

Research Article

Ethnomathematics exploration of Jember Fashion Carnaval (JFC) costume design

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ABSTRACT

Knowledge and views of certain tribes, community groups, or individuals without going through formal education. Mathematics with cultural nuances (*ethnomathematics*) will make a huge contribution to mathematics learning. The aim of this research is to describe the mathematical concepts contained in JFC costume designs. In this research, researchers used qualitative research with an ethnographic approach. The instrument in this research is a human instrument; the researcher is directly related to the research and acts as a data collector through library data collection, interviews, observation, and documentation. Data analysis techniques are carried out by reducing data, presenting data, and drawing conclusions. The results of this research show that ethnomathematics in Jember Fashion Carnaval (JFC) fashion design can be in the form of the concept of symmetry and flat shapes such as triangles, squares, rhombuses, and circles. This can be seen in several costumes worn at JFC. The ethnomathematics in JFC costumes can certainly provide inspiration for educators to develop interesting learning by applying ethnomathematics. Educators can use JFC costume design patterns as material for teaching students mathematical concepts.

Keywords: Costume Design; Ethnomathematics; Jember Fashion Carnival

1. INTRODUCTION

Culture and education are two factors that are interrelated and play an important role in shaping the character of a society, where culture includes values, norms, beliefs, and practices in life. According to Niss in Hardi (2017: 4), one of the main reasons for giving mathematics to students at school is to give each individual knowledge that can help them to overcome various things in life, such as education or work, personal life, social life, and as citizens. . Culture is a concept that arouses interest and is related to the way humans live, learn to think, feel, believe, and behave (Sumarto, 2019). Education also functions as a means of transmitting and updating knowledge, skills, and values necessary for social life. Culture is part of education, and the two have a reciprocal influence on each other. If culture changes, education can also change, and likewise, if education changes, culture can change (Myta Widyastuti, 2021). Culture is often the basis of the education system because values such as respect for others, honesty, and responsibility can be reflected in teaching methods and interactions in the educational environment. Additionally, local customs and traditions can be an integral part of the curriculum to preserve cultural identity.

Culture has a definition as a collection of the integrity of beliefs, knowledge, morals, legal arts, customs, and all abilities and habits acquired as part of society (Horton & Chester, in Prayogi and Danial, 2016). One of the districts in the eastern part of the Horseshoe region that has cultural elements is Jember Regency, which has distinctive cultural characteristics. The culture that developed in Jember is often called Pandhalungan culture. The culture of society itself is described through a form of culture that consists of three forms. The first is in the form of ideas, notions, values, and norms. Second, namely, human activities as part of society. The third is in the form of goods or objects produced as a form of human work (Koentjaraningrat, 2019). The third form of culture tends to be more observable because it is in the form of objects created from all human activities as part of society. Jember culture is a form of regional culture that is influenced by the daily life patterns of the Jember people.

Based on empirical conditions, it can be seen that the people of Jember have a distinctive cultural pattern where the culture that developed in the Jember region is like a large pot that accommodates a collection of surrounding cultures. The local culture that is developed, based on global local theory, is a friction of globalization (Aryni Ayu Widiyawati, 2019). The Jember Regency Government is also trying to introduce this cultural pattern to the younger generation of Jember and

people outside Jember, for example, through the famous Fashion Festival at the end of the world. Learning basically also has a central role in instilling cultural values. However, there is an incorrect paradigm when it appears that the cultivation of cultural values can only be done through learning the social sciences. Basically, instilling cultural values can be done in every type of learning, including exact learning such as mathematics.

Mathematics is a field of science that comes with the concept of calculation and is often used as an intelligence and placement test. This makes mathematics related to solving problems. Mathematics is a form of learning whose material is abstract (Murdiani, 2018). According to Johnson and Myklebust, as quoted by Abdurrahman (2012: 202), mathematics is a symbolic language whose practical function is to express quantitative and spatial relationships, while its theoretical function is to facilitate thinking. Mathematics emphasizes activities in the world of reason (reasoning) rather than emphasizing the results of experiments or observations. Mathematics is formed by human thoughts, which are related to ideas, processes, and reasoning (Russeffendi, 1988: 148). There are several inaccurate perceptions regarding the field of mathematics, including: high intelligence is needed in mathematics; mathematics is the science of arithmetic; the brain is the main capital in understanding mathematics; correct answers are important in doing mathematics; absolutes are the nature of truth in mathematics; and in real life, mathematics has no use. Mathematics learning is also considered too dry, not contextual, and up in the air (Agasi and Wahyuno, 2016). Even though mathematics is the result of the development of human civilization, which always creates culture, As a cultural product, mathematics basically has a part that can be utilized to instill cultural values itself. The consequence of this understanding is that mathematics learning taught in an educational environment must be able to provide mathematical content that is based on culture, especially local culture, and the opposite applies, namely that cultural practices must also be able to instill mathematical concepts. Ethnomathematics is an effort that can be made to bridge abstract mathematical concepts (Brandt & Chernoff, 2015). Ethnomathematics is how a culture understands and uses mathematics in everyday life. Including interesting, informative cultural issues as well as mathematically rich information.

The inculcation of mathematical concepts, which is very likely to occur in cultural practices and mathematical activities developed by each person as part of a community group, is often referred to as ethnomathematics (Fajriyah, 2018). The use of mathematics and mathematical thinking patterns in the context of everyday life is the goal of learning mathematics. This shows that ethnomathematics is an overall and dynamic depiction of the application of mathematics in relation to cultural influences (Supiyati *et al.*, 2019). The presence of mathematics with cultural nuances (ethnomathematics) will make a huge contribution to mathematics learning because formal education is a social institution that is different from others, making it possible for intercultural socialization to occur. It is also said that all formal mathematics education is a process of cultural interaction, and every student experiences various cultural conflicts in this process. Without realizing it, in their daily lives, they use mathematical concepts. Agreeing with this, Hardianti (2017) believes that culture is a complete, comprehensive, and applicable unity in the lives of a group of people, while mathematics is knowledge that humans use to solve everyday problems. Mathematical ideas that emerge naturally, through knowledge and culture, as well as the views of certain community groups, have an impact on the culture of an area. This is also the material for mathematical content in Jember culture, namely the Jember Fashion Carnival.

The Jember Fashion Carnival (JFC) is one of the most anticipated cultural events in Indonesia every year. Jember Fashion Carnival (JFC) is the largest carnival in Southeast Asia and is held in Jember City, East Java Province. With diverse and innovative themes, JFC is not just a fashion show but an impressive art exhibition that combines creativity, beauty, and culture. The show began with the contestants showing off their stunning costumes, creating a magical atmosphere that enchanted the thousands of spectators gathered on the city streets. The unique and creative costume designs reflect the diversity of Indonesian culture, creating a stunning visual mix from traditional to contemporary. Each costume has intricate details, from hair accessories and shoe accessories to clothing accessories that will be used by each contestant like a living and moving canvas. Apart from that, JFC also provides a stage for street performances, traditional dances, and various other artistic performances, adding variety and dynamism to the event. The music that follows every step of the participants echoes along the carnival track, creating an unforgettable festive atmosphere. The audience not only watches the performance but also participates in the collective enjoyment that occurs during the performance.

Jember Fashion Carnival participants come from various circles, from well-known designers to those who are experts in making costumes. This provides an opportunity for everyone to express their creativity and celebrate the diversity of Indonesian culture. JFC is also an event that promotes the local creative industry, giving designers and craftsmen the opportunity to showcase their work to a wider audience. One of the JFC design designers came from Arjasa Village, Jember Regency. This designer from Arjasa always takes part in the Jember Fashion Carnival every year. Dozens of costumes will be displayed at the Jember Fashion Carnival in 2023.

Through this research, it is hoped that knowledge about mathematics will not only stagnate in formal education but also in learning that places more emphasis on the social aspects of society, and the government needs to include ethnomathematics in mathematics education. By including ethnomathematics in mathematics education, it will provide a new nuance in mathematics learning, considering that the Indonesian nation consists of various ethnicities and cultures. Based on the background above, researchers are interested in studying more deeply the concept of ethnomathematics in Jember Fashion Carnival costume design

2. RESEARCH METHOD

In this research, researchers used qualitative research with an ethnographic approach. Ethnography is used to describe, explain, and analyze the cultural elements of a society or ethnic group. In determining informants, researchers pay attention to the conditions that must be met to become an informant so that an informant is obtained who is able to work well together. Fulfilling the criteria or requirements for informants in this research is very important because not everyone at the research location can be designated as an informant. As qualitative research with an ethnographic approach, this research instrument is a human instrument, namely the researcher, who acts as the main instrument that cannot be replaced or represented by other people. In this case, the researcher is directly related to the research and acts as a data collector through library data collection, interviews, observation, and documentation. The data analysis technique is carried out using the following steps: Data reduction is a step to convert recorded or image data into written form and select data that is needed and what is not needed. Presenting the data includes compiling and organizing data from the information that has been collected so that it can be organized well and meaningfully. At this stage, the researcher presents data, which is the result of data reduction. After the data is presented based on the results of the data reduction, the next step is the process of interpreting the data through data analysis. Finally, all the results of the data analysis will be presented, which are a representation of the answer results.

3. RESULTS AND DISCUSSION

3.1 Ethnomathematics

D'Ambrosio (2001) explains that the aim of ethnomathematics is to recognize that there are different ways of doing mathematics by taking into account the academic mathematical knowledge developed by different sectors of society as well as the different modes in which different cultures negotiate their mathematical practices (grouping, counting, measuring, designing buildings or tools, playing, and others). Ethnomathematics are various results of mathematical activities that are owned or developed in society, including mathematical concepts such as cultural heritage in the form of temples and inscriptions, traditional pottery and equipment, local units, batik cloth and embroidery motifs, traditional games, and community settlement patterns. According to Ethnomathematics, explained by D'Ambrosio (2001), it can be said that there are mathematical concepts that are practiced in everyday life. Among them is the geometric concept that appears in batik cultural arts and traditional games. So ethnomathematics in this research is the activity of a society that contains mathematical concepts and uses them in its own cultural life. Another study on ethnomathematics is the exploration and analysis of geometric concepts in wall decorations in Lesotho and other areas around South Africa (Gerdes, 1999). Women often decorate their walls with symmetrical decorations. The result of this work is called *Litema*. These decorations, called *lithemas*, form shapes that are mutually symmetrical. Thus, as a result of cultural history, mathematics can take different forms and develop according to the development of the society that uses it. Broad mathematical concepts relate to various activities in people's lives, including grouping activities, counting, measuring, designing buildings or tools, playing, determining locations, forming settlement patterns, and so on.

3.2 History of the Jember Fashion Carnival (JFC)

JFC (Jember Fashion Carnival) is a form of modern visual carnival (parade or procession) performing the arts (Proborini, 2017). In the context of traditional arts, parades or processions are usually carried out by displaying relics, certain figures, or prominent figures. In addition, JFC displays the beauty of creativity in fashion make-up design and supports various elements and fields of art such as dance, theater, music, and visual arts as genres of contemporary performing arts that are expressed theatrically. As a performing arts product, JFC has various supporting elements for performances, including themes and narratives, characters, dance movements, and music in the form of a marching band. All these elements are combined into a unique style and a very unique form of performance, which has become JFC's identity.

According to the Ministry of Education and Culture, JFC began as a fashion house founded by Dinan Fariz in 1998. A fashion house called Dynand Fariz International Haute Couture Center was founded as a form of recognition and appreciation for Dynand's contribution to the world of fashion. In 2001, Dinan held a fashion week to promote his fashion house. Dinan asked the fashion house staff to dress him in internationally popular clothes. These clothes must be worn at work during the week. The following year, Fashion Week took place differently. There was a parade of employees wearing unique and creative recycled clothing. The parade takes place around the fashion house. It seems that people are starting to show interest in the parade and view it positively. This shows that the response from the people of Jember is very good and JFC has also inspired the fashion industry in Jember (Angin & Balafif, 2017). Dinan Fariz H. Tirto's father's Jember Fashion Carnival began with a large family meeting in Soetovo (PKB).

The annual agenda of the Dynand Fariz fashion house includes Dynand Fariz Fashion Week, which is held from July to August, where all employees dress up according to themes that are currently becoming global fashion trends. This issue cannot be separated from the fact that Dinan Fariz is a teacher at ESMOD Jakarta Fashion School. At Dinant Paris Fashion Week in 2002, the idea was born to hold a parade in the area around the Dinant Paris fashion house, and the entire staff followed suit. During the parade, a good idea emerged to plan a platform to unleash the potential of the younger generation through educational and social service, namely the Jember Fashion Carnival. The first edition of JFC was officially held on January 1, 2003. Jember Fashion Carnival managed to achieve the title of third-largest carnival in the world after winning the Victoria International Carnival in the Seychelles. This spectacular show confirms JFC as a fashion event that not only displays the richness of Indonesian culture but also promotes the potential and talent of designers and participants from all over the world. Starting as a family activity, the Jember Fashion Carnival has developed into a fashion festival that has shocked the world of fashion and art.

3.3 The Noble Value of the Jember Fashion Carnival

The concept of nation cannot be separated from culture, which is based on cultural values that contain the essence of human personality, which is different from other humans. Through symbols, humans naturally express their thoughts, ideas, and concepts, which are realized in various forms of objects, especially tangible values. These values are a form of personality and can be applied through a person's behavior, attitude, creativity, etc. Therefore, identity formation requires an effective and active environment that recognizes society's moral values. Amber Fashion Carnival (JFC) is an example of a new type of carnival. JFC was chosen as a means to build national understanding based on national culture. Jember, whose people have a *pandalungan* community, has created a fashion carnival that is now used all over the world. The reason why this phenomenon is interesting is because Jember has no fashion history and is known as a Muslim student town. Led by Dinan Fariz, JFC has proven its existence for 18 years and succeeded in turning Jember into a world-class carnival city. In terms of increasing training, this is reflected in the training given before the JFC match. During the training period, participants receive in-house training for approximately six months. Here, in-house training enhances participants' creativity, allowing them to develop the skills they have learned. In the BBJ agenda at the 2009 East Java MTQ event, JFC also participated in displaying clothing on billboards with Islamic nuances, so that the religious elements of Jember students were still carried out well. With a clear vision and mission, the JFC Events event program is carefully organized every year. The opening ceremony of the first day was held with a children's carnival and carnival performances, which were attended by kindergarten and elementary school students. This shows that JFC is ready to encourage its participants again in the future. Global awareness is expressed through themes without realizing JFC's vision as a global citizen. Subjects that have a global message, including an awareness of how to see the world, are at the core of citizenship education. Therefore, students need understanding and strategies to bridge formal and informal education to build national understanding (Huang & Chen 2013).

3.4 Mathematical Concept

Concepts are abstract ideas that can be used to classify a group of objects (Skemp, 1987). NCTM (Bartell, Webel, Bowen, & Dyson, 2013:58) states that understanding concepts is the basic goal of learning mathematics. Concepts are formed from a number of experiences that have general similarities. When the first concepts are formed, they can be said to be examples of concepts. So, the more experience you gain, the more concepts you have. Concepts are abstract ideas that can be assimilated and accommodated with knowledge so that they can group and name a group of objects. Thus, to form a concept requires a number of experiences that have something in common. Understanding concepts is an ability related to understanding comprehensive and functional mathematical ideas (Gilang, F. A., et al.). The use of names in connecting an object is related to the classification process, namely to recognize an object as belonging to an existing class. Naming plays

a role in the formation of new concepts. If the same name arises from different experiences, it will have the effect of grouping those experiences in the mind and abstracting their intrinsic similarity, thereby separating them into separate groups. Thus, the relationship between a concept and its name can be established after the concept is formed or in the process of its formation. Mathematical concepts are needed to improve mastery of knowledge that can be used in solving problems (Kusumaningsih, Saputra, & Aini, 2019).

Ethnomathematics in Jember Fashion Carnaval (JFC) costume designs, as well as the benefits of ethnomathematics in Jember Fashion Carnaval (JFC) costume designs for learning mathematics. Mathematical concepts that are linked to culture are expected to make it easier for students to understand mathematical material because this learning connects with real examples in everyday life. The following is an example of a JFC costume design used in the Jember Fashion Carnaval (JFC):



Figure 1

Observing the example of the JFC costume design in **Figure 1**, several mathematical concepts can be found. These mathematical concepts include the concept of symmetry, geometric concepts, which include the concept of flat shapes, and the concept of sets. The mathematical concepts that can be observed from the JFC costume design are explained in detail as follows:



Figure 2

JFC suit in **Figure 2**. Original Symmetry has a unique and innovative symmetrical design, creating an extraordinary visual experience. With clever color combinations and thoughtful details, this suit displays impressive visual harmony and balance. Each element of the costume is precisely designed to create an incredible sense of symmetry, giving the overall effect an aesthetic and elegant feel. The combination of high-quality materials and creative details in each piece makes JFC Simetri's original costumes a striking and attractive choice in the world of fashion and performing arts.

a. Symmetry Concept in JFC Costumes

In this section, the mathematical concept referred to is fold symmetry. Image of the JFC costume design outlined in the form of a sketch for the design. One alternative that can be applied by educators in teaching students about the concept of folded symmetry is by applying the ethnomathematics contained in the JFC costume design. The learning alternative is described as follows: In preparation for learning, students are expected to prepare several sheets of paper, scissors, and pencils. In the lesson, students are first instructed to fold the paper into two equal parts. Second, students are given the

opportunity to create a JFC costume design (a simple design) on one of the folds. Then students are instructed to make another fold of paper. Students are instructed to form certain geometric shapes on one side of the folded paper. Then, students are given information about the shapes they obtained, saying that the shapes they produced from the previous activity are shapes that have lines of symmetry. And students are given the opportunity to draw conclusions.



Figure 3

The JFC 2023 suit in **Figure 3** is designed to utilize the symmetry of the pleats to maintain a balance between aesthetics and functionality. Every detail of this suit reflects the beauty of its symmetrical design, from the cut of the fabric to the decorative elements. Pleated symmetry gives a sense of harmony and proportion to the suit, creating a harmonious and attractive appearance. The innovative combination of pleated symmetry and signature JFC elements creates a suit that not only embodies a unique style but also guarantees maximum comfort and performance when worn, making it an ideal choice for fashion fans who value fit and quality.

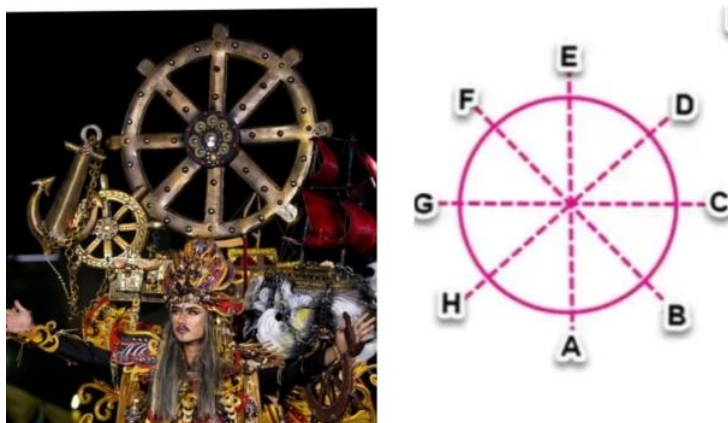


Figure 4

In **Figure 4**, it refers to line symmetry and rotational symmetry. Meanwhile, rotational symmetry is said to be the number of rotations that can be made on a flat shape where the results of the rotation will form the same pattern as before the rotation but not return to the initial position. In this context, each point on the circle can be considered a center of rotation, so if you rotate a particular element or model through 360 degrees, it will return to the same position as before. This creates a sense of harmony and visual balance in a circle where the same shape or structure is found in different positions when rotated. This concept of rotational symmetry is often used in art, design, and mathematics to achieve a unified aesthetic.

b. Flat-Build Concept in JFC Costumes

Furthermore, the concept used in making the costume design is the concept of flat shapes. So first, you can calculate the area of one shape to use as a benchmark for making the next shape. One alternative that can be applied by educators in teaching students about the concepts of area and perimeter is by applying the ethnomathematics contained in the JFC costume design. The learning alternative is described as follows: As preparation for learning, students are instructed to prepare a JFC costume design (which is simple and, of course, contains geometric shapes), paper, and pencils. First, instruct students to draw the JFC costume design that was previously selected on blank paper on a geometric figure.

Second, instruct students to determine the length of the side, radius, width, height, etc. The three students are guided to find the *lus* and perimeter of the shapes they have obtained. Fourth, give students the opportunity to draw conclusions from the activities carried out.

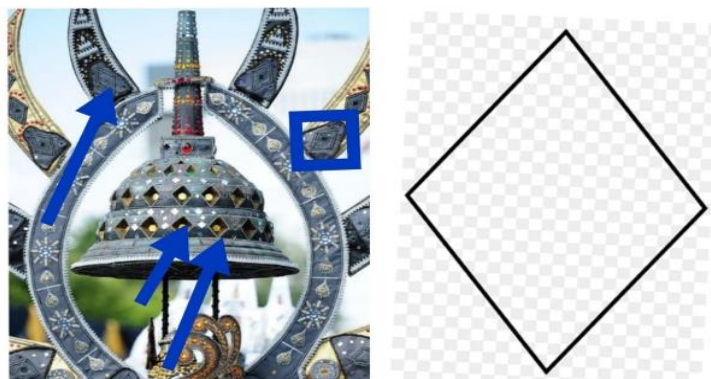


Figure 5

The original JFC suit in Figure 5. has a unique design that combines modern and traditional elements. The motif that attracts attention is the diamond motif, which is inspired by the flat shape of a rhombus. JFC Original uses diamond patterns to provide an elegant aesthetic and express the harmony of traditional and modern beauty. This motif creates a symmetrical and impressive visual appearance, while reflecting the richness of culture in every detail of the clothing.

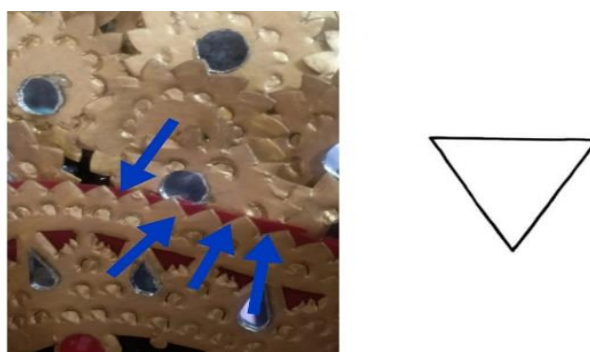


Figure 6

JFC Jember, or Jember Fashion Carnival in Figure 6, is a fashion carnival held in Jember. Each edition of JFC Jember features several clothing designs inspired by flat shapes and geometries such as triangles. Jember creative designers have incorporated original triangular elements into fashion designs to create unique and stunning looks. Each triangle featured in this work is not only a simple geometric shape but also represents the beauty that differentiates JFC Jember from other fashion carnivals and has become a symbol of artistic expression and innovation in the fashion world.

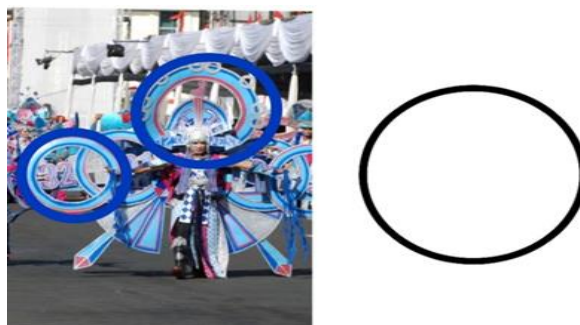


Figure 7

The flat build in Figure 7. of the original JFC suit was carefully crafted to create a sleek, aesthetic appearance. Circles have balanced and proportional proportions that reflect the beauty of harmonious geometry. Details such as corner curves, line thickness, and carefully selected colors focus on visual aesthetics. Thanks to the arrangement of these elements, the circles on an authentic JFC suit are not only geometric but also an artistic expression of beauty and uniqueness. By

understanding the ethnomathematics of JFC costumes, it can certainly provide inspiration to educators to develop interesting learning by applying this ethnomathematics. Educators can use JFC costume design patterns as material to teach students mathematical concepts such as rotational symmetry and folding symmetry, as well as flat shapes such as triangles, squares, rhombuses, and circles.

4. CONCLUSION

Based on the data analysis and discussion above, it can be concluded that the Jember people have a unique cultural pattern where the culture that developed in the Jember region is Ethnomathematics in Jember Fashion Carnival (JFC) fashion design can be in the form of the concept of symmetry and flat shapes such as triangles, squares, rhombuses, and circles. This can be seen in several costumes worn at JFC. The ethnomathematics in JFC costumes can certainly provide inspiration for educators to develop interesting learning by applying ethnomathematics. Educators can use JFC costume design patterns as material for teaching students' mathematical concepts, like a large pot that accommodates a collection of surrounding cultures. The Jember Regency Government is also trying to introduce these cultural patterns to the younger generation of Jember and people outside Jember.

ONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

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