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Innovative Research in Science, Mathematics, Environment and Education for Sustainable Development

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Make a Match Model to Minimize Students' Error in Solving Social Arithmetic Problems

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Abstract. Students of Junior High School showed difficulties in mastering the concept, skill, and problem solving strategy when solving social arithmetic problems. Difficulties in solving social arithmetic problems caused 61.29% of the students failed the social arithmetic learning. This research aimed to minimize students' errors in solving social arithmetic problems through the make a match model. The subject of this research was 31 students of Junior High School. The data collecting procedures were observation and written test. The observation was conducted to observe teacher and students activity during learning, while the written test was aimed to find out students' mastery on the learning material. The result of this research indicated that make a match model increased students' activeness and eagerness to learn. Learning with make a match model showed an increase in students' mastery. The percentage of learning mastery after the activity was 73.08%. Thus, the increased percentage of learning mastery was 11.79%. The increased percentage in learning mastery indicated the students' understanding. If the students could understand the learning material well, they would have fewer difficulties in solving the problems. This meant that the make a match model could minimize students' errors in solving social arithmetic problems.

Keywords: Make a Match, Errors, Social Arithmetic

INTRODUCTION

The observation was conducted in secondary school at Malang city. The result of this observation indicated that students made a lot of errors in solving social arithmetic problems. 19 of 31 students failed. The difficulties faced by students were difficulties in understanding the problem and concept (Bingolbali, Fatih Ozmantar, & Demir, 2011), and students were difficulties in making the mathematical model (Hariyani, 2018). Other students had difficulties in terms of less systematic in writing the idea of problem solving. The biggest problem was the weakness in reading, counting ability and mathematical skill (Phonapichat, Wongwanich, & Sujiva, 2014).

Difficulties in solving social arithmetic problems were usually determined by the teaching process. The difficulties faced by the students could be a reflection for the teachers to plan the lesson. Teaching process which provided students with problem solving skill could increase their skill in solving problems. Through problem solving, the students learnt about the numbers, mathematical symbols and problem solving skill. Problem solving is a means of learning and teaching mathematics (Karatas & Baki, 2013). Students' errors in solving mathematical problems usually happened in several subjects, such as arithmetic.

Students found difficulties in solving fraction (Hariyani & Suwanti, 2016). Some students had difficulties in fraction and decimal (Siegler & Lortie-Forgues, 2017). Siegler & Pyke (2013) stated that students of grade six and eight had difficulties in the operation of fraction, such as operation in addition, subtraction, multiplication and division. The sixth graders answered 41% of the problems correctly. The eighth graders answered 57% of the problems correctly. One way to solve these students' problems in arithmetic was through an improvement in the learning model. A professional teacher needed to be prepared, have the will and ability in teaching and learning through experience (Shulman & Shulman, 2017). Lie (2008) states that make a match is a learning technique that gives students the opportunity to collaborate with others. The stages of make a match model in this study consisted of (a) Introduction stage: the researcher started the lesson, delivered the apperception and learning goals, motivated the students, and explained the steps of learning; (b) Main activity stage: the researcher delivered the learning material, divided the students into two groups, which were the problem groups and answer groups,

distributed the problem cards and answer cards, group discussions, group presentations, and gave rewards for the students who could answer correctly. Teachers is crucial in facilitating discussion and learning (Gillies, 2008:; and (c) Closing stage: the researcher asked the students to include the material learned, motivated the students to study hard, and closed the lesson. This research aimed to minimize students' errors in solving social arithmetic problems through applying the make a match model. The result of this research could be used as a reference for teachers to plan the lesson which could minimize the difficulties for the students. This research gave a contribution for the teachers about the make a match learning model which could minimize the difficulties faced by the students.

RESEARCH METHODS

The approach used in this research was classroom action research. The researcher acted as the primary instrument, which was as the planner, executor, and data collector. The data collecting instruments used in this research were teacher observation result, students' observation result, and students learning result. This research included: (1) planning stage: the researcher constructed an action design in terms of lesson plan; (2) execution stage: the researcher conducted the activity according to the lesson plan; (3) observation stage: the researcher observed and documented all activities of the teacher and students during the lesson, and the researcher gave evaluation test; and (4) reflection stage: the researcher analyzed and reviewed the result of the action. The success indicator of the research was regarded by the success of activity process and students' learning result. The success of the process was measured using the observation sheet. The learning process was considered to be successful if the percentage of success of the process reached the minimum of 75%. The success accomplishment of the students' learning result referred to the minimum mastery standard. A student was said to succeed if he achieved score above the minimum mastery standard criteria. The predetermined score of the minimum mastery standard criteria was 75. A class is said to succeed if minimum 75% of the students succeed. Thus the indicators of the research about the make a match model which could minimize students' difficulties included: (1) Researcher's activity sheet and students' activity sheet reached the minimum percentage of 75%; and (2) The increased percentage of students' learning result in the form of test result.

RESULT AND DISCUSSION

The researcher conducted the make a match learning model according to the lesson plan. After the research, the students were given a test to see the students' understanding about the social arithmetic material. The analysis result of the observation on the researcher's activity indicated that the percentage of the researcher's activity was 82.29%.

Table 1. Analysis result of the researcher's observation

Explanation	Activity 1	Activity 2
Score achieved	20	13
Maximum score	24	16
Percentage of activity success	83.33%	81.25%
Percentage of average success	82.29%	
Category	Very good	

The analysis on the observation sheet on the students' activity indicated that the percentage of students' activity was 79.17%.

Table 2. Analysis result of students' observation

Explanation	Activity 1	Activity 2
Score achieved	20	12
Maximum score	24	16
Percentage of activity success	83.33%	75.00%
Percentage of average success	79.17%	
Category	Very good	

The result of the students' test could be seen in Table 3.

Table 3. Result of students' test

Explanation	Test Result
Number of succeed students	19

Number of failed students	7
Average score	72.65
Percentage of succeed students	73.08%
Percentage of failed students	26.92%

The reflection on the activity showed that:

The researcher applied the make a match learning model according to the lesson plan, and the students were well conditioned.

Students were not noisy when divided into groups.

The students were very confident when explaining the result of group discussion.

The test result showed that 19 of 26 students succeeded. The percentage of succeed students was 73.08% and the percentage of failed students was 26.92%.

Learning using the make a match learning model could minimize the difficulties faced by the students. This result could be seen from the observation sheet and the percentage of students' learning result. The result of the observation sheet indicated that the percentage of the researcher's activity was 82.29%, and that the percentage of students' activity was 79.17%. The learning result of the students showed that the percentage of succeed students was 73.08% with the average score 72.65. The percentage of learning accomplishment was improved 11.79%. The improvement of learning accomplishment percentage indicated the students' understanding. It meant that the students having difficulties in solving social arithmetic problems were reduced. If the students could understand the learning material well, they would have less difficulty in solving the problems. Thus, the make a match model could minimize students' errors in solving social arithmetic problems.

Make a match learning model was a learning model which could help students in solving problems. Students worked in group discussion, and they were guided to state their opinion in front of other students. Class discussion was an approach of the teacher to guide the students in solving problems (Intaros, Inprasitha, & Srisawadi, 2014). Through discussion, students could convey their difficulties in solving the problems. Therefore, it was easier for the students to apply and integrate many mathematical concepts and skills to get the final result (Tambychik & Meerah, 2010). Problem solving which was accomplished through group discussion could increase learning motivation and ability to recall the mathematical concepts. The success of problem solving was influenced by motivation, emotion, intellectual ability and recalling ability (Sternberg, 2003). Make a match learning model was a collaborative method with the help of peers. Collaborative method with peers helped improving students' motivation and will to learn (Alves, Pereira, Castanheira, Direito, & Duarte, 2014).

CONCLUSION

Applying the make a match learning model which could minimize the difficulties faced by the students in solving social arithmetic problems, were:

1. Introduction stage: the researcher started the lesson, delivered the apperception and learning goals, motivated the students, and explained the steps of learning.
2. Main activity stage: the researcher delivered the learning material, divided the students into two groups, which were the problem group and answer group, distributed the problem cards and answer cards, group discussion, group presentation, and gave reward for the students who could answer correctly.
3. Closing stage: the researcher asked the students to conclude the material learnt, motivated the students to study hard, and closed the lesson.
4. The researcher's observation sheet showed the percentage of the researcher's activity was 82.29%, while the students' observation sheet showed the percentage of the students' activity was 79.17%.
5. The students' learning result showed the percentage of students' mastery was 92.86% with the average score 85.46.
6. Improvement in the percentage of the learning accomplishment was 11.79%.

Therefore the make a match model could minimize students' errors in solving social arithmetic problems. A suggestion for the teachers is that compliments or reward are important for the students, in order that the student could maintain their motivation and be active during the learning process.

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