The Error in Ethnomathematics Exploration on *Silat Perisai* in Kampar District

Molli Wahyuni[1*], Zulfah[2], Astuti[3], Zulhendri[4] (iD)

[1] Master of Basic Education, University of Pahlawan Tuanku Tambusai, Kampar
[2,3,4] Mathematics Education, University of Pahlawan Tuanku Tambusai, Kampar

A B S T R A K

Silat Perisai merupakan salah satu warisan budaya Pucuk Adat Kabupaten Kampar Provinsi Riau yang sudah ada sejak sebelum kemerdekaan Republik Indonesia dan sejak tahun 2017 masuk dalam Warisan Budaya Takbenda. Penelitian ini bertujuan untuk mengevaluasi hasil eksplorasi etnomatematika yang dilakukan oleh mahasiswa Pendidikan Matematika Universitas Pahlawan Tuanku Tambusai dalam gerakan Silat Perisai. Penelitian ini merupakan penelitian deskriptif dengan studi kasus eksplorasi etnomatematika Silat Perisai. Peneliti mengamati proses eksplorasi yang dilakukan siswa, dan mengevaluasi laporan hasil eksplorasi. Kesalahan siswa dilihat dari dua aspek yaitu aspek kesalahan konsep matematika dan aspek kesalahan prosedur eksplorasi etnomatematika. Sebelum melakukan eksplorasi, kelompok mahasiswa terlebih dahulu melakukan validasi terhadap instrumen penelitian yang digunakan, seperti lembar observasi dan wawancara. Hasil penelitian menunjukkan bahwa secara keseluruhan tingkat kesalahan pengungkapan konsep etnomatematika bangun datar mencapai 50% yang berarti kesalahan siswa dalam mengungkapkan konsep masih tergolong sedang. Tingkat kesalahan prosedural dalam eksplorasi etnomatematika mencapai 40%..

A B S T R A C T

Silat Perisai is one of the cultural heritages of the Pucuk Adat, Kampar Regency, Riau Province, which has existed since before the independence of the Republic of Indonesia and since 2017 has been included in the Intangible Cultural Heritage. This study aims to evaluate the results of ethnomathematical exploration carried out by students of Mathematics Education at Pahlawan Tuanku Tambusai University in the *Silat Perisai* movement. This research is a descriptive study with a case study on ethnomathematical exploration in *Silat Perisai*. Researchers observed the exploration process carried out by students, and evaluated reports on exploration results. Student errors are viewed from two aspects, namely aspects of mathematical concept errors and aspects of ethnomathematical exploration procedures errors. Before carrying out the exploration, the student group first validated the research instruments used, such as observation sheets and interviews. The results showed that the overall level of error in disclosing ethnomathematical concepts of flat shapes reached 50%, which means that students' errors in expressing concepts are still relatively moderate. The procedural error rate in ethnomathematical exploration reaches 40%.

1. INTRODUCTION

Introducing cultural heritage to the next generation, it can be done through exploring the concepts of certain disciplines in the arts and cultural activities. The implementation of learning that is oriented to local culture can be used as an effort to increase students' understanding of various phenomena in their environment (Parmiti et al., 2021; Wijana, 2015). In the field of mathematics, the activity of finding mathematical ideas in the concept of cultural arts is called ethnomathematics exploration. Ethnomathematics is a special method used by a group of people in mathematical activities (Noto et al., 2018; Sarwoedi et al., 2018). Through ethnomathematics, it is hoped that learning will be more meaningful because it is not only about getting to know mathematical concepts but also knowing about the cultural heritage of our ancestors (L. Putri, 2017).

Mathematics learning that refers to local culture can create dynamic learning that allows students to explore various interesting information about the mathematical concepts being studied (Irawan & Kencanawaty, 2017; Nur & Dadi, 2018). As it is known that learning mathematics is a means of logical and systematic thinking that can shape the personality of students who can think scientifically (Asmara et al., 2018). In research in the form of mathematical exploration, many concepts are found that support

*Corresponding author.
E-mail addresses: whykpr@gmail.com (Molli Wahyuni)

students to think scientifically about the phenomena around them, especially about martial arts. Several studies have found geometry, especially the concept of flat shapes in the found martial arts movements. The concepts of numbers, geometry, and measurement in the art of Reog Cemandi in the Sidoarjo Regency (Budiyono, 2022). Geometric concepts in the Kuntau martial arts movement in South Kalimantan (Monica et al., 2021). The ethnomathematics of the strokes of the Riau Archipelago's *Pencak Silat* arts, in which the concepts of flat shapes are found in the form of triangles, acute, obtuse, and right angles, intersections of lines and perpendicular lines (R. W. Wicaksono & Et.al, 2020).

Based on this research, it is known that research using ethnomathematics helps students understand the geometric concepts contained in self-defense movements. This certainly answers student complaints about the difficulty of understanding geometric concepts. Geometry is known as part of the field of mathematics related to fields and spaces (Asmara et al., 2019). Not a few students complain about the difficulty of understanding the material in geometry so they fail to understand geometric concepts which in the end are unable to solve geometric problems. Given the importance of introducing ancestral cultural heritage to the younger generation, and encouraging students to understand the ethnomathematics of *Silat Perisai*, the students were assigned to carry out an ethnomathematical exploration of *Silat Perisai* in Empat Balai Village, Kuok District, Kampar Regency, Riau Province. Kuok District is one of the sub-districts that has a local community with various kinds of cultural heritage that have been preserved from generation to generation.

An exploration is an approach taken in learning that adheres to constructivism. This approach is carried out to conduct an in-depth investigation of an event or object or activity that you want to study (Supardan, 2016). Through this exploration, it is hoped that students will understand more about the concepts that are the topic of discussion so that students are more skilled in solving mathematical problems that are taught (Octariani & Rambe 2020). The exploration process is also referred to as the activity of obtaining information from different versions related to future learning needs (Wicaksono, 2019). In research activities, exploration is translated as an activity that aims to describe and describe a phenomenal thing. Ethnomathematical exploration activities are one of the increasingly developing research activities in Indonesia because it is a country that has a rich cultural diversity (Princess 2017).

Ethnomathematics has been developed in 1977 or 45 years ago by a Brazilian scientist named D'Ambrosio (Sunandar, 2016). The emergence of the concept of ethnomathematics is a response to the efforts of continuous change in the student's living environment so that a cultural pedagogical concept is needed to maintain culture from generation to generation, (Rosa & Orey 2011). Cultural activities that contain interesting mathematical concepts are to be explored and found in activities in learning so that mathematical understanding becomes more inherent in students (R. Prasasti & Budiyono 2022).

Ethnomathematical exploration requires accuracy in uncovering mathematical concepts contained in the observed traditional movements. This condition allows the occurrence of concept disclosure errors and less than the maximum exploration carried out so that very few concepts are disclosed. Several studies that reveal student errors in learning mathematics are in terms conceptual errors, errors in operating, errors in disclosing facts, and errors in using mathematical principles. (Fadillah, 2016; D. A. K. Putri, 2014). Students' mistakes in solving mathematical problems were generally caused by a lack of mastery of concepts and procedures. To find out student errors in solving mathematical problems, lecturers need to evaluate the process and results of problem-solving by students. Three student errors in solving mathematical problems, namely errors in understanding the problem, wrong in planning problem solving, and wrong in problem-solving (Amir, 2017; Yarmayani et al., 2017).

Silat Perisai is one of the cultural heritages of traditional shoots in Kampar Regency and has been designated as an Intangible Cultural Heritage of Indonesia in 2017. The existence of this martial arts has been passed down from generation to generation since before the independence of the Republic of Indonesia (RI). This *Pencak Silat* is played through cultural attractions at official moments welcoming official guests at an event. Not infrequently, the *Silat Perisai* attraction is accompanied by traditional Kampar music called Calempong Oguong. This *Pencak Silat* player wears distinctive black clothes and is equipped with the property of a sword and a *Perisai* made of wood (Suryani, 2020). *Silat Perisai* was originally performed to seek a consensus from disputes that occurred between tribes. However, over time, *Silat Perisai* is now being implemented, and now it is more dominant in cultural attractions in ceremonial activities, (Suryani, 2020; F. T. Wulandari, 2017). The origin of the word *Silat Perisai* is Pencak *Silat Perisai* (*Poncak* comes from the word *moncak-moncak* which means to dance). The existence of *Silat Perisai* began in the Kampar region before the independence of the Republic of Indonesia. In the past, in that area, there was an Andiko government system, in which the ruling was the *Pucuk Adat* called *Ninik Mamak. Ninik Mamak* protects a community called *Anak Kemenakan* and *Urang Sumondo*, and each community consisting of *Anak Kemanakan* and *Urang Sumondo* is called *Pesukuan*.

Each tribe has a *DubalangSilat Perisai* warrior. If there is a difference of opinion between tribes, for example regarding *Ulayat* land, and after being reviewed from the legal aspect the parties to the dispute both have strong rights, then to determine who has the most right, it is done through a *Silat Perisai* competition. Representatives of the two warring tribes who are usually referred to as *Dubalang* appear to compete with the support of their respective communities, relatives, and traditional leaders. The clothing used is a black cove type. The match can be stopped, if one of the *Dubalang* is in a pressured position by the opponent, then his wife can enter the arena to stop the match by giving a signal that her husband can no longer continue the match or admit defeat. On this decision, (FT Wulandari 2017).

Along with the times, *Silat Perisai* activities are now carried out at cultural arts performances to welcome guests of honor, cultural week activities, and other regional activities. Although it is no longer used as a step to resolve differences of opinion between tribes, it does not mean that *Perisai Silat* is lost from the midst of society. Even this cultural heritage that has been passed down from generation to generation has been declared an Intangible Cultural Heritage by the central government. To beautify the appearance of *Silat Perisai*, the performance is complemented by the musical accompaniment of *Calempong Oguong*. (Appdilla 2017).

2. METHODS

This research is a descriptive study with the concept of a case study on ethnomathematical exploration in *Silat Perisai*. The exploration was carried out by a group of students from the Mathematics Education Study Program at Pahlawan Tuanku Tambusai University consisting of 6 students at the *Silat Perisai* teacher's residence in Kuok District, Kampar Regency, Riau Province. Researchers observed the exploration process carried out by students, and evaluated reports on exploration results. Student errors are viewed from two aspects, namely aspects of mathematical concept errors and aspects of ethnomathematical exploration procedures errors.

Before carrying out the exploration, the student group first validated the research instruments used, such as observation sheets and interviews. The instrument validation was carried out by a Lecturer in the Mathematics Education Study Program at Pahlawan Tuanku Tambusai University. Students conducted two interviews with the informant, namely the *Silat Perisai* teacher, Yusheri, in June 2022. Based on the results of the interview, it is known about the function of the *Silat Perisai*, which is used for traditional events, weddings, Regional Culture Week, Traditional Sports Week, Opening of MTQ, and other regional activities. The properties of the *Silat Perisai* are *Perisai*s and swords. The *Perisai* is in the form of a circle made of *Butuong* stems. According to the informant, the rod is stronger to withstand resistance, behind the *Perisai* there is a bell or bell as a sound source. While the sword is made of iron.

3. RESULT AND DISCUSSION

Results

There are several moves used in *Perisai* silat, namely *Pasombahan, Simbu, Gayuong, Concang, Tikam, Sebeng*, and *Toko Laman*. To complete the information from the interviews, further observations of the *Silat Perisai* activities were carried out and the documentation of the *Silat* activities was carried out. The *Silat* movement was demonstrated by the *Silat* coach, Yusheri, who on that occasion demonstrated the *Perisai Silat* movement. The ethnomathematical findings on the *Perisai* property used in the *Perisai Silat* are in the form of a flat circular shape and there is a circular motif as well as there is an element of reflection geometry transformation (mirror) in the *Perisai* motif.

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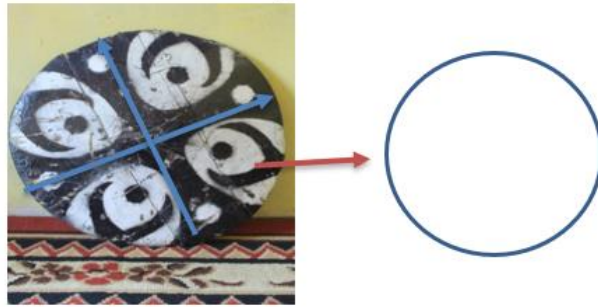
Figure 1. Perisai Used in Perisai Martial Arts

Ethnomathematical findings on the *Pasombahan* movement. The initial movement in *Silat Perisai* is an attitude of respect for the guests present. In Figure 2 the positions of the sword and *Perisai* are attached. There are ethnomathematical findings in the position of the sword and *Perisai* that form a right angle (90º) and if given a guideline between the two fists it will produce a triangular flat shape. From the head to the shoulders an obtuse angle is formed and the fighter's arms and body have sharp angles in the armpits.
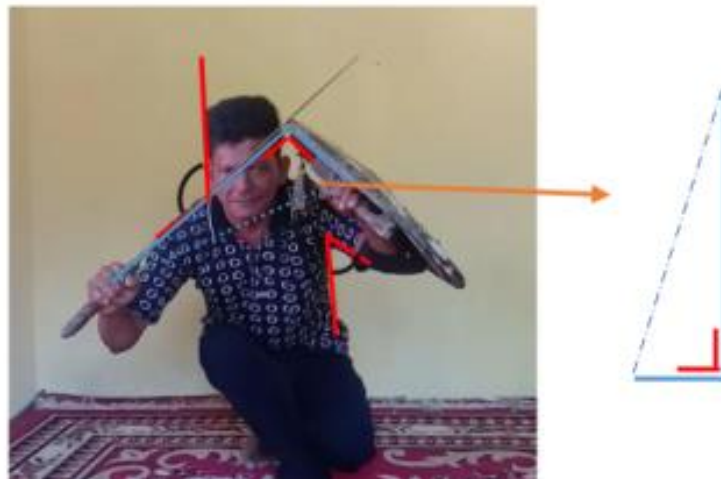
Figure 2. Ethnomathematical Findings in the *Pasombahan* Movement with a Salute in a Sitting Position

In the disclosure of the *Pasombahan* movement, students only express the concept of a triangle, with right angles. There are still many other triangular concepts that have not been revealed in this *Pasombahan* movement, such as when an arbitrary triangle position is formed when a line is drawn from the speaker's head to the elbow point. The position of the right foot against the floor can also form a triangle, the position of the right armpit forms an angle, and the cross of the legs can form a plane. From this, it can be seen that students do not reveal the concept of flat wake in this Pasombahan movement in detail.

In the Sujud Position, students reveal the formation of a flat shape when the resource person takes a prostrate position in the *Pasombahan* movement. The flat shape is an isosceles trapezoid. In Figure 3 there are ethnomathematical findings where the position of the sword and *Perisai* is attached to the floor so that it forms a flat trapezoidal shape when given a guideline between the two fists and both sides of the armpit.

Figure 3. Ethnomathematical Findings in The Pasombahan Movement with a Respectful Gesture Approaching the Prostration Movement

The mathematical concept that can be expressed in the position of the prostration *Pasombahan* is not only an isosceles trapezoid shape. In this position, a straight line can be drawn from the head to the back of the informant and a line from the front of the head to the floor to form a triangle. The position of the right sword that touches the floor can form a triangle by pulling a straight line between the two grips.

In Figure 4 the *Gayuong* movement there are ethnomathematical findings in the position of the sword and foot that form an angle and if given a guideline between the tip of the sword and the footstool it will produce a triangular flat shape. In the *Gayuong* movement, there are ethnomathematical findings, where the position of the legs is bent and forms an angle > 90º (blunt). In the position of the hand also forms an angle of < 90º (taper). From the eye of the *Silat* fighter that leads to the tip of the sword, there are ethnomathematical findings, namely the concept of a line.

Figure 4. Findings of Ethnomathematics in the *Gayuong* Movement

Disclosure of the findings of mathematical concepts, especially flat shapes in Figure 4 is still not optimal. *Gayuong* movement can form a variety of planes and not just a triangular shape. Flat shapes that can be expressed in this position include the shape of a parallelogram, namely the formation of an angle at the position of each knee, and the angle position formed in each position of the left hand.

In Figure 5 there is the concept of a line relationship, namely parallel lines and line intersections at the foot position of the Pilat. In the *Concang* movement, there are ethnomathematical findings of the kite's flat shape when it is given a guideline at the ends of the elbows and knees. In addition, there is also

the concept of a line relationship, namely parallel lines and line intersections at the foot position of the fighter.

Figure 5. Ethnomathematical Findings in the *Concang* Movement

Concang movement facing sideways provides interesting inspiration in the disclosure of mathematical concepts, especially the flat plane. In this section, students managed to uncover several concepts. However, the concept of the kite that the students referred to in the findings was not clearly described. The intersection of the lines that have been described is also not explained. The straight-back position does not draw a line to the floor to get an angle formation. In the findings revealed in Figure 6, students revealed that a rhombus was formed from the results of a line drawn in the position of the *Gayuong Concang* movement.
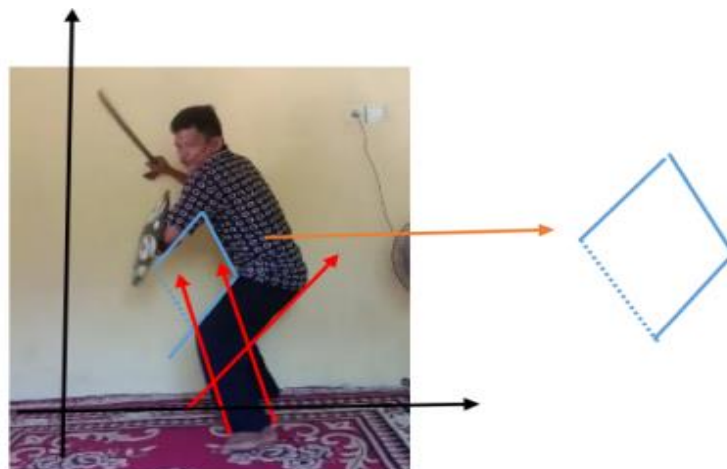
Figure 6. Ethnomathematical Findings in the *Concang* Movement

The concept is expressed too little. At least some other mathematical concepts can be revealed. For example, the field is formed by the pull of the line between the knees and the ankles. The measure of the angle formed from the line formed on the pull from the shoulder to the knee. The plane can be formed from the results of drawing a line from the tip of the sword to the floor and from the grip of the hand to the floor so that it can form a trapezoid.

Based on Table 1, it can be seen that the level of error in the ethnomathematics concept means that the overall level of error in disclosing the ethnomathematical concept of flat shapes reaches 50%. This means that students' errors in expressing concepts are still classified as moderate. This condition needs serious attention because prospective mathematics teachers must have good conceptual understanding skills.

Table 1. Identification of the Ethnomathematical Concept Error Rate

No	Ethnomathematical Mathematical Concepts	Score	Ideal Score	Percentage
1	Error in the order of disclosure of concepts	2	4	50
2	Misuse of terms and symbols	1	4	25
3	Errors in the description of the concept	2	4	50
4	Error in image presentation	2	4	50
5	Error in concept disclosure details	3	4	75
	Average			**50**

Based on Table 2, it is known that the procedural error rate in ethnomathematical exploration is low. However, the number is already above 40%, so attention must be paid so that these procedural errors do not have a major impact on the exploration results.

Table 2. Error Rate Identification of Ethnomathematical Exploration Procedures

No	Procedure Error Ethnomathematical Exploration	Score	Ideal Score	Percentage
1	Choosing Problem	3	4	50
2	Data collection	2	4	50
3	Analyzing Data	1	4	25
4	Formulating the Ethnographic Hypothesis	2	4	50
5	Full report writing	2	4	50
	Average			**43.75**

Discussion

In the exploration report, students also explain the concepts they have found. A flat shape is a two-dimensional shape that only has length and width that is limited by straight or curved lines (Hardiarti, 2017). The kinds of flat shapes found in the properties and movements of *Silat Perisai* are: First, Circle. A circle is a set of points that are equidistant from a certain point. This point is called the center point. In the ethnomathematics findings of *Perisai* silat, there is a flat circular concept found in the *Perisai*ing property. Circle properties (C. Wulandari, 2017) have one side, rotational symmetry, and infinite fold symmetry, the number of degrees of a circle is 360o and the circle has 1 center point. Suppose the *Perisai* used has a radius of 35 cm. What is the circumference of the *Perisai*? From the length of the radius, the circumference of the *Perisai* is 220cm.

Second, triangle. A triangle is a flat shape made of 3 sides in the form of straight lines and 3 angles (C. Wulandari, 2017). In the findings of the ethnomathematics of *Perisai* silat, there is the concept of a right triangle and an arbitrary triangle. A right triangle has the characteristics of an angle of 90o. While the characteristics of an arbitrary triangle are that the three sides have different lengths, the three angles are not the same size, do not have an axis of symmetry, do not have folding symmetry, and have one rotational symmetry. The third is the trapezoid, which is a quadrilateral that has a pair of parallel sides. An isosceles trapezoid is a trapezoid in which one side is perpendicular to a pair of parallel sides. In the findings of the ethnomathematics of *Perisai* silat, there is the concept of a trapezoidal flat shape. The properties of a trapezoid are that it has 4 sides and 4 vertices, has a pair of sides that are parallel but not the same length, and the angles between the parallel sides are 180o.

Fourth, Cut the rice cake. A rhombus is a special parallelogram whose four sides are the same length. In the findings of the ethnomathematics of *Perisai* silat, there is the concept of a flat rhombus. The properties of a rhombus are that it has 4 sides and 4 vertices, all four sides are the same length, two pairs of opposite angles are equal, the diagonals intersect perpendicularly, have 2-fold symmetries, and have rotational symmetry level 2. Fifth is the transformation of reflection geometry. The *Perisai* property contains a mathematical element, namely the transformation of the reflection/mirror geometry. Reflection is a transformation that moves every point on the plane using the mirror image properties of the points to be moved. Reflection of a geometric figure is the process of reflecting each point of the geometric figure on a certain line, this particular line is called the mirror axis or the axis of symmetry. If a geometric figure is reflected on a certain line, then the image is congruent with the original shape. The properties of reflection are the distance from the origin to the mirror = the distance from the mirror to the image and the line connecting the original object with the image will intersect perpendicular to the mirror.

Sixth concept, Angles and Lines. In the *Pasombahan* and *Gayuong Perisai Silat* movements there are mathematical elements, namely right angles, acute angles, and obtuse angles. The angle is the union of

two rays AB and AC with rays AB and AC being called the legs of the angle, respectively. A right angle is an angle whose measure is 90 degrees. An acute angle is an angle that measures less than 90 degrees. An obtuse angle is an angle that measures more than 90 degrees. In the *Gayuong Perisai Silat* movement, there are mathematical elements, namely straight lines, and intersecting lines, and there are parallel lines in the *Concang* movement. A straight line is a line that extends indefinitely at both ends. Two lines are parallel if they lie in the same plane and have no common points. Two lines intersect if they have a common point. (Trimurtini et al., 2021)

Concept decomposition is not carried out by students systematically from simple concepts to more complex concepts. This needs to be a serious concern and needs to be emphasized that students must get used to doing exploration systematically, as well as in terms of disclosing mathematical concepts. Several studies have found the benefits of this ethnomathematical research. Through the discovery of this mathematical exploration process, it is hoped that students will be more motivated in understanding mathematical concepts contained in cultural-based activities, such as *Silat Perisai* (Mahendra, 2017) Teaching mathematics by involving the culture of local wisdom can be used as an effort to support character education for students, (Wijana, 2015). Previous study shows an increase in students' understanding of the value of mathematics in everyday life (Nur & Dadi, 2018). Each area has its peculiarities and has a relationship with various mathematical concepts that can be integrated with learning mathematics. At the stage of choosing the problem, students as ethnographers have chosen the object under study, namely *Silat Perisai*, and have understood the cultural meanings contained in the *Silat Perisai* (Fajriyah, 2018). When choosing a problem ethnographer must pay attention to the meaning of the culture in the community and interpret the community's experience of the culture (Budiasa, 2016).

At the data collection stage, the ethnographer interviewed informants and made observations and documentation. At the data analysis stage, students found the ethnomathematical domain in the properties and movements of the *Silat Perisai* in the Kampar Regency, namely the property form domain and the playing domain. Based on the domain that has been determined, it is determined to determine the taxonomy or level that is following the domain of property form and the domain of play, namely the *Perisai* used, *Pasombahan* movement in *Silat Perisai*, *Gayuong*, and *Concang* movement. In the results of the componential analysis, the students found that the *Perisai* used in the *Silat Perisai* was made of *Botuong* rods because the rods were stronger to withstand resistance. The *Perisai* is circular and has a motif in which there is the concept of a circle and reflection (shown in Figure 1). In the *Pasombahan* movement, there is the concept of an angle in the fused position of the sword and *Perisai*, and the concept of a flat triangle (shown in Figure 2 and Figure 3). In the *Gayuong* movement, the concept of obtuse angles on the feet and sharp edges on the hands, and flat wake on the sword position is found (shown in Figure 4 and Figure 5). In the *Concang* movement, it is found that ethnomathematics is in the form of a flat shape when the fighter wants to do the bouncy movement (shown in Figure 6). In the *Gayuong* movement, the concept of obtuse angles on the feet and sharp edges on the hands, and flat wake on the sword position are found (shown in Figure 4 and Figure 5). In the *Concang* movement, it is found that ethnomathematics is in the form of a flat shape when the fighter wants to do the bouncy movement (shown in Figure 6). In the *Gayuong* movement, the concept of obtuse angles on the feet and sharp edges on the hands, and flat wake on the sword position is found (shown in Figure 4 and Figure 5). In the *Concang* movement, it is found that ethnomathematics is in the form of a flat shape when the fighter wants to do the bouncy movement (shown in Figure 6).

Analysis of cultural themes is done by determining the mathematical concepts found in the domain of building forms. On the *Perisai* used in the *Silat Perisai*, there are ethnomathematical findings in the form of a circle. The *Perisai* used in the *Silat Perisai* is made of *Botuong* rods because the rods are stronger to withstand resistance. The *Perisai* is in the form of a flat circle and has a motif, the motif is in the form of a flat circle and there is also the concept of a reflection/reflection geometry transformation (shown in Figure 1). In the *Pasombahan* movement, there is the concept of a right angle (90°), a triangular flat shape, and a trapezoidal flat shape (shown in Figure 2 and Figure 3). In the *Gayuong* movement, there is the concept of an angle > 90° (blunt) in a bent leg position, an angle < 90° (taper) in the hand position, and a flat triangle and trapezoidal shape (shown in Figure 4 and Figure 5). In the Concang movement, there are ethnomathematical findings of the kite's flat shape which, when given a guideline at the ends of the elbows and knees (shown in Figure 6). Based on the results of these explorations, students concluded that there were several ethnomathematical findings in the *Silat Perisai* in its properties and movements. Its property is in the form of a *Perisai* and the *Silat Perisai* movement, several ethnomathematical findings are found, namely the *Pasombahan, Gayuong,* and *Concang* movements. Based on the mathematical concepts found in the *Silat Perisai*, there are flat shapes of circles, triangles, trapezoids, and rhombuses. And there are right angles, acute and obtuse, and there are also straight lines, parallel lines, and line intersections.

Interviews and observations were carried out by students only on one resource person, namely the *Silat Perisai* teacher who was in Empat Balai Village, Kuok District, Kampar Regency, this condition closed the possibility of knowing other alternative movements of *Silat Perisai* which might have been modified over time. The possibility is very large because the objectives have also changed. In the beginning, *Silat Perisai* was used for problem-solving, but now it has become an attraction for welcoming guests of honor. In this exploration, students carry out technical triangulation, namely by conducting observations, interviews, and documentation, (R. W. Wicaksono & Et.al, 2020). However, interviews and observations were carried out by students only on one resource person, namely the *Silat Perisai* teacher who was in Empat Balai Village, Kuok District, Kampar Regency, this condition closed the possibility of knowing other alternative movements of *Silat Perisai* which might have been modified according to the times. Likewise, the documentation process is carried out on the equipment owned by the resource person. In collecting the data, students did not systematically express the geometrical concepts of flat shapes starting from the simplest concepts such as the existence of straight lines to more complete concepts for a flat shape, such as a rhombus. When collecting data, the ethnographer must be very careful (Andriani et.al 2017; Budiasa 2016). Interviews are an important process in ethnography research, in which there are at least three things that must be considered, namely explicit objectives, explanations, and ethnographic questions. The ethnographic questions are divided into three, namely descriptive questions, structural questions and contrasting questions (Budiasa, 2016; Spradlley, 1979)

Likewise, the documentation process is carried out on very minimal equipment and movements, giving the impression that the *Silat Perisai* movement only consists of various types. In collecting the data, students did not systematically express the geometrical concepts of flat shapes starting from the simplest concepts such as the existence of straight lines to more complete concepts for a flat shape, such as a rhombus. The sequence of data analysis carried out has included the implementation of an ethnomathematical exploration based on the references owned, but the elaboration of explanations has not been systematically arranged. The conclusion-making process is carried out in very simple language and synchronizes the mathematical concepts in every observed movement.

The data analysis technique used in ethnographic research is the Spradley concept (R. Wicaksono, 2019), namely Domain analysis, where researchers carry out activities to find ethnomathematics that will be used as research centers. In the domain analysis, there are three components, namely, cover terms, including terms and semiotic relationships; Taxonomic analysis which is the stage to describe the selected domains in more detail to get their internal structure; Componential analysis, where at this stage the data that has differences is organized; Analysis of cultural themes as the final stage in the data analysis process. Based on the components that have been determined in the componential analysis, the research results are in the form of cultural findings (ethnomathematical findings), (R. W. Wicaksono & Et.al, 2020). When conducting data analysis, ethnographers re-examined the cultural symbols contained in the object under study, about their authenticity and the meaning of each symbol that has to do with the concept to be explored.

When conducting ethnographic research, researchers need to formulate hypotheses based on the cultural object under study, which hypothesis is made after analysis of data collection in the early stages (Salim, 2006). Meanwhile, in writing the report, the ethnographer made improvements to the hypotheses that had been made previously. The writing of the ethnographic report is carried out at the final stage of the study, which needs to pay attention to the enrichment and sharpness of the hypothesis. In the report on the results of the *Silat Perisai* ethnography, the ethnographer does not formulate hypotheses, but only describes the things found, then compares them with theories that are relevant to the mathematical concepts found.

4. CONCLUSION

Based on the results and discussion of the ethnomathematical exploration of *Silat Perisai* in Kampar Regency, it is known that the overall level of error in disclosing ethnomathematical concepts of flat shapes reaches 50%, which means that students' errors in expressing concepts are still relatively moderate. The procedural error rate in ethnomathematical exploration is low. However, the number is already above 40%, so attention must be paid so that these procedural errors do not have a major impact on the exploration results.

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