



The Existence of Geometry in Zapin Pat Lipat Dance

Syahidah Nabilah Asit Udin*, Nor Muhainiah Mohd Ali, Sharifah Kartini

Department of Mathematical Sciences, Faculty of Science
Universiti Teknologi Malaysia, 81310 Johor Bahru, Malaysia.
Laboratory of Ethnomathematics and Didactics,
Institute for Mathematical Research, Department of Mathematics,
Faculty of Science, University of Putra Malaysia.
*Corresponding author: syahidahnabilah@graduate.utm.my

Abstract

Zapin Pat Lipat Dance was analysed to construct the floor pattern and find the existence of geometry by the movement of every dancer. The floor pattern is a trajectory or line that determines the shape of the pattern in the dance art that is displayed on the stage, forming a formation. The existence of geometry in Zapin Pat Lipat Dance is one of uniqueness in relationship between mathematics and dances, which produce a sense of existence and appreciation for our race as well as a respect for the culture of other races. Usually, most of the Malay traditional dances are consists of either male or female only or both genders in a group. By the definitions of field geometry, the floor pattern of Zapin Pat Lipat Dance had appeared in many shapes of polygon and line specifically in two-dimensional shapes. The floor pattern of Zapin Pat Lipat Dance used play a crucial role to identify every polygon appeared in final steps. Repeated movements of footsteps in dance produce a variety of geometries. This study will focus on the geometric shapes that produced in the Zapin Pat Lipat Dance.

Keywords: Zapin Pat Lipat Dance; floor pattern; geometry; Malay traditional dance

1. Introduction

Zapin Pat Lipat is another variation of zapin dance in the Muar area which originates from Parit Bugis, Parit Yusof and is now developed to Parit No. 2, Parit Yusof Darat (Sungai Balang sub-district). It contains four dance moves that start with a count of one to eight.

Imam Nasir bin Mahmud Sulaiman is the third generation to inherit this Zapin Pat Lipat. He was a religious teacher in the village and had taught this dance to Md Amin bin Ma'osom. The costume for the dancers is the Teluk Belanga Malay shirt, side by side, wearing songkok and sometimes the dancers wear tarbus, also is usually performed at weddings and celebrations.

The specialty of this zapin is that it was originally danced to the accompaniment of Arabic songs such as Sollualallahhadisofi and Yaa Badi'usami. However, this zapin also uses the accompaniment of Malay songs such as Terang Bulan, Inang Baru, Lancang Kuning and Mawar Putih. Md Amin has also formed a group called 'Zapin Sri Serumpun'.

Like other zapin dances, Zapin Pat Lipat was also originally danced by men only. But now it is also danced by women according to the passage of time. Additionally, Zapin Pat Lipat dance was founded by a religious teacher known as Imam Haji Yusak from Parit Bugis, Muar.

Geometry is one of the branches in Mathematics. Dealing with the shape, sizes, and volumes of figures, geometry is a practical branch of mathematics that focuses on the study of polygons, shapes, and geometric objects in both two-dimensions and three-dimensions. By observing the floor pattern of Zapin Pat Lipat dance, the existence of geometry which were focusing more on the presence of lines and polygons will be explained and analysed.

2. Literature Review

2.1 *Ethnomathematics In Malay Culture*

According to Wan Muhamad Fauzan et al. in [1], D'Ambrosio defined Ethnomathematics as Mathematics that was built based on a racial culture and system of values. According to Rosa and Orey in [2], ethno refers to members of a community characterized by their cultural customs, rules, symbols, myths, and unique forms of thinking and inferring within a cultural context. While Mathema means to clarify and understand the world so that the members of cultural groups that can survive and prosper can overcome, handle and cope with reality, and tics refer to techniques calculating, ordering, categorizing, aligning, evaluating, ciphering, analyzing, inferencing, and designing are used.

By deepening the art, the differences between the cultures of races can be understood and appreciated. Therefore, Shaharir in [3] stated that Malay civilization is one of the amazing countries which has a rich culture and heritage, creative festivals and events, and different history in different states with different multiracial.

2.2 *The History and Uniqueness of Zapin Dance*

Warisan Zapin Flora Jaya in [4] stated that Zapin is believed to have been brought by missionaries from the Middle East around the 15th century. Most of these missionaries and traders came from Arabia and Persia. In the Yemeni dialect it is known as Zaffana. In the beginning, only men participated in this dance. But now it has changed with the participation of women.

2.3 *The Origin of Zapin Pat Lipat Dance*

According to Warisan Zapin Flora Jaya in [4], Zapin Pat Lipat is another variation of zapin dance in the Muar area which originates from Parit Bugis, Parit Yusof and is now developed to Parit No. 2, Parit Yusof Darat (Sungai Balang subdistrict). Imam Nasir bin Mahmud Sulaiman is the third generation to inherit this Zapin Pat Lipat. He was a religious teacher in the village and had taught this dance to Md Amin bin Ma'osom. Besides, Zapin Pat Lipat contains four dance moves that start with a count of one to eight. The costume for the dancers is the Teluk Belanga Malay shirt, side by side and wearing songkok and sometimes the dancers wear tarbus.

2.4 *Mathematics and Art of Dance*

Wan Muhamad Fauzan and Said Husain in [5] explained that Zapin is one of the Malay traditional dance today are well known in Southeast Asia. There are many stories of how Zapin began to tread in the Malay but for sure this is a dance brought by Arab traders who came to do business and expand Islam in the Malay world. Regarding Dhiba in [6], there are thousands of cultures spread around the world and each have their own dances with various kinds of moves. Dances are made of rhythm, shapes, and patterns. These can be linked to the mathematical concepts. According to Kalpana in [7], dance is an expression of culture and through dance, cultural traditions are preserved, lived, shared, and explored. Along with cultural preservation, it is also established that dance can be utilized to teach math.

2.5 *Floor Pattern*

Etik et al. in [8] stated that the floor pattern is required both in single or group dance. In group dance and colossal dance, the floor pattern becomes very important in order to move among the dancer's group looks neatly and well, and gives a solid theatrical impression. While from a mathematical point of view, geometry provides approaches to problem solving, such as drawings, diagrams, coordinate systems, vectors, and transformations. The types of floor pattern in [9] are showed as follows:



Figure 2.5.1 The straight horizontal line form of floor pattern



Figure 2.5.2 The straight vertical line form of floor pattern



Figure 2.5.3 The curved circle form of floor pattern



Figure 2.5.4 The curved semi-circle form of floor pattern

2.6 Geometry

Referring to Nurisyah in [10], the word geometry was originally taken from the Greek meaning “geo” for earth and “metron” for measurement. Geometry is a branch of mathematics that specializes in the understanding of the shape, size, relative position of objects and the characterization of a space. Bird in [11] had mentioned that geometry is one of the systems in mathematics that begins with a basic concept, namely the point. The points are then used to form lines and the lines will form a field. According to Bird in [11], geometry is divided into several types. Firstly, field geometry is defined as the study of lines, curves, angles, and polygons in a plane. Second, space also as known as building geometry is the study of cones, cylindrical balls, and polyhedra curves in three-dimensional space. Third, differential geometry is the application of calculus in geometry to study the local properties of curves. Next, descriptive geometry is a mathematical technique used to describe the geometric relationship of a three-dimensional surface on a plane surface. Lastly, analytical geometry is the application of algebraic methods to geometry where lines and curves are expressed in algebraic equations.

3. Methods and Material

3.1 Collection of Data

According to Wan Muhamad Fauzan and Said Husain in [5], Professor Dr Hanafi stated that the greatest approaches to understand and study about the evolution in Malay dance is analyzing the dance in age-old Malay films since it gives the big influence in the Malay traditional dance world. Hence, Wan Muhammad Afiq has been chosen as the person of interest in gaining more information regarding this project.

Zapin Pat Lipat Dance was performed for Zapin Johor in Municipal of Batu Pahat Competition organized by Batu Pahat Municipal Council. It consists of five male and female dancers respectively. This dance was suggested due to the movements of dances and floor pattern produced were easy to follow.

3.2 Floor Pattern of Zapin Pat Lipat Dance

According to Aprizal in [12], the floor patterns in dance are trajectories or lines that determine the shape of a pattern in a form dance performed on stage, floor or the place of the show that forms a certain formation. Trails dancers in moving places, or positions to create a deep formation presents a certain movement to form a certain line.

This floor pattern of Zapin Pat Lipat Dance was started with the dancers when entering the stage in a different direction which were the male dancers from the left and the female dancers from

the right of the stage. Following are the figure of floor pattern of Zapin Pat Lipat Dance, noted that the blue color represents male dancers while pink color represents female dancers:

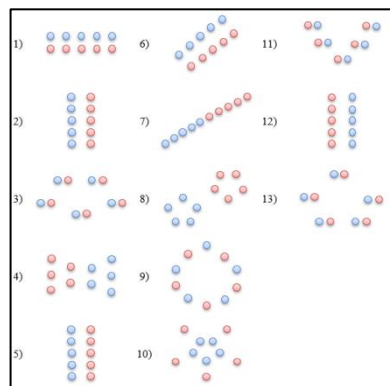


Figure 3.2.1 The Floor Pattern of Zapin Pat Lipat dance

3.3 The Type of Geometry

Bird in [11] mentioned that geometry have divided into several types which are field geometry, building geometry, differential geometry, descriptive geometry and analytical geometry as explained in Chapter 2. Field geometry is briefly defined as the study of lines, curves, angles, and polygons in a plane. Thus, the focus will be specifically in lines and polygons for this research.

From the definitions of field geometry, the floor pattern of Zapin Pat Lipat Dance had appeared in many shapes of polygon and line specifically in two-dimensional shapes. The floor pattern was analyzed from the top view to follow the stepping movement of the dancers easily. From this method used, the polygons and lines can be identified easily.

4. Results

4.1 Floor pattern Step 1 to Step 2

The dance started by the entrance of five female dancers from the left and five male dancers from the right. The female dancers occupied the front row while the male dancers occupied the back row. Then, the dancers rotate between themselves in one complete circle. As we can see in picture 2, the front row's dancers make an anticlockwise rotation while the backrow's dancers make a clockwise rotation simultaneously. This will make the dancers go back to their same position during their first entrance, as in picture 3. In picture 4, the male and female dancers then move simultaneously to the opposite direction to form a new formation. From picture 5 until picture 7, the male and female dancers move together and make a half circle turn until the male dancer number 1 meet up with female dancer number 5. The dancers then move side by side like in picture 8 until picture 10, forming a new formation which was aligned in pair at the middle of the stage, shown as in picture 11. In this floor pattern, the movement of the dancer from Step 1 to the Step 2 consists of translation and rotation.

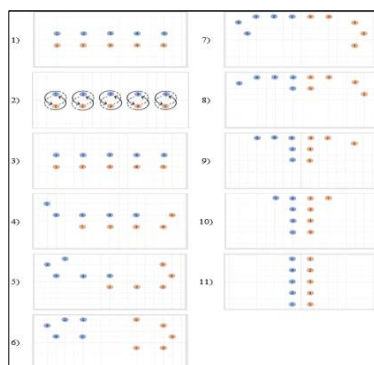


Figure 4.1.1 The Floor Pattern Step 1 to Step 2

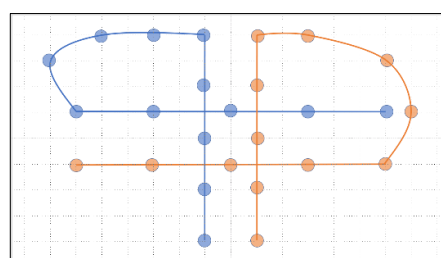


Figure 4.1.2 The Final Step of Floor Pattern Step 1 to Step 2

4.2 Floor pattern Step 2 to Step 3

In picture 1, the dancers were aligned in pair at the middle of the stage which was the Step 2 of the dance. Notice that in this transition, each pair in every row moving together alternatively in opposite direction, such as first and third row move two steps to the right, second and fourth row move two steps to the left while the pair in fifth row move one step forward. From picture 3 until picture 5, every pair were seen to move uniformly to form a geometrical shape, named Pentagon. The first, second, and fifth row each moves to their designated position in three big steps while the third and fourth row only moves in two big steps. In picture 6, the male dancers in each pair move in one full circle, rotating their own partner. The final shape that can be seen is an overlapping pentagon.

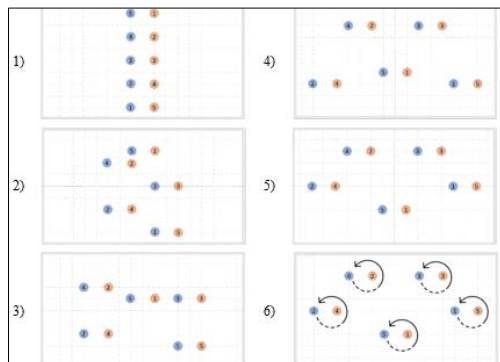


Figure 4.2.1 The Floor Pattern Step 2 to Step 3

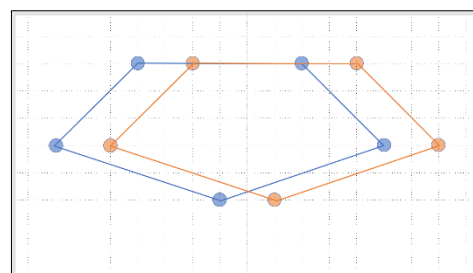


Figure 4.2.2 The Final Step of Floor Pattern Step 2 to Step 3

4.3 Floor pattern Step 3 to Step 4

The dancers started to move in group by gender, which that the female dancers moving to the front while the male dancers moving to the back. After that, every dancer moves back to their assigned places, shown in picture number three above. Then in order to obtained Step 4, the dancers started to move randomly until the dance formation shown in picture number five was obtained. Notice that two of the female dancers and also male dancers were standing in a straight line alternately. The Both male and female dancers then started to move to their group by gender, which that the male dancers move to the left side while the female dancers move to the right side. Final shape obtained are trapezoids.

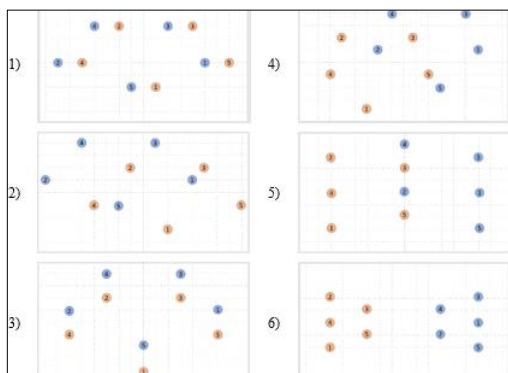


Figure 4.3.1 The Floor Pattern Step 3 to Step 4

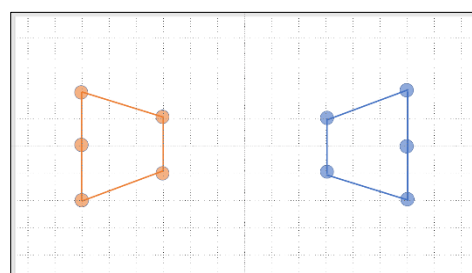


Figure 4.3.2 The Final Step of Floor Pattern Step 3 to Step 4

4.4 Floor pattern Step 4 to Step 5

The three male dancers and female dancers at the left and right side move closely to the two male and female dancers at the middle stage, which then forming a straight line of 5 male dancers on the right and 5 female dancers on the left. Both groups then move slowly resulting in having a straight line consist of 5 male dancers and 5 female dancers as shown as in picture 4. Both group – male and female dancers then moving similarly like in picture 3, but exchange places which that female group on the left and male dancers on the right which is Step 5. Final formation is two straight line.

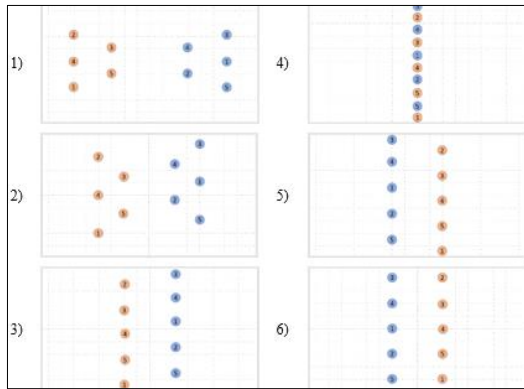


Figure 4.4.1 The Floor Pattern Step 4 to Step 5

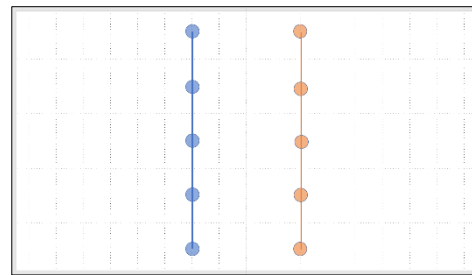


Figure 4.4.2 The Final Step of Floor Pattern Step 4 to Step 5

4.5 Floor pattern Step 5 to Step 6

In Step 5, both group - male and female dancers were standing in a straight line. Then, from picture 2 each two dancers from male and female group were moving to the left side and right side respectively. While as the other three dancers – from male and female group move to middle and forming a straight line. Every male and female dancer were then moving distinctively in order to form 2 horizontal line with approximate angle at $\pm 30^\circ$ as shown as in picture 4. Final formation that can be seen is in two horizontal lines with approximate angle at $\pm 30^\circ$

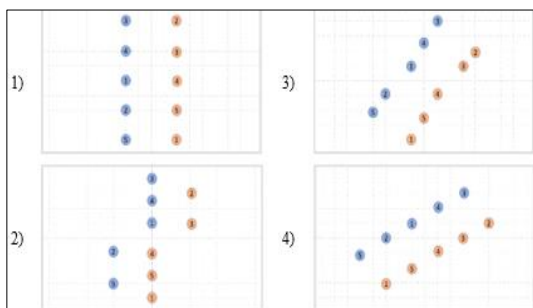


Figure 4.5.1 The Floor Pattern Step 5 to Step 6

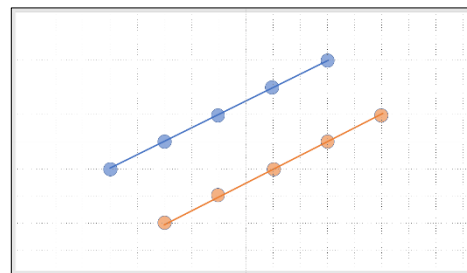


Figure 4.5.2 The Final Step of Floor Pattern Step 5 to Step 6

4.6 Floor pattern Step 6 to Step 7

Previously in Step 6, the male and female dancers were standing horizontally with approximate angle at $\pm 30^\circ$. As in figure 4.2.6.1 above, both male and female dancers can be seen dancing by stepping in and out side by side while moving towards different direction which that the male dancers moving to the left and female dancers to the right. The movement can be seen clearly as shown in picture 2 until picture 10. Final formation is a straight horizontal line with approximate angle at $\pm 30^\circ$.

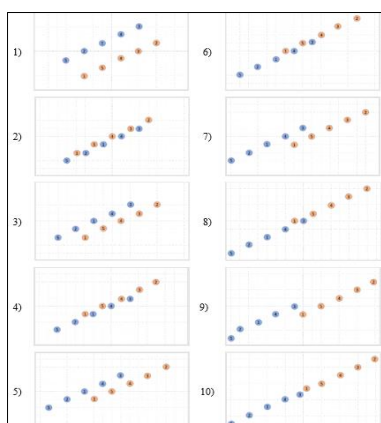


Figure 4.6.1 The Floor Pattern Step 6 to Step 7

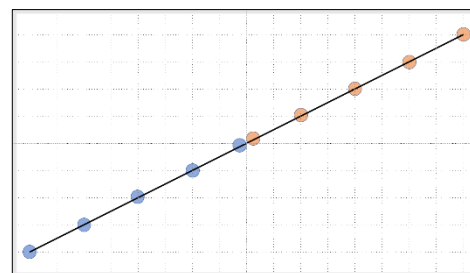


Figure 4.6.2 The Final Step of Floor Pattern Step 6 to Step 7

4.7 Floor pattern Step 7 to Step 8

From Step 7, the dancers then started to move by making a S-shape curve as shown in picture 2 while moving slowly to different direction which that the female dancers move to the top right while the male dancers move to the bottom left creating one horizontal line of female dancers at top right and one horizontal line of male dancers at bottom left. The dancers then started to move into position as in picture 5 in order to create a pentagon shape as shown as in picture 6 and 7 which is the final formation obtained for Step 8.

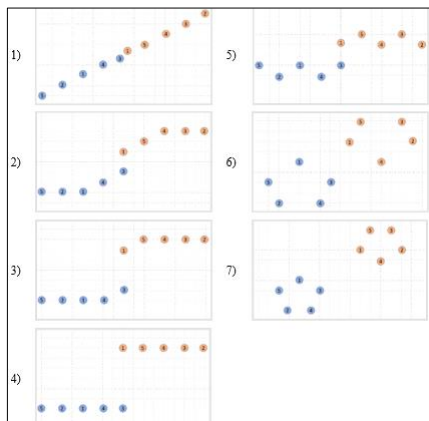


Figure 4.7.1 The Floor Pattern Step 7 to Step 8

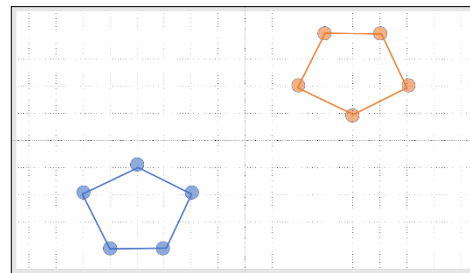


Figure 4.7.2 The Final Step of Floor Pattern Step 7 to Step 8

4.8 Floor pattern Step 8 to Step 9

After both group – male and female dancers forming a pentagon shape, the dancers then started to move randomly while dancing gracefully and move to their designated place in order to create a pattern shown in picture 2. Slowly, the dancers started to separate by pair – male and female instead of group by gender. The first pair dancing and moving slowly to the right followed by the next pair moves to the left side. The pair moves in alternate order which then created a formation shown in picture 4. All of the dancer dance and moving randomly as in picture 5 in order to form a big circle consists of male and female dancers. There are two observable shapes from this dance formation. Since circle does not include in the polygon, therefore by looking the group of gender, two overlapping pentagons can be seen.

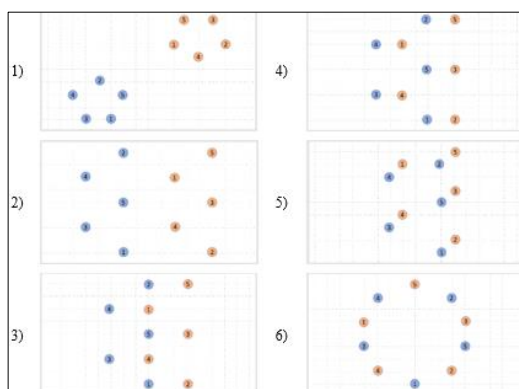


Figure 4.8.1 The Floor Pattern Step 8 to Step 9

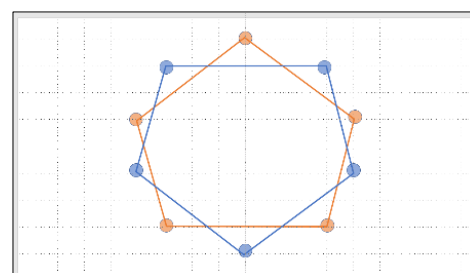


Figure 4.8.2 The Final Step of Floor Pattern Step 8 to Step 9

4.9 Floor pattern Step 9 to Step 10

Previous step, the dancers were forming a big circle. Then, the dancers move randomly to their designated places and create a star shape. Notice that the first star shape was formed by all male dancers crowding the female dancers who were standing in the middle. Then, the dancers move and form a circle again. This step were repeated three times and last formation was a star shaped with all

female dancers crowding the male dancers who were standing in the middle. As a whole, a five-pointed star shape is obtained. But by group of gender, two different size and overlapping pentagon can be seen.

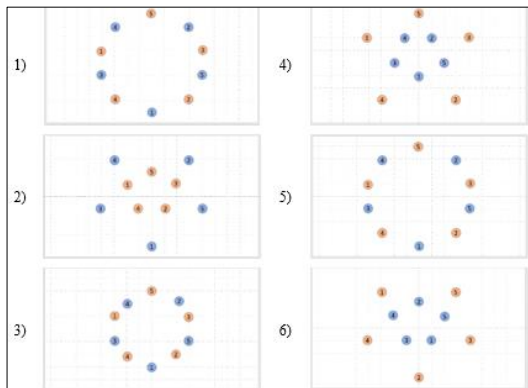


Figure 4.9.1 The Floor Pattern Step 9 to Step 10

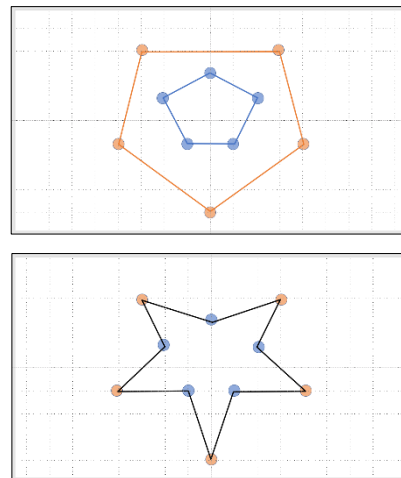


Figure 4.9.2 The Final Step of Floor Pattern Step 9 to Step 10

4.10 Floor pattern Step 10 to Step 11

The dancers started to move randomly and formed two pentagon shapes, constructed by both male and female group. After several steps, the dancers then slowly move to the middle of the stage, forming a straight horizontal line in the middle of the stage with each male and female dancer positioned alternating each other. The dancers then rotate 90° within each other and facing each other, resulting a straight horizontal line of male group and female group. All of the dancers then started to move distinctively towards their designated position as shown in picture 7. The male group started to rotate their partner 270° and ends up standing beside their partner, resulting as Step 11 which are two overlapping isosceles triangles.

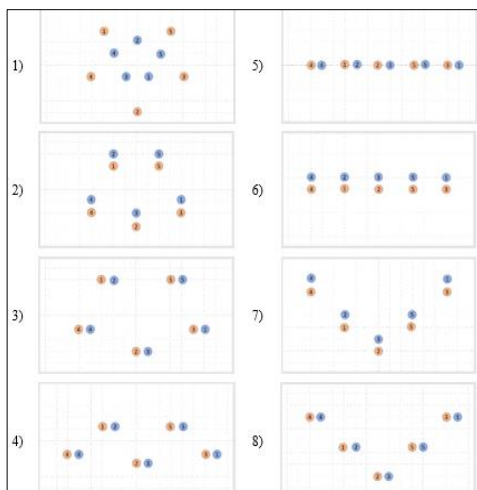


Figure 4.10.1 The Floor Pattern Step 10 to Step 11

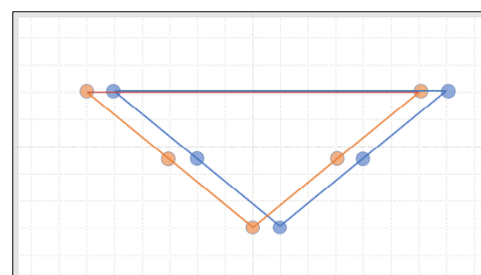


Figure 4.10.2 The Final Step of Floor Pattern Step 10 to Step 11

4.11 Floor pattern Step 11 to Step 12

From Step 11, the dancers start to move randomly and started to make a horizontal straight line as shown as in picture 4. Then, the male dancers move and stay behind the female group. The dancers start to move again and make new vertical lines at the middle of the stage, consisting male and female group. Final formation are two vertical straight lines.

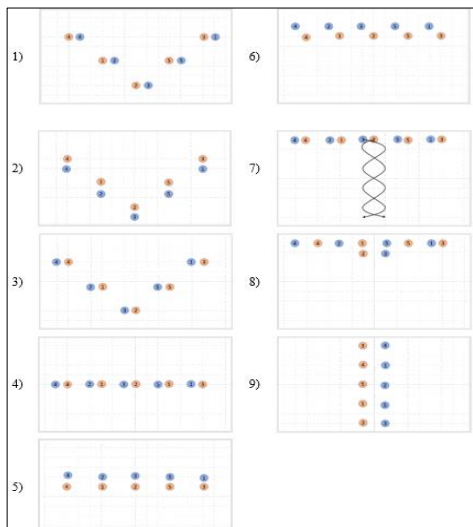


Figure 4.11.1 The Floor Pattern Step 11 to Step 12

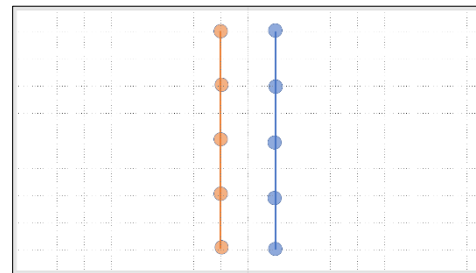


Figure 4.11.2 The Final Step of Floor Pattern Step 11 to Step 12

4.12 Floor pattern Step 12 to Step 13

Before this, the dancers were standing in two vertical straight line and divided by the genders. The dancers then started to move by pair and went to their designated position after as shown as in picture 2 until picture 4. Before finishing the dance, the dancers were dancing and rotating each other as shown as in picture 5 until 7 before return to their original places back. In this last step, two overlapping pentagons can be seen clearly.

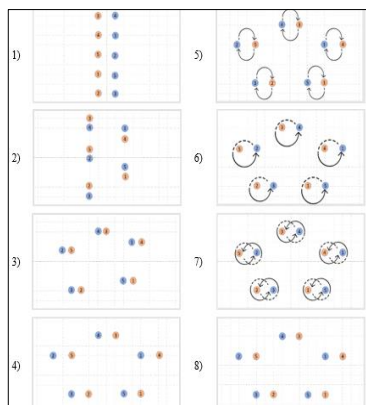


Figure 4.12.1 The Floor Pattern Step 12 to Step 13

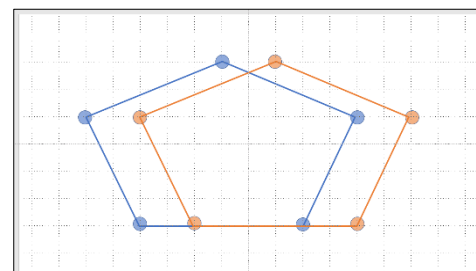


Figure 4.12.2 The Final Step of Floor Pattern Step 12 to Step 13

Conclusion

This research starts with observing the video of Zapin Pat Lipat Dance. The dance was delivered beautifully by ten dancers consists of five male dancers and five female dancers. Every stepping and movement by the dancers were clearly have an attractive symmetrical shape or formation throughout the whole dance. Consequently, the floor pattern of Zapin Pat Lipat Dance was created to identify the existence of basic geometry in this dance. Hence, the main objective which is to study about Zapin Pat Lipat dance and also constructing the floor pattern of the dance in this is achieved.

For the first objectives, 13 dance formations were successfully obtained by identifying every step and movement by the dancers. Then, the geometry that existed in all 13 formations were observed by considering the lines and polygons in every step. Additionally, there are many types of geometry in this field stated in [3] but this research project is focusing on field geometry studying polygons and lines which was learn in secondary school. Also, this research applies to two-dimensional shape only. In this research, pentagon is one of the most appeared shape in this dance, followed with straight line. There are also other unique shape that appear in the Zapin Pat Lipat dance, for instance a circle, isosceles triangles and also a five-pointed star shape. Thus, the second

objective which is to identify the existence of geometry in Zapin Pat lipat Dance focusing on lines and polygons is accomplished.

Acknowledgement

The researchers would like to thank all people who have supported the research and those who has funded this research and give unceasing ideas and helpful information that enabled to complete this research successfully. Thank you.

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