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ENCULTURATION OF TRADITIONAL MADURA FOOD: FROM TAJIN SOBIH SELLERS TO SPATIAL ACTIVITY IDEAS IN MATHEMATICS

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Abstract

The purpose of this study is to explore the ideas of spatial skills activities in mathematics from tajin sobih culture. Spatial skills are one of the important skills used to help solve problems in the real world. Exploring spatial ideas in tajin sobih culture can be useful in learning geometry and mathematics. This research uses qualitative research methods with the researcher as a participant. The collection techniques in this study were obtained through observation and in-depth literature review. The data analysis technique used includes four main processes, including data collection through literature and documentation, data reduction, data presentation in the form of narrative text, and conclusion drawing. This research produced spatial skills activity ideas and mathematical ideas, especially in the field of geometry of flat and spatial shapes from the tajin sobih culture through the making process to the presentation process. Other mathematical ideas are number and measurement. Based on the results of the research, it was found that the shape of the tajin sobih container is hemispherical, the wooden ladle has a length that can be measured using standard units such as cm, tampah or woven basket is circular, and so on.

Keywords: spatial skills; culture; tajin sobih; maths; geometry

1. Introduction

Spatial skills have an important role in various fields, especially in the field of education, including (1) being able to improve school readiness (Verdine et al. 2017); (2) helping someone to predict math achievement, where someone with good spatial skills will have good achievement in math (Gilligan et al. 2019; Rittle-Johnson, Zippert, and Boice 2019); (3) helping someone in solving geometry problems (Wardhani et al. 2023). In addition, in everyday life spatial skills also help a person in solving navigation problems, such as reading maps or google maps (Atit et al. 2020). In the field of work spatial skills are used to complete STEM field work (Yang et al. 2020; Gagnier and Fisher, 2020). From this importance, it can be concluded that through spatial skills, a person has the potential to be successful (Atit et al. 2020) because spatial skills allow a person to encode, imagine, manipulate, represent spatial relationships (Newcombe and Shipley, 2015; Uttal et al. 2013).

The term spatial ability is often interpreted as the same as the term spatial skills. However, (Wai, Lubinski, and Benbow 2009) and (Uttal et al. 2013) have different views on the two terms. Ability is used to distinguish students in education (Wai et al. 2009). This means that ability is stable over time. Meanwhile, spatial skills indicate opportunities for growth and change (Uttal et al. 2013). This is supported by the definition of spatial skills according to several experts, among others: (1) spatial skills are the skills to understand and interpret the relationship between objects in space (Marmor, 1975); (2) spatial skills are the ability to understand and organize space and objects mentally (Piaget, 1954); (3) spatial skills are the ability to process visual-spatial information, including understanding the size, shape, and position of objects (Newcombe and Frick 2010). (Harris, 2021) to explain spatial terminology, developed a conceptual model as shown in Figure 1.

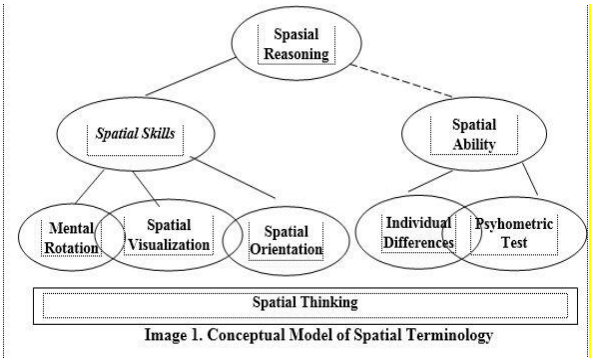


Figure 1. Conceptual Model of Spatial Terminology (Harris, 2021)

Spatial skills include aspects of spatial visualization, spatial orientation, and spatial rotation. According to Lohman (1996), the components of spatial skills consist of: (1) visualization in the form of mentally imagining objects; (2) orientation in the form of understanding the position and direction of objects. The components of spatial skills according to Putri & Imanah (2018) consist of (1) spatial visualization is the ability that requires someone to manipulate information spatially; (2) spatial orientation is a skill that requires someone to determine spatial relationships with known information (Putri and Imanah 2018). Spatial visualization includes imagining activities, using aids, and hand movements (Wardhani et al. 2023). Imagining activities are carried out by someone when describing the position of an object without seeing the physical object. For example, someone determines the back side of a cube whose front side is known. Assisted activity is done when someone uses props to explain objects. For example, a person takes paper, draws a beam net according to the pattern, cuts according to the pattern, marks the side as the lid, folds the net to form a beam, finds the side as the base, marks the base, reopens, becomes a net, and finally answers the test question by giving the appropriate mark.

Hand gesture activities are performed when a person uses the help of hand movements to indicate certain parts of the object. This movement is one way to learn math (Weber et al. 2007). Meanwhile, spatial orientation includes egocentric activities and activities according to viewpoint. Egocentric activity is used when a person does not change their point of view of the object. For example, students describe the shape as a result of imagining a cube viewed from the top perpendicularly. Students with egocentric skills assume that the top side is parallelogram-shaped. This skill tends to appear in students with low spatial ability (Riggs, K. J., Simpson, A. 2011). Viewing activities, used by students in imagining objects according to the requested viewpoint. This skill tends to be possessed by students with good spatial skills (Wang and Carr, 2014) (Wai et al. 2009). So that students can communicate objects to others well (Cheng, Y.L., & Mix 2014).

Culture and spatiality are interrelated. Spatial activities can grow from social interactions with the real world (Arts and Malec, 2018). This is supported by (Harris, et al., 2022) that learners who come from areas with strong cultures, have meaningful experiences so that they can make meaningful connections, while students with less strong cultures in their environment, will have

difficulty implementing spatial strategies without experience. (Tian, Yang, and Dong, 2022) showed that people with different cultural backgrounds show differences in spatial memory, spatial orientation, and other spatial cognitive strategies.

One of the traditional Madurese foods that has been cultivated is tajin sobih. Tajin sobih is a traditional Madurese food originating from Sobih Village, Bangkalan Regency, Madura Island. "Tajin" means "porridge" in Madurese, and "sobih" is the name of the village that gave birth to the origin of the tajin sobih food. The name tajin is a form of respect for the use of the local Madurese language, and the name sobih is a respect for the name of the village that gave birth to it. So tajin sobih is a Madurese culture in the form of food that is a form of respect from the Madurese language. Tajin sobih sellers, who are identical to market hawkers, combine tajin (porridge) sobih with coconut milk and brown sugar. Tajin sobih is very relevant to spatial skills as can be seen from the furniture used to serve tajin sobih such as “pincuk”. The activity of weaving banana leaves into “suru” and “pincuk” requires spatial activity, transforming flat objects into spatial objects. In changing flat objects into spatial objects, spatial skills components are needed in the form of visualization using hand movements to change banana leaves into “pincuk”. Other pieces of furniture such as kendil, ladle and tampah represent spatial objects in life. The tajin sobih furniture can be seen in Figure 2. The exploration of spatial ideas from tajin sobih sellers is an interesting study for further research.

Figure 2. *Suru*, *pincuk*, tajin sobih set.

The purpose of this study is to explore tajin sobih sellers' enculturation of spatial skill activity ideas that can be linked to geometry learning in mathematics. Specifically, this study aims to identify and analyze the spatial skills that emerge in the cultural activities of tajin sobih in Madura and the ideas of mathematical concepts can be integrated in mathematics learning, especially in understanding geometry (flat and spatial shapes). Meanwhile, no previous research has focused on this culture.

2. Method

This research uses qualitative research methods with researchers as participants. (Bogdan dan Biklen 1982) say that qualitative research is a research procedure with descriptive data in the form of written or spoken words from several people and observed behavior. In qualitative research, the researcher is referred to as an instrument which means that the researcher is a data collection tool. Humans are the right instrument to understand the relationship between facts in the field compared to other instruments (Abdussamad 2021). Therefore, the collection techniques in this study were obtained through observation and in-depth literature review. Observations were conducted in Burneh Village, Burneh District, Bangkalan Regency, Madura, which is the main location for selling tajin sobih. Observations lasted for one month, from August 1 to September 3, 2024, with a total of 15 observation sessions, each lasting 1–2 hours. This observation aims to explore spatial skills in the activities of tajin sobih sellers, such as making tajin sobih, making pincuk and kendil containers, to the process of serving tajin sobih. As a participant, the researcher also participated in several activities such as helping to make tajin sobih food to gain a deeper understanding of the spatial skills that are applied intuitively by the seller. Spatial Skills indicators can be seen in Table 1.

Table 1. Indicators of Spatial Skills Components

No.	Spatial Skills Component	Indicators
1.	**Spatial Visualization**	
	Imagine	Can describe the position of the object without seeing the physical object
	Using Help	Can use props to explain objects
	Hand Movement	Can use hand gestures to indicate certain parts of the object
2.	**Orientasi Spasial**	
	Egocentric	Does not change its point of view on the object
	As per Viewpoint	Can imagine the object according to the requested point of view

Source: (Wardhani et al. 2023)

The literature review conducted in this study was to gain a theoretical understanding related to

the enculturation of tajin sobih culture, spatial skills in mathematics, and geometric concepts in daily activities. This literature review is used as a basis for analyzing the results of observations and linking them to the concept of spatial skills with mathematical ideas in relevant geometry.

The subjects of this study consisted of five tajin sobih sellers who were actively selling at the research location. The data analysis technique in this study followed four main stages (Creswell & Creswell 2017; Fraenkel, Wallen, & Hyun 2012):

a. Data collection: data was obtained through direct observation and literature review.
b. Data reduction: the collected data was selected and grouped based on the main themes related to spatial skills.
c. Data presentation: data was arranged in the form of narrative text to describe spatial skills in the activities of tajin sobih sellers.
d. Conclusion drawing: conclusions were made based on the data analysis that had been carried out, by connecting it to relevant theories.

3. Results and Discussion

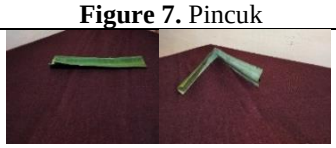
3.1 Results

Culture in Indonesia is very diverse, one of which is traditional food. Traditional food is food that is passed down from generation to generation and is characteristic of a particular region. Traditional food has the characteristics of (Koniherwati and Harjani 2019): (1) the ingredients used to make it tend to be local ingredients, (2) the manufacturing process is simple, (3) the tools used in the making process tend to come from clay, and (4) the way of serving is simple and uses environmentally friendly containers. Tajin Sobih is a form of culture in the form of traditional food originating from Sobih village, Socah sub-district, Bangkalan district, Madura, East Java. Tajin in Madurese means porridge, while sobih is the name of a village in Bangkalan district. Most of the tajin sobih sellers come from Sobih village. This food is usually enjoyed in the morning. Tajin sobih is made from sticky rice flour, rice flour, brown sugar, coconut milk, and pearls. The texture of tajin sobih looks like marrow porridge. The interesting thing about this food is the combination of pearl porridge, marrow porridge, chocolate cenil, and thick legit spices.

In tajin sobih food, there can be a process of cultural enculturation which can then be associated with several disciplines, one of which is the field of mathematics in the idea of spatial activity. These ideas can be seen in Table 2, as follows.

Table 2. Results of Spatial Ideas and Mathematical Ideas

No	Documentation	Spatial Idea	Math Ideas
1.	 **Figure 3.** Coconut (Coconut Milk) and Brown Sugar	Before making tajin sobih, several ingredients need to be prepared, including coconut for coconut milk and brown sugar. The activity of preparing the ingredients above is a visualization using the help of real objects.	The mathematical concepts found are: a. Volume of the ball b. Volume of ½ ball c. Surface area of a ball d. Surface area of ½ ball
2.	 **Figure 4.** Flour Measuring Activity and Cans	Measuring flour using a can. Spatial ideas in the above activities include visualization or imagining using props in the form of cans.	The mathematical concepts found are: a. Volume of the tube b. The surface area of the tube

No	Documentation	Spatial Idea	Math Ideas
3.	 **Figure 5.** Coconut Cutting Activity	When viewed from a two-dimensional perspective the coconut is circular in shape with visualization using aids. Splitting or cutting a coconut into two or four pieces to grate and extract the coconut milk. The above activity includes visualization using real objects and hand movements when cutting coconut milk.	The mathematical concepts found are: a. Diameter and radius of a circle b. Circumference of a circle c. Area of a circle d. Fractions
4.	 **Figure 6.** Banana Leaf Sheet	The tajin container made from a rectangular banana leaf is a visualization of hand movements and uses help.	The mathematical concepts found are: a. The perimeter of a rectangle b. Area of a rectangle
5.	 **Figure 7.** Pincuk	Making pincuk from banana leaves is a spatial activity with visualization using hand movements.	The mathematical concepts found are: a. Volume of cone b. Surface Area of a cone
6.	 **Figure 8.** The Process of Making Suru and The Finished Suru	Making a spoon or suru from rectangular banana leaves folded to the same size is a visualization spatial activity using hand movements.	The mathematical concepts found are: a. Characteristics of rectangular flat shapes (fold symmetry axis) b. The perimeter of a rectangle c. Area of a rectangle
7.	 **Figure 9.** Jug Surface and Picture of Jug Lid	The surface of the jug and the lid of the jug are circular, including visualization spatial activities using real objects in the form of jugs.	The mathematical concepts found are: a. Circumference of a circle b. Area of a circle
8.	 **Figure 10.** Kendil and Jug With Upside Down Position	Kendil has a space to fill tajin is a visualization spatial activity using props.	The mathematical concepts found are: a. Volume of ½ ball b. Surface area of ½ ball
9.	 **Figure 11.** Tampah or Woven Basket and Putting the Jug on the Tampah	Putting all the tajin jugs in the woven basket in the shape of a circle is included in the visualization spatial activity using hand movements and orientation according to the point of view.	The math concepts found are: a. Circumference of a circle b. Area of a circ

No	Documentation	Spatial Idea	Math Ideas
10.	 **Figure 12.** Brown Cenil	Oval-shaped chocolate cenil is included in the spatial activity of visualization using props.	The mathematical concepts found are: Characteristics of oval flat shapes
11.	 **Figure 13.** Pearl and Pearl Details	The spherical pearl Tajin is included in the visualization using the help of pearl objects.	The mathematical concepts found are: a. Volume of the ball b. Surface area of the ball
12.	 **Figure 14.** Balls of White Tajin Filling	Forming white tajin filling in the shape of balls is included in visualization using hand movements.	The mathematical concepts found are: a. Volume of the ball b. Surface area of the ball
13.	 **Figure 15**. Wooden Ladle	Using a wooden ladle as a ladle and a long tajin stirrer is included in the visualization using the help of a wooden stirrer.	The mathematical concepts found are: Measuring length (in cm)
14.	 **Figure 16.** Tajin Sobih Wrap and Details of Tajin Sobih Wrap	Wrapping tajin sobih to resemble a prism with a small sharp stick is included in the visualization spatial activity with hand movements and orientation according to the requested viewpoint.	The mathematical concepts found are: a. Volume of prism b. Prism surface area
15.	 **Figure 17.** Activity of Pouring Tajin Sobih Filling and One Portion of Tajin Sobih	Serving tajin sobih by pouring several wooden spoons of bubur sumsum and other fillings. The activity is a visualization with hand movements.	The mathematical concepts found are: Comparative value
16.	 **Figure 27.** The Activity of Placing a Roll of Cloth on the Head and The Activity of Placing a Tampah on a Roll of Cloth	he seller carries the tajin sobih by placing it on the head with the cloth rolled up into a tube. The spatial activity above is included in mental rotation.	The mathematical concepts found are: a. Volume of the tube b. The surface area of the tube c. Axis of symmetry of a circle

3.2 Discussion

Based on the results table above, the grouping of spatial skill activity ideas on activities, furniture, and tajin sobih food filling is obtained, namely:

a. Visualization using the help of real objects or props shown in the following spatial activities:
   1) Activity of preparing grated coconut and brown sugar
      With the help of props in the form of coconut and brown sugar, someone can explain the shape and size of spatial objects.
   2) Activity of measuring flour using cans
      Through the activity of measuring flour using a can full of spatial objects, one can explain the shape and size of the can.
   3) The shape of jug furniture and jug lid
      Through jug furniture and jug lids, one can explain spatial objects related to shape and size.
   4) Oval-shaped chocolate cenil
      Through the props of cenil that is oval and full of spatial objects, the spatial shape becomes oval as a representation in a flat shape, someone can explain the shape and size of the object.
   5) Ball-shaped pearl stuffing
      Through the pearls that are in the form of balls as spatial objects, someone can explain the size and shape of pearls.
   6) Wooden ladle props as spoons and stirrers for sobih rice
      Through the wooden ladle prop, one can explain the shape and size of the wooden ladle used when stirring sobih rice.

b. Visualization using hand movements is shown in the following spatial activities:
   1) The activity of shaping the white rice flour filling into a ball
      Through hand movements when forming rice flour filling into a ball, one can visualize its shape and size when it was originally dough and then formed into a ball.
   2) Activities of making banana leaf pincukes and making spoons or suru
      Through hand movements when making pincuk from a flat object of banana leaves into pincuk as a spatial object, one can explain its shape and size before and after becoming pincuk or suru.
   3) The activity of serving sobih rice flour by pouring several wooden ladles filled with sobih rice flour
      Through hand movements when serving sobih rice flour one can understand and explain the shape and size of the pincuk after pouring several sobih rice flour using a wooden ladle.

c. Visualization using the help and hand movements is shown in the following spatial activities:
   1) Activity of preparing a banana leaf as a container for tajin sobih
      Through visualization using the help of banana leaf props and visualization using hand movements when cutting banana leaves into sheets, someone can understand and explain the shape and size of the spatial object.
   2) Activity of cutting grated coconut
      Through props in the form of coconuts and hand movements when cutting coconuts into several parts, someone can visualize by explaining the shape and size of coconuts before and after they are cut.

d. Visualization using hand movements and orientation according to the point of view is shown in the following spatial activities:
   1) The activity of placing all the jugs on a tampah
      Through hand movements when placing the jugs on the circular tampah object, a person can understand the shape and size of the two objects. Placing the jugs on the tampah shows orientation according to the point of view because a person can determine the position of the jugs on the tampah.
   2) The activity of wrapping tajin sobih to resemble a triangular prism using banana leaves
      Visualization using hand movements when wrapping tajin sobih to resemble a prism so that a person can understand the size and shape requested (prism), and shows orientation according to the point of view, namely a person can explain the shape (prism) and size based on its position.

The idea of spatial skill activities in tajin sobih above contains mathematical elements, among others: (1) flat shapes consisting of rectangles, circles, and ovals; (2) spatial shapes consisting of spheres, tubes, and cones; (3) measurement consisting of measuring length in centimeters; (4) numbers consisting of fractions and proportional values.

4. Conclusion

Based on the results and discussion above, it can be concluded that in tajin sobih food, there are findings of spatial skill activity ideas, namely visualization using props, visualization using hand movements, orientation by viewpoint, and mental rotation. In some activities there are also two spatial skill activity ideas, namely visualization using props and hand movements and visualization of hand movements and orientation according to point of view. In tajin sobih food, there are mathematical ideas, namely flat shapes, spatial shapes, measurement (length measurement in standard units), and numbers (fractions and comparisons). So that through the idea of spatial skills activities from tajin sobih culture can be integrated in learning mathematics.

In this study, there is a weakness that only focuses on the main filling of tajin sobih. So it is hoped that further research can explore more spatial activity ideas about additional fillings in tajin sobih food that have developed today such as red porridge and additional pieces of jackfruit.

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