JEJAHITAN: ETHNOPEDAGOGICAL STUDY IN BALINESE CULTURE

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Abstract. *Mejejahitan* is an activity to obtain the shapes of pieces of leaf material. The product of this activity is called *jejahitan*. This research is a qualitative descriptive study. The aim of this research is to determine the mathematical concepts that exist in Balinese *jejahitan* and the potential for their use in the mathematics learning process. The subjects of this research were three mothers from Dalung village. The data in this research was analyzed through three stages, namely data reduction, data presentation and data conclusion. Studies on Mathematics learning contained in *jejahitan* include squares, rectangles, trapezoids and circles. The geometric elements contained in this *jejahitan* can be used as a learning resource, especially those related to the elements, properties and fold symmetry of squares, rectangles, trapezoids and circles.

INTRODUCTION

Ethnopedagogy is ethnic-based learning, whether used as a learning resource or learning media (Widiastuti, 2015; Abdurrahman et al., 2020; Susilaningtiyas et al., 2021). Ethnopedagogy is an educational practice based on local wisdom, which aims to pass on living cultural values and be able to interpret ancestral heritage, not just as historical relics (Nikmawati et al., 2019; Sugara & Sugito, 2022; Parwati, 2023; Kusumua et al., 2024). Ethnopedagogy is the actualization of learning to instill local wisdom values of an ethnic group (Abdurrahman et al., 2020). Ethnopedagogy is closely related to multicultural education which has the view that it promotes local wisdom and diversity which has ethnic commodities. In Mathematics learning, the concept of ethnopedagogy is better known as ethnomathematics (Payadnya & Agung Ngurah Trisna Jayantika, 2022; Hastuti et al., n.d.). Ethnomathematics is mathematics that grows and develops in a particular culture. Remembering that mathematics learning emphasizes the problem solving process (Nikmawati et al., 2019). So linking mathematical concepts to the real world, especially culture, can help the learning process in the classroom (Hermawan et al., 2019; Trisna Jayantika & Santhika, 2023).

With the development of increasingly diverse cultures, the existence of ethnomathematics is often not realized by the people who use it (Widana & Diartini, 2021). This is due to the view

that ethnomathematics is simpler than the mathematical concepts found in classroom learning. Basically, Mathematics in this culture does not contain theorems, formulas and formal formulas that are usually found in Mathematics in the classroom. However, many studies on ethnomathematics have been carried out. Rahayu (2014) has also studied the ethnomathematics that exist in woven crafts in Bali and their relationship to learning. Mathematical elements that can be studied in woven crafts include the concept of tiling, the concept of parallel lines and angles. Apart from what has been mentioned, another element of Balinese culture that is no less interesting is Balinese sewing (Puspadewi, 2018).

Jejahitan is the result of the process *mejejahitan*. Conceptually *majejahitan* is an activity to get shapes from pieces of leaf material such as *busunsg* (still coconut leaves) (Dewi & Agustika, 2022; Sudiarta et al., n.d.; Wayan et al., 2023). *Jejahitan* requires materials sourced from nature such as *selepan* (coconut leaves that are still green), *ron* (palm palm leaves that are still green), *ambu* (young white leaves) and *ental* or *rontal* (the leaves of the *ental* tree are still young and going through a drying process). In general, the leaves mentioned above are widely used in society as a means of *bebantenan* ceremonies (offerings) for Hindus in Bali. The leaves are then cut into pieces according to the size desired by the party doing the work according to the length of the distance between the thumb and forefinger plus one transverse finger (*amusti*). These leaf pieces are now assembled by sewing using *semat*, namely small bamboo slices with a minimum size of 0.1 x 15-50 cm.

Considering that the art of mejejahitan is practiced almost every day by Balinese women, now in schools there are extracurricular *mejejahitan* programs. This extra tailoring aims to preserve Balinese culture in this modern era, so that students do not forget the culture that has been passed down from their ancestors. Apart from that, students who take part in this extra-curricular mejejahitan are expected to be able to apply it in the community, such as the *ngayah* at tample tradition which uses offerings with various kinds of *jejahitan*. In this extracurricular *mejejahitan*, students are taught to make various types of *jejahitan* ranging from simple to complex (Astiti, 2021). The art of sewing is something that is familiar to students. The art of sewing is rich in mathematical elements which can be used as a source of mathematics learning in the classroom. The countless numbers of *jejahitan* Bali and its presence so close to students can have a very vital influence if it can be utilized, especially in mathematics learning at school. Therefore, researchers are interested in studying the mathematical elements that exist in Balinese sewing. The results of this research will add to the ethnomathematics study of Balinese culture (Widana et al., 2023). This study really supports the implementation of mathematics learning, especially at the basic education level.

Ethnopedagogy
Ethnopedagogy is ethnic-based learning, whether used as a learning resource or learning media (Abdurrahman et al., 2020; Widiastuti, 2015; Susilaningtiyas et al., 2021). Ethnopedagogy is an educational practice based on local wisdom, which aims to pass on living cultural values and be able to interpret ancestral heritage, not just as historical relics (Widiastuti, 2015). Ethnopedagogy is the actualization of learning to instill local wisdom values of an ethnic group (Abdurrahman et al., 2020). Ethnopedagogy is closely related to multicultural education which has the view that it promotes local wisdom and diversity which has ethnic commodities (Hastuti et al., n.d.). So, ethnopedagogy can be defined as learning based on ethnicity in a particular area, which of course is related to the material being discussed.

The transformation of ethnopedagogy goes through several stages as follows. 1) The first stage of ethnopedagogical transformation is cultural understanding. Teachers should understand the culture around students, both internally (in the form of language and beliefs) and externally (norms from the student's area of origin); 2) The second stage is adjustment to the existing curriculum. This adjustment is quite an important stage, because it reduces the possibility of selecting ethnic aspects that are not in accordance with the existing curriculum; 3) The third stage is the development of learning methods/models. Ethnic aspects that are compatible with the curriculum then require appropriate learning methods/models so that they can be applied pedagogically in classroom learning; 4) The fourth stage is material development (Nur & Hikmah, 2023; Sugara & Sugito, 2022); . The material developed is of course in accordance with ethnic aspects, the curriculum and the characteristics of the method/model chosen.

Ethnopedagogy and local wisdom have a strong relationship, including: 1) Respect for Local Culture: Both ethnopedagogy and local wisdom emphasize the importance of respecting local culture and traditions. Ethnopedagogy integrates cultural elements in education, while local wisdom focuses on preserving and developing knowledge and values originating from local communities; 2) Increasing Cultural Identity: Both ethnopedagogy and local wisdom can help in strengthening the cultural identity of students or community members. This can encourage a sense of pride in their own culture and promote the preservation of cultural heritage; 3) Local Community Empowerment. Ethnopedagogy and local wisdom can work together to build strong and empowered local communities. Through culturally appropriate education, they can help local communities identify solutions to their own problems.

Jejahitan
Jejahitan are the result of the process of *mejejahitan*. Conceptually, *majejahitan* is an activity to obtain shapes from pieces of leaf material such as *busung* (young coconut leaves or coconut leaves), *selepan* (coconut leaves that are still green), *ron* (palm palm leaves that are still green), *ambu* (young white leaves) and *ental* or *lontar* (the leaves of the ental tree are still young and go through a drying process) (Suarta, 2020). In general, the leaves mentioned above, in reality, are widely used in society as a means of "*bebantenan*" ceremonies (offerings) for Hindus in Bali (Poni, 2023). The leaves are then cut into pieces according to the size desired by the party doing the work according to the length of the distance between the thumb and forefinger plus one transverse finger (*amusti*). These leaf pieces are now assembled by sewing using *semat* , namely small bamboo slices with a minimum size of 0.1 x 15-50 cm (Suarta, 2020).

There are various types of Balinese sewing, from simple to complex. Simple stitches such as *tamas, ituk-ituk, ceper*, and *taledan*, while examples of complicated stitches include *sampian pajegan, lis,* and *sampian jerimpen*. Considering that the art of *mejejahitan* is practiced almost every day by Balinese women, now in schools there are extracurricular *mejejahitan* programs (Purnadewi & Widana, 2023). This extra tailoring aims to preserve Balinese culture in this modern era, so that students do not forget the culture that has been passed down from their ancestors. Apart from that, students who take part in this extra sewing are expected to be able to apply it in the community, such as the *ngayah* tradition in temples which uses offerings with various types of stitching. In this sewing extracurricular, students are taught to make various types of stitches ranging from simple to complex. The art of sewing is something that is familiar to students (Sudarmini, 2022). The art of sewing is rich in mathematical elements which can be used as a source of mathematics learning in the classroom. The countless Balinese crafts and their presence so close to students can have a very vital influence if they

can be utilized, especially in mathematics learning at school. Therefore, researchers are interested in studying the mathematical elements that exist in Balinese *jejahitan*.

Geometry Studies
Geometry is a branch of mathematics that studies the properties, sizes, shapes and geometric relationships between objects in space. This is a very broad field of mathematics and has many different sub-fields. In geometry, various object entities are considered, such as points, lines, planes, angles, curves, surfaces and more complex objects. Some basic concepts in geometry include: 1) points, are geometric objects that have no dimensions. In geometry, points are used as references in building other geometric objects; 2) line, is an infinite set of points that form a straight path. Lines have length, but not width or depth; 3) a plane is a set of points that form an infinite flat surface. Fields have two dimensions, namely length and width; 4) angle, formed when two lines or segments meet. Angles can be measured in degrees or radians and are used to measure rotation or deflection in geometry (Afidah & Arifin, 2021 ; Maulani & Setiawan, 2021; Widyaningsih et al., 2020).

METHOD
This research is qualitative research which aims to examine ethnopedagogy in Balinese sewing which can be integrated into Mathematics learning. The research approach used is an ethnographic approach, namely a qualitative research approach to describe, analyze and interpret local Balinese wisdom in relation to geometry as a branch of mathematics. The research stages are as follows: (1) selecting social situations (places, informants, and activities), (2) conducting participant observations, (3) making field notes from observations and interviews, (4) carrying out descriptive observations, (5) make domain analysis, (6) make focused observations, (7) make taxonomic analysis, (8) make selected observations, (9) make component analysis, (10) make theme analysis, (11) make notes on theoretical findings, and (12) create theories and research reports. This research was conducted in Dalung Village, North Kuta District, Badung, Bali. This research involved three women in Dalung Village, which was determined using purposive sampling technique. The data in this research was collected using interview techniques, observation and documentation. This research data analysis uses three stages, namely data reduction, data presentation and data conclusion (Sugiyono, 2012).

RESULTS AND DISCUSSION
Based on the results of interviews, observations and documentation carried out directly on the selected subjects, a recapitulation of the results of the ethnopedagogical study on Balinese sewing is presented in the table below.

Table 1. Recapitulation of Ethnopedagogical Studies in *Jejahitan* Bali

No	*Banten* image	Related material
1	*Ceniga*	Related material Class material: IV, V, VI on the subject: (1) Identify the elements of an isosceles trapezium (2) Determine the perimeter and area of the trapezium (3) Determine line symmetry and rotational symmetry of an isosceles trapezium

2	*Ceper*	Related material Class material: IV, V, VI on the subject:
		(1) Identify the elements of a square (2) Determine the perimeter and area of a square (3) Determine symmetry
3	*Tamiang*	Related material Class material: IV, V, VI on the subject:
		(1) Identify the elements of a circle (2) Determine the circumference and area of a circle (3) Determine line symmetry and rotational symmetry in circles
4	*Lamak*	Related material Class material: IV, V, VI on the subject:
		(1) Identify the elements of a rectangle (2) Determine the perimeter and area of the rectangle (3) Determine the rotational and fold symmetry of the rectangle

(1) *Ceniga*

Ceniga is a stitch that is often used on *Galungan, Kuningan* and various other major holy days for Hindus. *Ceniga* is often made from a combination of coconut leaves, *selepan* (green coconut leaves), or with *ron*. *Ceniga* is usually arranged with three pieces of coconut leaf that are connected and shaped so that the bottom part is wider, while the top part is slightly pointed but does not form an angle. The results of *jejahitan* the pieces of coconut will form a trapezoid, as seen in the image below.

Image 1. Picture of *ceniga*

Elements of an isosceles trapezoid in *ceniga*:
a. Have opposite sides the same length
b. Has a pair of parallel sides

(2) *Ceper*

Ceper is a stitch made by intertwining several pieces of coconut with *semat* (a stick made of bamboo) or a stapler. Some of these stitches form a square shape, some also form a square shape, as seen in the image below.
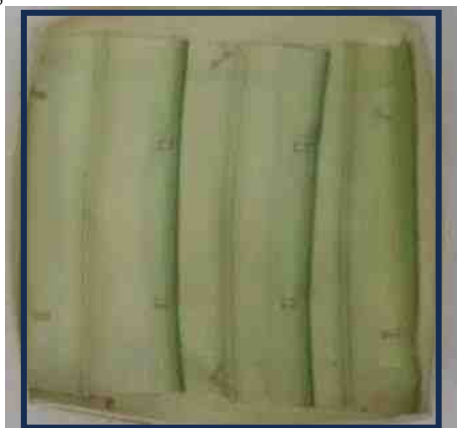

Image 2. Picture of *ceper*

Square Elements on *ceper:*
a. Has four sides of the same length
b. Has four right angles
c. The two diagonals intersect at right angles

(3) *Tamiang*

Image 3. Picture of *Tamiang*

Tamiang is one of the stitches that is often used during the *Kuningan* day. However, as time goes by, *tamiang* is now also used as part of decoration. *Tamiang* is made by assembling coconut leaves in one center until they are filled into one circle. *Tamiang* has characteristics similar to circles. One of the circular elements that is very visible in *tamiang* is the radius. The radius of the circle is the initial measurement that must be prepared in making the *tamiang*.

(4) *Lamak*

Image 4. Picture of *Lamak*

Lamak is a stitch that is often used by the Hindu community in Bali specifically for certain sacred events, especially the *piodalan* ceremony. Lamak is a type of stitching made by sewing several pieces of *ambu* (young, yellowish-white palm leaves) with *semat* (sticks made of

bamboo), then filled with various decorative motifs and decorated with edges in the form of *ron* leaves (dark green palm leaves). The stitches form a rectangular shape. One of the flat construction materials used from lamak stitching is identifying *lamak* elements that correspond to rectangular elements.

CONCLUSION

The local wisdom of the Balinese people, especially stitching, can be used as a mathematics learning medium that is able to visualize geometric shapes in the daily lives of the Balinese people. Therefore, the local wisdom of the Balinese people needs to be preserved and developed on a massive scale so that the noble traditions do not become extinct and last throughout human civilization. Fakti shows that local Balinese wisdom can be used to learn geometry which is the backbone of technological development in the future.

The geometric shapes found in Balinese sewing are as follows.

Table 2. Conclusion of the Study of *Jejahitan*

No	Element of *Jejahitan*	Related Materials
1	*Ceniga*	Trapezium
2	*Ceper*	Square
3	*Tamiang*	Circle
4	*Lamak*	Rectangle

From the elements of this *jejahitan*, we can study the elements, perimeter, area, fold symmetry and rotational symmetry of trapeziums, squares, circles and rectangles.

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