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The Use of Domino for Teaching Geometri

S.S Rahayu; B Usodo; I Slamet

Post Graduated Program of Universitas Sebelas Maret, Indonesia

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Abstract

Simple geometry material is taught to elementary school students. A conventional learning model where the teacher always explains makes students lazy to read. Thus, instead of getting new knowledge, the seventh-grade students only know what they remember about the geometry material they learn in their elementary schools. This study aims to find out the effect of using the domino game for teaching geometry, especially in the rectangle chapter, with SFAE learning model. VII F and VII G, sampling was carried out by stratified random sampling. Using quasi-experimental method, this study the seventh-grade students of SMP Negeri 1 Tawangmangu, Karanganyar Regency, as its population. Classes VII E, VII F, and VII G were selected as the samples using stratified random sampling. Data were collected using observation, questionnaires, and interviews. The data were then analyzed using two-way analysis of variance with unequal cells. It was found that (1) Fa (206.947) > F-table (6.0526) which means that students taught using SFAE model with dominoes have better achievement than those taught with the SFAE model only; (2) Fa (12.71791) > F-table (6.0526) which means that students taught using SFAE model with dominoes have better achievement than those taught using conventional learning models; (3) Fa (322.718) > F-table (6.0526) which means that students taught using SFAE learning model have better achievement than those taught using conventional learning models. Therefore, it can be concluded that learning using SFAE model with domino cards can improve students' mathematics learning achievement in geometry material.

Keywords: *Domino Card Game; SFAE Learning Model*

1. Introduction

Junior high school students still do the memorizing habit as in their elementary school because the interaction of students with their teacher will leave permanent traces (Aydin & Karabay, 2020). Despite the variety of learning models introduced, most teachers tend to apply traditional learning which only functions the small brain. The learning process is teacher-centered, making students the object of learning with the main activity of memorizing, doing assignments from the teacher, receiving punishment for making mistakes, and not getting enough appreciation for their work.

This contradicts the goal of the 2013 curriculum to create students who are more creative, innovative, and responsive. Students must also have creative, innovative, and responsive thinking skills in

learning mathematics (Sari, 2017). Therefore, mathematics is a must-learn subject for students. Learning mathematics prepares them to deal with challenges in the global era (Khashan, 2016). However, most students still consider mathematics as a complex subject (Ariyanto, 2017).

One of the difficult mathematic materials in junior high school is geometry (Wulandari, 2017). This can also be seen from the results of the 2018 national exam where the percentage of students who can answer geometry-related questions is low, around 42.27% (Ministry of Education and Culture, 2018). It means that the number of students who could correctly answer the questions about geometry that has been taught for 3 years is less than a half. To solve this problem, teachers as educators should be creative in using the right model in learning.

A game is one of the creative media that can be used to create fun learning because it can increase the enthusiasm of students in participating in learning (Pradhita, 2018). Games are expected to change student behavior (Larkin, 2015) because many people assume that games can make students happy, so they can explore, interact, and come up with ideas (Molin, 2019). However, the game used must be familiar to students so that it can be applied more easily (Oktavia, 2019).

2. Method

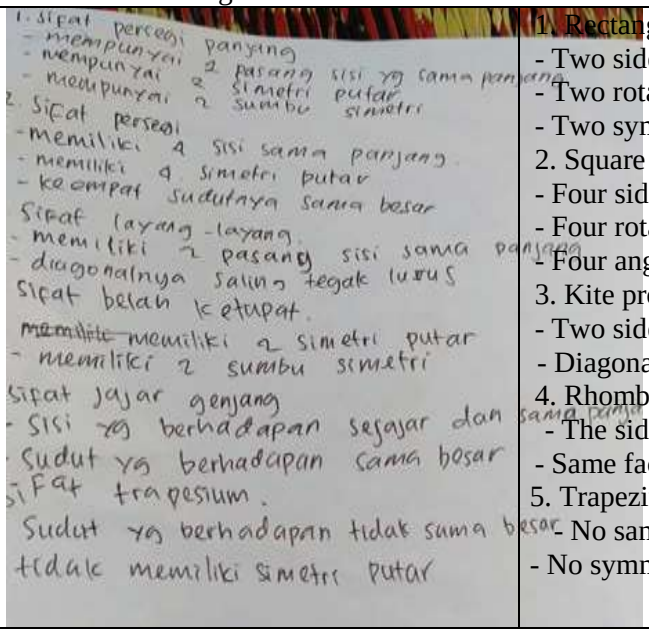
Using quasi-experimental method with a 3 x 3 design, this study aims to test the effect of using Student Facilitator and Explaining (SFAE) model with domino cards on improving students' learning achievement in geometry material because, with SFAE, students will learn to express their ideas and opinions to their friends (D Mulyono, 2017). The population of this study was the seventh-grade students of SMP Negeri 1 Tawangmangu, Karanganyar Regency, and the samples were students of classes VII E, VII F, and VIIG, selected using stratified random sampling.

The results of pre-observations showed that students were not active in conventional learning (see Figure 1).

Figure 1: Initial Conditions with SFAE Model

The results of posttest were not satisfactory because they answered similarly as they did in elementary school as shown in the following figure:

Figure 2:The Result of the Student's Work in the First Lesson

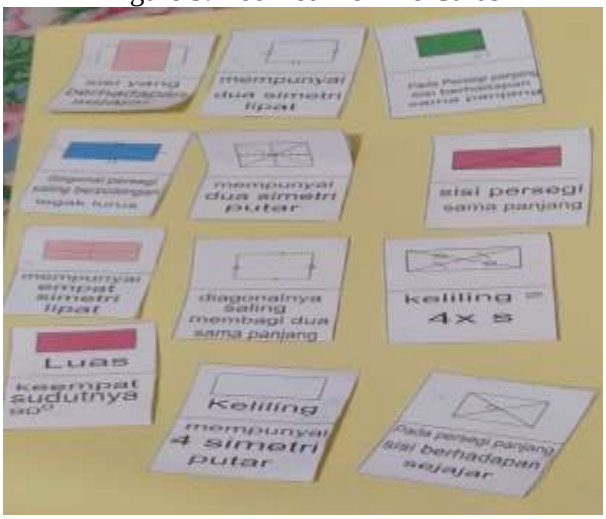


1. Rectangle properties
- Two sides of the same length
- Two rotary symmetries
- Two symmetry axes
2. Square properties
- Four sides of the same length
- Four rotary symmetries
- Four angles of the same size
3. Kite properties
- Two sides of the same length
- Diagonals perpendicular to each other
4. Rhombus properties
- The sides facing parallel with the same length
- Same facing angle
5. Trapezium properties
- No same facing angle
- No symmetry axis

The students' answers were only limited to simple and rote characteristics they learned in their elementary school. Thus, the researcher developed a learning model that stimulates student activity, namely a modified domino game, because dominoes are considered familiar for students. Based on the research by Godoy, Alves, Xander, Carmo, and Souza, dominoes is effective in increasing students' understanding of addition and subtraction material (Gris G, 2017). Therefore, it is hoped that the domino game is also effective to improve learning achievement in geometry.

The domino card was adapted from a card game that consists of 18 cards. Then, it was applied in geometric material, especially quadrilateral material. The cards were divided into 2 parts (square properties and pictures of different properties). This game was played by matching the pictures with the properties on the other card. The form of this domino card is as follows:

Figure 3:Modified Domino Cards



Before being tested for its effectiveness, the game had been tested in other schools of the same level as the experimental school. The game was found to be very influential on the students learning achievement as shown by the average scores of mathematics learning as in Table 1 below:

Table 1: Student Achievement in the Experimental School

	Conventional class	SFAE class	SFAE with domino class
Mean score	57.625	47.125	63.375

At the beginning of learning with direct model, the students' achievements were not as expected, so SFAE learning model was used. However, student achievement decreased. After using domino game, their achievement increased. Students became more enthusiastic in learning as shown in the following figure:

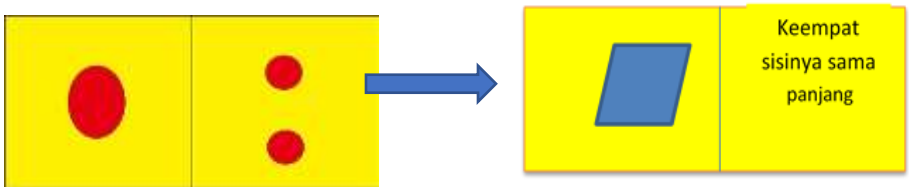
Figure 4: Learning Using Domino Game

3. Result and Discussion

The domino cards made of cardboard consisted of 28 cards measuring 10 x 5 cm, which had been modified from circles into pictures and rectangles. This aims to achieve the learning objectives.

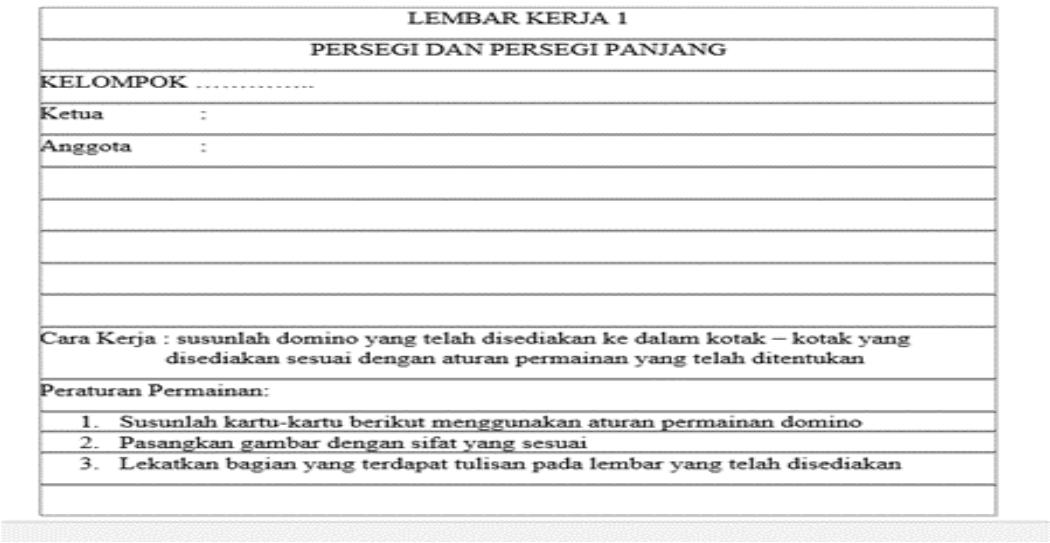
Figure 5: Domino Card

Original card Modified card



Besides using domino cards, worksheets were also provided for students to work on. The worksheets were used to show the in studying the material about rectangles. The worksheets used are as follows:

Figure 6: Student Worksheet



LEMBAR KERJA 1

PERSEGI DAN PERSEGI PANJANG

KELOMPOK .....

Ketua :

Anggota :

Cara Kerja : susunlah domino yang telah disediakan ke dalam kotak – kotak yang disediakan sesuai dengan aturan permainan yang telah ditentukan

Peraturan Permainan:

1. Susunlah kartu-kartu berikut menggunakan aturan permainan domino
2. Pasangkan gambar dengan sifat yang sesuai
3. Lekatkan bagian yang terdapat tulisan pada lembar yang telah disediakan

The use of dominoes in learning has a significant effect as shown by the F-test results in the trial. The results of F-test between SFAE learning model (a1), SFAE learning model with domino (a2), and direct learning model (a3) were significant as shown in the following table.

Table 2: F-test results

	(Xi-Xj)^2	1/ni+1/nj	MSE	F-obs	F-table	Conclusion	
a1-a2	576.7136	0.020833	133.7638	206.9487	6.05626	Significant	H0 rejected
a1-a3	35.44157	0.020833	133.7638	12.71791	6.05626	Significant	H0 rejected
a2-a3	898.0896	0.020833	133.7638	322.2718	6.05626	Significant	H0 rejected

Based on Table 1 and Table 2, the use of SFAE learning model with dominoes has a significant effect on mathematics learning achievement in geometry material, as evidenced by an increase in the average learning achievement. The results of the above calculations indicate that children prefer to learn while playing, not memorizing many formulas. By playing, they can explore more, laugh more, be happier without fear of punishment.

4. Conclusion

The use of SFAE with modified domino cards to embed the concept of quadrilateral material through discussion activities can make students more active in learning, resulting in increased achievement. They forget about the learning process that tends to memorize the properties of geometry and have fun arranging domino cards. This leads to an increase in their learning achievement for quadrilateral material. Teachers should consider how to introduce dominoes to their students because not all the students, especially girls, know this game. Girls must not be grouped with boys because the boys will dominate the game.

During this pandemic, discussion activities among students could not be carried out. Thus, dominoes could not be used in real life. The use of dominoes was important in online learning because students were only given a summary of the material. Teachers are recommended to develop virtual domino games in learning quadrilateral material. It is advised that teachers use online domino games in teaching quadrilateral material so that students will not spend most of their time playing online games.

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