Research Paper

The Impact of the Think Pair Share Cooperative Learning Model with Multi-Representation Based Worksheet on Students' Critical Thinking

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Abstract: This study aimed to see how Think Pair Share (TPS) learning model combined with multi-representation-based student worksheet affected junior high school students' critical thinking abilities and learning outcomes. This type of research is a quasi-experimental design with a non-equivalent control group. The population in this study was all class VII MTsN 4 Banyuwangi (2021/2022). Data collection techniques using test observation, interviews, and documentation. The data analysis technique used a normality test and Independent Sample T-test with the help of SPSS 25 software. Following is the study's finding: (1) The TPS learning paradigm considerably impacts critical thinking skills, as evidenced by the experimental class's average critical thinking score increasing from 22.28 to 58.96; (2) Students in the experimental class form those in the control class in science. The experimental class's average learning outcome is 52, whereas the control class's average is 35.6. TPS learning paradigm has a considerable influence on critical thinking abilities and learning.

Keywords: Think Pair Share; Learning model; Multirepresentation based worksheet; Critical thinking; Learning outcome.

INTRODUCTION

Learning science is one aspect of education that is used as a tool to achieve educational goals. In science learning, more emphasis is placed on the active involvement of students in learning science concepts, skills, and principles. Science subjects play an active role in preparing students to think logically, creatively, critically, and have the initiative when facing issues in the field. Mastery of science concepts can be achieved if students simplify the material to make it easier to understand, interpret, and apply in everyday life (Wicaksono et al., 2020). The thinking process in science subjects is related to 21st-century skills. The Ministry of Education and Culture stated that the 21st-century education model focuses on students' capabilities to learn from many references, formulate problems, collaborate, and think critically when solving problems (Wijaya et al., 2016).

The Ministry of National Education (2011) suggests that science learning leads to scientific products today, as indicated by the number of students studying science by memorizing science concepts, principles, laws, and theories. In Indonesia, most students can only work on questions to the medium level; about 5% of students can solve various upper-level questions; and another 78% can solve various easy questions, especially at the level of knowledge or remembering (Rahayuni, 2016). Based on the 2018 PISA survey in the field of science, Indonesia is in the 62nd position out of 71 countries, with a mean score of 396 (Schleicher, 2019). Then Indonesia got the 62nd position out of 70 countries in 2015 with a mean score of

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403, which is still less than 493, the international mean score (Kusumastuti et al., 2019). This implies that critical thinking skills in Indonesia must be improved. The lack of emphasis on lessons brings students to a level of thinking where they lack critical thinking skills.

Critical thinking skills are logical, reflective, systematic, and productive thinking skills used to make the right decisions (Sari et al., 2019). Weak critical thinking because learning methods still focus on the teacher. Students often do memorization activities rather than develop thinking power, so students are weak in providing responses, analyzing activities, and relying on others. Another reason that weakens low critical thinking skills is that students are not trained with questions that present phenomena. The ability to think critically cannot develop and grow by itself in students. This ability can develop and grow as best as possible if the teacher guides the learning.

Teachers must develop a learning process that focuses on developing students' critical thinking skills. Learning models are significant in accommodating the development of students' mindsets and skills (Budiarso et al., 2022). The learning model plays a vital role in the learning process because it can describe systematic procedures in organizing student learning experiences to achieve learning goals (Wicaksono et al., 2020). The Think Pair Share (TPS) type cooperative learning model is a learning model that pays attention to cognitive and social aspects of learning so that it can develop students' mastery of knowledge and critical thinking skills (Husen et al., 2017). The stages of the TPS learning model start from thinking; learning begins with students thinking independently in solving a problem. In pairs, students discuss the results of their thoughts. Third, each group member is asked to share the thoughts that have been discussed.

The advantages of the TPS learning model are that it is easy to use at all levels and conditions, provides pause for thinking to develop the quality of student responses, students play an active role in material concepts, and students understand class concepts better when discussing with other students. The drawback of the TPS model lies in the large number of groups that need to be reported and monitored, but fewer ideas emerge. To assist students in the teaching process, the application of student worksheet (known with LKPD) teaching materials helps students in the learning process. LKPD is a place for teaching activities to find various science concepts, whether obtained from investigations, demonstrations, or theories in groups or individually. In the LKPD there are concrete directions and performance steps to hone science and thinking process skills when doing exercises, based on the size of the teaching to be achieved (Firdaus et al., 2018). The multi-representation approach is one approach that combines text images, symbols, and graphics to present material in order to deepen students' understanding and allow students to be actively and directly involved during the teaching and learning process (Doyan et al., 2018).

According to Wicaksono et al., (2017), in their research, the TPS teaching model is suitable for developing critical thinking for junior high school students. The teaching process requires a more effective and shorter duration. Meanwhile, according to Afoan et al., (2016), in their research measuring the effectiveness of the TPS teaching model on student activities and learning outcomes in the human respiratory system material can improve cognitive learning outcomes, it can be seen from the increase in the pretest mean of 34.06% at posttest to 83.13%. Meanwhile, in his research, Sariningrum (2017) applied the TTW (Think Talk Write) teaching model with multi-representation-based worksheets that were applied in the experimental class. The control class showed that the experimental class had better learning outcomes than the control class. Based on the background that has been described, this research aims to examine the impact of the TPS type cooperative learning model with multi-representation-based LKDP on the critical thinking and learning outcomes of junior high school students.

METHOD

This research uses a quasi-experimental type of research. The research design used is the non-equivalent control group design.

Table 1. Non-equivalent control group design research

O_1	X	O_2
O_3		O_4

Note:
O1   : Pretest experimental class
O3   : Pretest control class
X   : TPS type cooperatve learning model
O2   : Posttest experimental class

O3   : Posttest control class

The research was conducted from 07 to 19 February 2022 and was carried out at MTsN 4 Banyuwangi for the 2021/2022 academic year. The population in this study were all seventh-grade students at MTsN 4 Banyuwangi. The sample was determined using a cluster random sampling technique, which had previously been tested for homogeneity. The sample in this study was class VII F as the experimental class and VII G as the control class. The data collection method was carried out using tests. The test carried out is a test of learning outcomes in the form of pretest and posttest, and the structure of questions is in the form of multiple choice. According to Ennis' critical thinking indicators, the critical thinking skills test, essay questions. Indicators of critical thinking skills used in this study are providing simple explanations, building basic skills, concluding, providing additional answers, and setting strategies. The observation method was carried out to determine the condition of students, teacher learning activities, and student learning activities. Observations were made pre and post-implementation to see the impact of treatment on the experimental group. The data identification method used to determine student learning outcomes and critical thinking skills in this observation are to use the Independent sample T-test and the normality test with the help of SPSS 25.

RESULTAND DISCUSSION

Data on students' critical thinking skills were obtained through a descriptive test of five questions arranged according to Ennis' critical thinking indicators. Table 2. Shows the difference in the mean value of critical thinking of pretest and post-test students critical thinking between the experimental and control classes. The experimental class got a better average score of 58.96 than the control class, which was 42.40.

Tabel 2. Critical thinking test score recapitulation

Component	Experimen class		Control class	
	Pretes	Posttes	Pretest	Posttes
Higest score	60.00	96.00	78.00	84.00
Lowest value	0.00	38.00	0.00	4.00
Average	22.80	58.96	20.00	42.40

The results of the Independent Sample T-test showed a significant difference between the experimental and control classes. Because the experimental class uses the TPS teaching model with multi-representation-based worksheets in the learning process, the average critical thinking score in the experimental class is better than in the control class.

Tabel 3. Recapitulation of the average critical thinking score for each indicator

Component	Average	
	I	II
Give a simle explanation	5.92	9.76
Building basic skills	5.04	14.32
Conclude	2.16	8.96
Provide further explanation	0.96	7.60
Set strategy	8.72	18.32

Table 3 shows the experimental class's post-test results of each critical thinking indicator. The highest average critical thinking ability is found in the indicators of managing strategies (18.32) and building basic skills (9.76), and concluding (8.96), the lowest average critical thinking index is an indicator of providing a further explanation (7.60). Overall, the indicators of critical thinking in the experimental class increased from an average of 22.28 to 58.96.

The study aimed to examine the effect of the TPS-type cooperative learning model accompanied by a multi-representation-based worksheet on students' critical thinking skills. The TPS model is a learning model that pays attention to cognitive and social aspects of learning to improve students' thinking skills and mastery of the material. The steps of the TPS learning model will train students to think and participate actively in discussions to find the right solutions to problems to improve students' critical thinking skills (Husen et al., 2017). Students are first given problems from everyday phenomena during learning activities by identifying problems presented in multi-representation-based worksheets. When students encounter

problems from everyday phenomena, they try to organize their knowledge by looking for general facts and concepts to draw specific conclusions so they can solve problems appropriately. Using problems around students will stimulate the development of critical thinking skills to solve these problems.

Students are asked to think independently (think) in solving a problem. In the thinking phase, students observe and formulate problems outlined in the multi-representation-based learning LKPD. The thinking phase makes students concentrate when making observations and give students time to formulate problems. Then students in pairs discuss, share and exchange information, and provide arguments based on their knowledge to provide the right solution to the problems discussed in the group. When students collect information, data, and specific concepts to draw general conclusions to be used to develop problem-solving, then they will train in building essential student skills. In addition, the involvement of students in finding solutions and discussing with the group in the pair phase positively impacts students' critical thinking skills.

According to Arends (2013), the pair stage in the TPS model gives students sufficient time to discuss with their group mates, help each other, and discuss the closing process according to the correct concept. Student activities in the discussion can increase the index of critical thinking skills in setting strategies, building basic skills, and providing brief explanations. Next, each group presents the discussion results and conveys the results of solving problems (share). According to Wicaksono et al., (2017), the pair and share stages in the TPS model support the development of critical thinking in organizing ideas and defending them. According to Vygotsky, students learn activities through interaction with peers or adults who have higher expertise. This social interaction can accelerate the formation of new ideas and increase the intellectual growth of students (Budiarso et al., 2022).

The analysis of critical thinking skills in this study is from research conducted by Purnama et al., (2020), which states that the process of TPS-type cooperative learning activities can improve students' critical thinking. With the help of multi-representation-based worksheets, students will be trained to carry out critical thinking activities to help improve their critical thinking skills. This also follows what Firdaus et al., (2018) reported, which states that guided inquiry-based worksheets can improve students' critical thinking skills. Critical thinking skills are obtained from students who can find material concepts in pairs and are trained to express opinions in solving problems. Students are trained in critical thinking skills for searching, collecting data, and discussing with other students (Nurkhaliza, 2018).

CONCLUSION

Based on the data analysis and discussion in the previous chapter, it can be concluded that the think Pair Share (TPS) learning model significantly impacts critical thinking skills from an increase in the average critical thinking in the experimental class from 22.28 to 58.96.

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