the Ramayana Ballet performance, accompanied by images and graphs of these patterns. Figure 4.3 shows a rectangular floor pattern, while Figure 4.5 illustrates the chart for this rectangular pattern, labelled as "Floor Pattern 1." Figure 4.2 depicts a parallelogram floor pattern. Figure 4.6 presents the chart for this parallelogram pattern, labelled as "Floor Patterns 2." Figure 4.3 illustrates an octagonal floor pattern, with Figure 4.7 showing the chart for this octagonal pattern, labelled as "Floor Pattern 3." Lastly, Figure 4.4 displays a combined floor pattern of a rectangle and an isosceles triangle, with Figure 4.8 providing the chart for this combined pattern, labelled as "Floor patterns 4." These floor patterns demonstrate how ethnomathematics is applied in the art of the Ramayana Ballet, utilizing various geometric shapes.

Measuring

The measurement in this *Ramayana Sendratari* covers the duration of the dance. *Sendratari* Ramayana's performance in the Prambanan Temple tourist area has two versions of the performance. The first version, the four-episode series, can take four nights of performances, each lasting 1.5 hours. So, for the total duration of the series, *Sendratari Ramayana* can use the concept of 4 × 1,5 hours = 6 hours. The second entirely performed version consists of 4 episodes over 2 hours. The drama dialogue of the second version of the show has been shortened for tourists.

Figure 5.1. Image of Trimurti stage (Jogjakini, 2019)

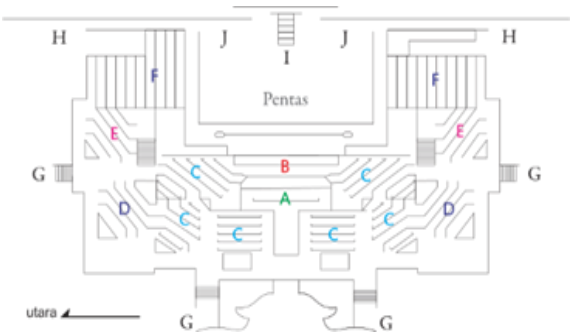


Figure 5.2. Image of Outdoor stage (Tommy, 2014)

Measuring activity in addition to the performance duration includes assessing the stage size for Ramayana's Singratari, as depicted in Figures 5.1 and 5.2. The prominent (Figure 5.1) has a stage width $210\ m^2$ $(14\ m\ \times 15\ m)$ with a capacity of 330 seats. As for (Figure 5.2), it has a staging area of $456\ m^2 (19\ m\ \times\ 24\ m)$ which can accommodate as many as 1.200 seats. The stage also

influenced the number of dancers in the Ramayana Sendratari performance. In this activity, the broad stage of the performance can be used to compare the indoor and outdoor stages.

Indoor Stage: Outdoor Stage $= 210\ m^2 : 456\ m^2$
$= 35\ m^2 : 76\ m^2$

So, the indoor and outdoor stage comparison is $35\ m^2 : 76\ m^2$

Designing

The designs found in *Sendratari Ramayana* covered the characteristics of the floor patterns of the dance movement and the design of the finger pattern of the dancer Sinta, such as Ethnomathematics on the floor pattern of Ramayana Ballet, dan Ethnomathematics on the Ramayana Ballet finger pattern

Ethnomathematics on the Floor Pattern of Sendratary Ramayana Designing or designing on Sendratario Ramayana is the pattern in the floor movement of the first Ramayana. A square-length floor pattern in (Figure 4.5) has the properties of four sides, facing sides of the same length and parallel, having four equal angles of 90 degrees. The second pattern (Figure 4.6) has characteristics: the sides are equal lengths, the angles face the same size, diagonal-diagonally cut in the middle and dividing each other into two equal longitudes, and the sum of all angles is 360 degrees.

The third pattern is regular (Figure 4.7) with properties; all sides are equal in length. All angles are 135 degrees equal, diagonally-diagonally cut straight to each other in the middle of a flat building. The latter pattern has a combination pattern of flat building (Figure 4.8), the properties of a square length with four sides facing the same size and parallel, having four equal angles of 90 degrees. The triangle is the same foot, the two sides are the same length, the three sides are the same size, and the third has the same feet.

The pattern on the thighs worn by the players *Sendratari Ramayana*, especially Sinta, is a *klithik* batik motif. Nobles often use this motif because it has a philosophy of femininity, gentleness, wise behaviour, and subtle behaviour. This batik motif belongs to the simple, a combination like the S that continuously forms a diagonal with a 45-degree bend.

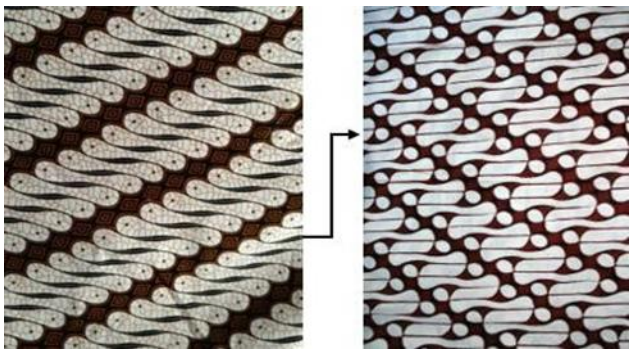


Figure 6. *Klithic batik* motif

Figure 7. Details of klithic batik motif

Klithik batik motifs form rhythmic and dynamic patterns, such as giving points and curved lines. The *klithik* batik geometry forms patterns of squares, circles, and spirals (Figure 6). Geometric motifs repeatedly arranged with the same pattern create a moving impression. In addition, in Figure 7 there

is a mathematical element in the pattern: the concept of extended transformation and the translation transformation concept.

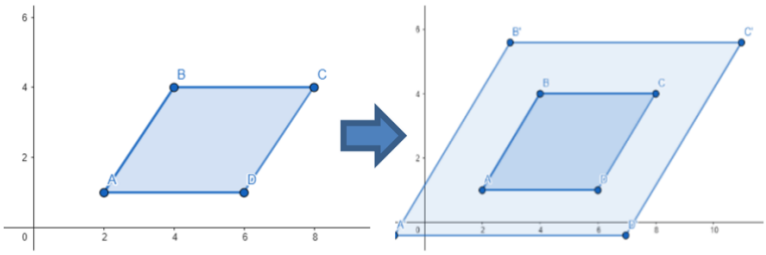


Figure 8. *Klithik* batik pattern on the Concept of Dilation

Based on Figure 8, the pattern uses the idea of a dilation transformation. In the ABCD plane dilated by K, the point $A(x, y)$ dilated by K then produces shadow coordinates $A'(x', y')$. Likewise for point B, point C, and point D. So that the field is obtained $A'\ B'C'D'$.

So, the general form is

$$(x, y)\ \rightarrow\ (x^{1}, y^{1}) =\ (K\ (x - a) +\ a, K\ (y - b)\ +\ b)$$

In Figure 8, the ABCD field is dilated with a scale factor of 2 being $A'\ B'C'D'$.

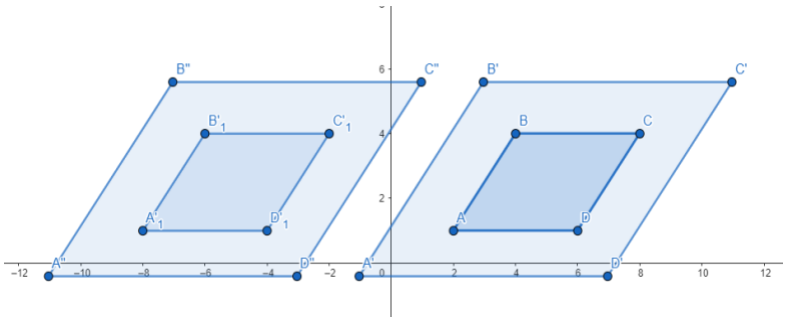


Figure 9. *klithic batik* pattern on Concept of Translation to the Left

Based on Figure 9, the pattern uses the concept of translational transformation (shift). In the ABCD field translated so far $-a$ hence the starting point $A(x, y)$ translated into dots$A_1{}'(x_1', y_1')$ so far$(-a\ 0\ )$ so that the coordinates of the point $A(x, y)$ will shift to the left. This concept applies to other points as well. In the field of $A'B'C'D'$ translated as far as –a, then the starting point $A'(x', y')$ translated into dots $A"(x", y")$ so far$(-a\ 0\ )$ so that the coordinates of the point $A'(x', y')$ will shift to the left. So, the general is

$$A(x, y)\ (-a\ 0\ )\ \rightarrow\ A'(x - a, y)$$

In this pattern, the ABCD field is translated 10 units to the left so that the field is obtained $A'_1B'_1C'_1D'_1$ and for fields $A'B'C'D'$ translated 10 units to the left so that it is obtained $A"B"C"D"$

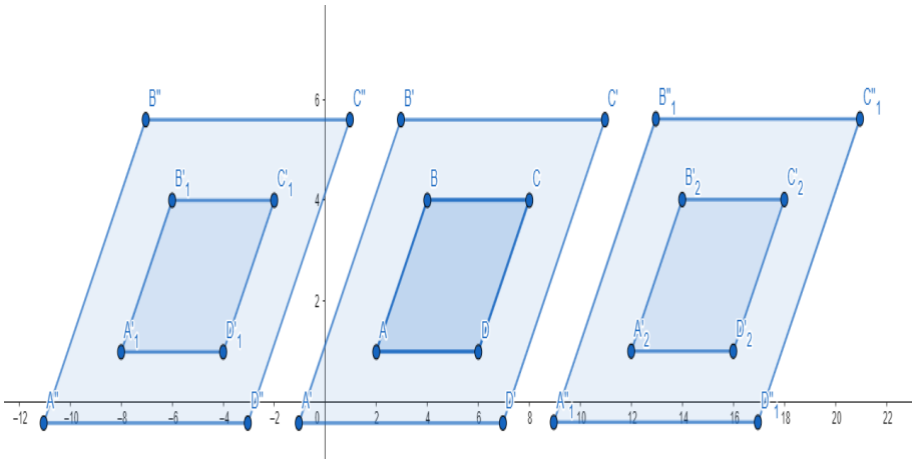


Figure 10. Graph of klithic batik pattern on Concept to the right

Based on Figure 10, the ABCD field translated as far as a then the starting point $A\,(x, y)$ translated into dots ${A_2}'(x_2', y_2')$ so far $(a\ 0\ )$ so that the coordinates of the point $A\,(x, y)$ will shift to the right and also apply to other points. In the field of $A'\,B'C'D'$ translated as far as a then the starting point $A'(x', y')$ translated into dots $A_1"(x_1", y_1")$ so far $(a\ 0\ )$ so that the coordinates of the point $A'(x', y')$ will shift to the left. So, the general form is

$$A(x, y)\ (a\ 0\ ) \rightarrow\ A'(x + a, y)$$

In this pattern, the ABCD field is translated 10 units to the right so that the field is obtained ${A'}_2{B'}_2{C'}_2{D'}_2$ and for fields $A'B'C'D'$ translated 10 units to the right so that it is received${A"}_1{B"}_1{C"}_1{D"}_1$

Playing

Playing in *Ramayana's Sendratari* is a way for dancers to avoid clashing with each other on stage, like a dancer who passes the front and the rear. That could minimize the occurrence of a collision. The ethnomathematics of the second play activity is the set of stories per episode in Ramayana's *Sendratari*. The *Sendratari* of Ramayana consists of four episodes: *Hilangnya Sinta, Hanuman Duta, Gugurnya Kumbakarna*, and *Api Suci Sinta*

Explaining

Ethnomathematics on the explanatory aspect of the Ramayana Ballet explains the storyline and the sequence of the Ramayana storyline. The Ramayana Ballet's storyline must be told sequentially, and no storyline should be skipped or preceded. The storyline begins with the first episode, the disappearance of Sinta, followed by episode two, Hanuman Duta, followed by the third episode, the fall of Kumbakarna, and the last episode, the holy fire of Sinta.

The story of Ramayana Ballet tells about the journey of Rama, a prince from Ayodhya, to save his wife Sinta, who Rahwana, the giant king of Alengka, kidnapped. The story of Ramayana Ballet can be divided into several episodes, namely

Episode One: *Hilangnya Sinta*

Sendratari Ramayana begins with Rama's victory in an archery competition. The competition is to find the best knight who will edit the daughter of King Mantili, Princess Sinta. Then they married

and went to the forest of Dandaka with Laksmana, Rama's brother. Then Rama and Sinta were enchanted by the flock of cattle and wanted to catch him. Finally, Rama hunted the cattle and left Sinta with the Laksman, but Rama didn't return, and Laksmans followed him. That's when Rahwana kidnapped Shinta in disguise and was taken to Alengka.

Episode Two: *Hanuman Duta*

To get Shinta back, Rama, with the support of Hanoman and his army, built a bridge to the kingdom of Alengka to free Shinta. There was a great battle between the kingdoms of Alengka and Ayodya. An army of monkeys fought against the monsters who protected the Alengka kingdom.

Episode Three: *Gugurnya Kumbakarna*

The battle between the army of Rama and the Army of Alengka was fierce and devoured many victims. One of them was Rahwana's brother Kumbakarna, who led the Alengka army and was killed in battle. The bidarians welcomed the spirit of Kumbakarna.

Episode Four: *Api Suci Sinta*

After the battle, Rama and Shinta met again, but Rama doubted the sanctity of Sinta. Then Sinta persuaded Rama by burning himself to prove his sanctification. Sinta survived the fire, which proved that Sinta was still holy. Finally, Rama and Shinta are reunited. The story of Ramayana has many moral values that can be taken, such as loyalty, courage, justice, and wisdom.

In addition, the explanatory aspect also explains the meaning of the costumes and accessories contained in the Ramayana Singhratari. The meaning of the costume and accessories is black symbolizing superiority; gold symbolizing prosperity; and yellow symbolizing relaxation.

In this study, implementation is used as a context for learning mathematics. The context can be used as a basis for manufacturing teaching materials at the junior high school level (SMP) on geometry material grade IX (nine).

This research aligns with Harminto's (2023) study titled "*Sendratari Ramayana Prambanan Yayasan Roro Jonggrang Four Episodes on the Open Air Stage*," which states that Sendratari is a performance that combines dance and drama without dialogue. The performance is on an open-air stage with the Prambanan Temple landscape as the backdrop. Yayasan Roro Jonggrang has been the main supporter of this Sendratari since 1961. The Ramayana story is taken from the Hindu epic and adapted to Javanese culture, transforming it into a dance. According to historical evidence, the story is depicted in the stone reliefs carved at Prambanan Temple. This Sendratari is a colossal dance supported by around 100 people, including 70 dancers and 30 musicians. The method used in this paper is qualitative descriptive. The data to be analyzed includes four scenes: *Sinta Ilang*, *Anoman Duta*, *Kumbokarno Gugur*, and *Kembalinya Sinta* (holy fire). This data helps obtain information about the Ramayana performances at Prambanan Temple.

CONCLUSION

Based on this research, it can be used to learn mathematical concepts through an ethnomathematical approach. Ramayana's Witnesses have mathematical activities like counting, measuring, locating, designing, playing, and explaining. The mathematical concepts present in this study include the concepts of aggregation, multiplication, determining the magnitude of angles, and

comparison. The idea of geometry of flat shapes such as rectangles, parallelograms, octagons, and combined shapes of rectangles and triangles. The concept of translation transformation is also limited to the finger pattern worn by Ramayana dancers. Researchers suggest further research on Ramayana Ballet, such as accessories, dancers' costumes, and musical accompaniment to Ramayana Ballet.

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