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ETHNOMATHEMATICS: MATHEMATICHAL CONCEPTS IN THE GAPLE CARD GAME

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Abstrak

Tujuan penelitian ini adalah untuk mendeskripsikan unsur-unsur matematika yang terdapat pada permainan kartu gaple. Penelitian ini menggunakan jenis penelitian etnografi dengan pendekatan kualitatif. Fokus penelitian ini adalah alat, aturan dan proses permainan kartu gaple. Teknik pengumpulan data yang digunakan adalah observasi, wawancara, catatan lapangan, dan dokumentasi. Penelitian ini menggunakan analisis data triangulasi yang terdiri dari reduksi data, penyajian dan penarikan kesimpulan. Hasil dari penelitian ini ditemukan konsep matematika pada permainan kartu gaple yaitu himpunan, penjumlahan, peluang dan ketaksamaan.

Kata Kunci: Permainan kartu gaple, Himpunan, Penjumlahan, Peluang, Ketaksamaan

Abstract

The purpose of this research is to describe the mathematical elements contained in the gaple card game. This study uses ethnographic research with a qualitative approach. The focus of this research is the tools, rules and processes of the gaple card game. Data collection techniques used are observation, interviews, field notes, and documentation. This study uses triangulation data analysis which consists of data reduction, presentation and conclusion. The results of this study found mathematical concepts in the gaple card game, namely set, addition, opportunity and inequality.

Keywords: Gaple card game, Set, Addition, Opportunity, Inequality

Introduction

Traditional games are children's games made from simple materials that adapt cultural aspects in people's lives [1]. Traditional games are playing activities that are inherited from previous generations with the aim of creating excitement and having their own rules for playing them [2]. Traditional games can encourage various aspects of children's development, namely cognitive aspects, social aspects, motoric aspects, emotional aspects, language aspects, spiritual aspects, ecological aspects and moral values aspects [3].

Traditional games are one of the nation's cultural assets that must be preserved [4][5] by keeping traditional games alive if they develop for the better. This means that apart from keeping traditional games alive in the community, efforts are still made to keep traditional games evolving with the times. However, this is difficult to realize, because of globalization which causes changes in traditional values with the presence of modern products and games that affect the existence of traditional games in the world, including in Indonesia [4][6][7][8].

Indonesia is famous as a country that has various cultures, ethnicities and regional languages [9][10]. Indonesia also has a variety of traditional games [11], one of which is the gaple card game. Gaple cards are a traditional game usually played by 4 people. Playing karu gaple requires high concentration to remember. Just like other games, playing gaple cards is also oriented towards winning or losing. The player who loses will get an additional task, namely taking turns shuffling the cards and then distributing them to each player. These additional tasks cause the game to become fierce and take a long time to think because players don't want to lose. This condition makes the game difficult because each player will use more complex thinking skills before lowering their cards [12].

Based on the rules of the gaple card game, the researchers saw an element of mathematics, namely the concept of chance. Therefore the researcher wants to conduct further research to find other relationships between the gaple card game and Mathematics. An approach that can be used to explain the reality of the relationship between culture and mathematics education is ethnomathematics [13]. Ethnomatematics is the study of mathematics that arises as a result of human activities in an environment that is influenced by culture [14]. From this explanation, it can be concluded that ethnomathematics is a strategy that combines elements of culture with mathematics [15]. The existence of ethnomathematics can expand knowledge related to mathematics and can understand the mathematics contained in a culture. Therefore, the more research on ethnomathematics, the more culture will be integrated with mathematics.

Previous research that discussed ethnomathematics in the gaple card game, namely Alghadaril and Loka in 2018, showed that there are mathematical elements in the gaple card game, namely in the thinking process and probability theory. Then, based on the background and several studies that have been described, it can be concluded that the gaple card game contains mathematical elements. Therefore, this research aims to describe the mathematical elements contained in the gaple card game and complement studies from previous research.

Materials and Methods

In research using ethnographic research with a qualitative approach. The focus of this research is on game tools and processes, so this research describes the mathematical elements contained therein. Collecting data in this study using observation techniques, interviews, field notes and documentation. The subject of this research is the gaple card game. The resource person in the interview to get additional information was a UIN Malang student from Gresik who lives in Malang.

Data analysis used in this study is triangulation, namely data reduction, presentation and conclusion. Data reduction is a form of analysis that sharpens and removes unnecessary. In this study, the results of data collection which was carried out through interviews, observation, and documentation about the Malangan mask dance were reduced by selecting the information needed in this study. The results of data reduction show that the mathematical elements obtained in the gaple card game are elements of opportunity, sets and inequalities. Then after being reduced, next is the presentation of the data by explaining the mathematical elements presented in the sketch of the gaple card game card. After doing the reduction, it is concluded that there are mathematical elements in the gaple card game.

Results and Discussion

The description of the mathematical concepts identified in the gaple card game is divided into two, namely the tools or materials used in the game and the processes or activities carried out while playing.

Tools or materials used in the game

The tools used in the gaple card game are gaple cards. The gaple card consists of 28 cards where the card has two parts containing different numbers of circles. The card has circles 0 to 6 which can be seen in Figure 1.

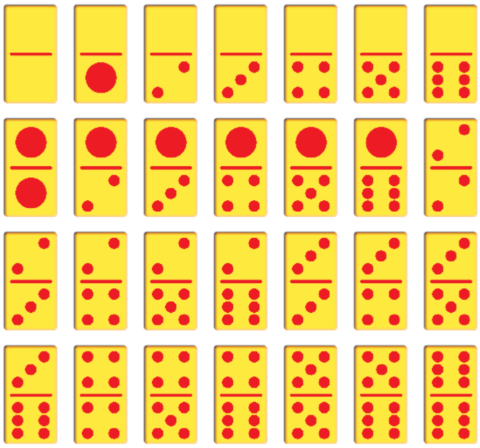
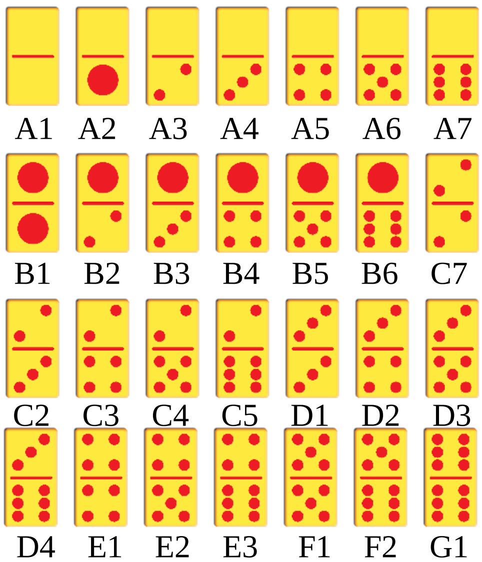


Figure 1. Gaple Card.

Mathematical Concepts Tools or materials used in the game

The mathematical concept contained in the gaple card is a set of fractional numbers where the top of the card we assume is the numerator and the bottom is the denominator, also the concept of addition where the cards on all sides add up to become whole numbers.



The first set is a card with a numerator of 0 and has 7 cards, namely figure A1, A2, A3, A4, A5, A6, A7, These sets can be symbolized by letters A, so A = $\left\{\frac{0}{0}, \frac{0}{1}, \frac{0}{2}, \frac{0}{3}, \frac{0}{4}, \frac{0}{5}, \frac{0}{6}\right\} = \{0\}$, because $\frac{0}{0}$ = undefined and n(A) = 1. Card with numerator 1 of 6 cards are figure B1, B2, B3, B4, B5, B6. This set is symbolized by B, so B = $\left\{\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}\right\} = \{1;\ 0{,}5;\ 0{,}33; 0{,}25; 0{,}2; 0{,}17\}$ and n(B) = 6. Then for the numerator 2 there are 5 cards, namely figure C1, C2, C3, C4, C5 can be symbolized by a set C, so C = $\left\{\frac{2}{2}, \frac{2}{3}, \frac{2}{4}, \frac{2}{5}, \frac{2}{6}\right\} = \{1; 0{,}66; 0{,}5; 0{,}4; 0{,}33\}$ and n(C) = 5. A card with a numerator of 3 has 4 cards, namely figure D1, D2, D3, D4 can be said to be a set D, so D = $\left\{\frac{3}{3}, \frac{3}{4}, \frac{3}{5}, \frac{3}{6}\right\} = \{1; 0{,}75; 0{,}6; 0{,}5\}$ and n(D) = 4. The card with the numerator 4 has 3 cards, namely images E1, E2, E3 which are symbolized by E, so E = $\left\{\frac{4}{4},\frac{4}{5},\frac{4}{6}\right\} = \{1; 0{,}8; 0{,}66\}$ and n(E) = 3. Then the card with the numerator 5 has 2 cards, namely images F1 and F2 which are symbolized by sets F, so F = $\left\{\frac{5}{5},\frac{5}{6}\right\} = \{1; 0{,}83\}$ and n(F) = 2. The card with the numerator 6 has 1 card with the image G1 which is symbolized by G, so G = $\left\{\frac{6}{6}\right\} = \{1\}$ and n(G) = 1. From these findings, the following set was obtained:

A = $\left\{\frac{0}{0},\frac{0}{1},\frac{0}{2},\frac{0}{3},\frac{0}{4},\frac{0}{5},\frac{0}{6}\right\} = \{0\}$
B = $\left\{\frac{1}{1},\frac{1}{2},\frac{1}{3},\frac{1}{4},\frac{1}{5},\frac{1}{6}\right\} = \{1;\ 0{,}5;\ 0{,}33; 0{,}25; 0{,}2; 0{,}17\}$
C = $\left\{\frac{2}{2},\frac{2}{3},\frac{2}{4},\frac{2}{5},\frac{2}{6}\right\} = \{1; 0{,}66; 0{,}5; 0{,}4; 0{,}33\}$
D = $\left\{\frac{3}{3},\frac{3}{4},\frac{3}{5},\frac{3}{6}\right\} = \{1; 0{,}75; 0{,}6; 0{,}5\}$
E = $\left\{\frac{4}{4},\frac{4}{5},\frac{4}{6}\right\} = \{1; 0{,}8; 0{,}66\}$
F = $\left\{\frac{5}{5},\frac{5}{6}\right\} = \{1; 0{,}83\}$
G = $\left\{\frac{6}{6}\right\} = \{1\}$
so A ∪ B ∪ C ∪ D ∪ E ∪ F ∪ G=
$\{0;\ 0{,}17;\ 0{,}2;\ 0{,}25;\ 0{,}33;\ 0{,}4;\ 0{,}5;\ 0{,}6;\ 0{,}66;\ 0{,}75;\ 0{,}8;\ 0{,}83;\ 1\}$

Then the concept of the set can be made into a set of integers by adding up the circles on the cards, then it can be written as follows:
A = {0+0, 0+1, 0+2, 0+3, 0+4, 0+5, 0+6} = {0, 1, 2, 3, 4, 5, 6}
B = {1+1, 1+2, 1+3, 1+4, 1+5, 1+6} = {2, 3, 4, 5, 6, 7}
C = {2+2, 2+3, 2+4, 2+5, 2+6} = {4, 5, 6, 7, 8}
D = {3+3, 3+4, 3+5, 3+6} = {6, 7, 8, 9}
E = {4+4, 4+5, 4+6} = {8, 9, 10}
F = {5+5, 5+6} = {10, 11}
G = {6+6} = {12}
so
A ∪ B ∪ C ∪ D ∪ E ∪ F ∪ G= {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}
If presented in a Venn diagram, it will be illustrated as follows:

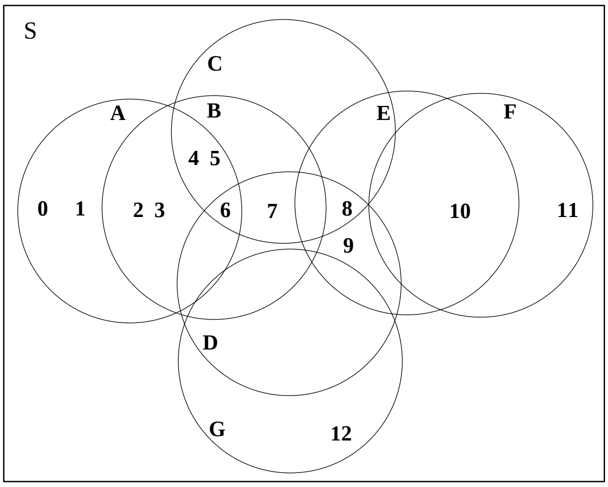


Figure 2. Venn Diagram.

Gaple Card Game Rules

The following are the rules in the gaple card game which are known and always applied in playing in the Gresik area.

a. The gaple card consists of 28 cards and 4 players, the first session will be distributed cards to each player according to the agreement, more often the five-five gaple card game, where each player gets 5 cards. Then 1 card from the remaining is made for the start of the game.
b. Furthermore, the player who is playing first must issue a card that has the same point from one side, if he does not have a suitable card, he must close one card according to his choice. Then it continues to the next player according to the agreement to walk left or right with the same rules. Cards that are closed cannot be played.
c. The game is said to be finished if someone has gapped or the cards have run out. If it is not finished, the game is considered finished if there are no suitable cards for all players to lower.
d. After the game ends, the remaining cards that have not been lowered and those that have been closed are added up in a circle. The player with the lowest score will be declared the winner. If you want to proceed to the next round, the rules of play are the same as before, but the player who has the right to issue a card first is the winner of the previous round.

Mathematical Concepts of Gaple Card Game Rules

The mathematical concept in the rules of the gaple card game is chance, where during the game all players will get the same 5 cards. This means that each player has the same opportunity to play and win. When the starting card is issued, each player has the opportunity to play as many times as possible $\frac{1}{5}$. However, because this game consists of 4 players, the chances of winning for each player are$\frac{1}{4}$.

From the description above, it can be concluded that in this game there is a concept of chance, namely: For example, we symbolize player P, then player 1 will be symbolized as P1, player 2 is P2, player 3 is P3 and player 4 is P4. This means that at the start of the game each player has the opportunity, namely $P1 = \frac{1}{5}; P2 = \frac{1}{5}; P3 = \frac{1}{5}; P4 = \frac{1}{5}$ and the probability of winning the game is $P1 = \frac{1}{4}; P2 = \frac{1}{4}; P3 = \frac{1}{4}; P4 = \frac{1}{4}$. Then when the game is over, we must count the total number of circles on each participant's card to determine the player who lost. Remaining cards in play in figure 3.

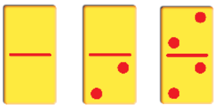
Player 1 (P1)

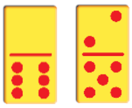
Player 3 (P3)

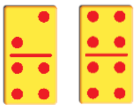
Player 2 (P2)

Player 4 (P4)

Figure 3. And Game.

Player 1 (P1) =  = 0+0+0+2+2+2 = 6

Player 2 (P2) =  = 0+6+2+5 = 13

Player 3 (P3) =  = 2+4+4+4 = 14

Player 4 (P4) =  = 2+3 = 5

From the description above, the player who loses the game is player 3 (P3) with the lowest score of 14. Then from these results we can write it in the form of an inequality, namely:

$P1 < P2; P1 < P3; P1 > P4$

$6 < 13; 6 < 14; 6 > 5$

$P2 < P3; P2 > P4$

$13 < 14; 13 > 5$

$P3 > P4$

$14 > 5$

From all the findings above, it can be said that there are many mathematical concepts contained in it such as sets, addition, probability and inequality. However, the dissimilarity value will be different in each game because in each round of the gaple card game, players will get a different card. This is emphasized in point (a) where the cards distributed to players can be 3, 4 and or 5 depending on the agreement.

Conclusion

In accordance with this theoretical study, we are discussing the mathematical concepts contained in the gaple card game, so in this study several mathematical concepts were obtained, namely on the gaple card there are the concepts of set and addition. Then in the game rules and processes found mathematical concepts namely opportunity, addition and inequality. From these findings it can be concluded that there are 4 mathematical concepts in the gaple card game, namely set, addition, probability and inequality.

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