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Mathematical representation ability viewed from the students' cognitive style in Two Stay Two Stray with product assessment

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Abstract

The mathematical representation ability in Junior High School 1 Bojong is still not optimal. For this reason, one of the methods that can be used to increase the ability of mathematical representation is cooperative learning type Two Stay Two Stray with product assessment. This research aims to obtain the effectiveness of learning and analyze students' mathematical representation abilities in terms of the reflective-impulsive cognitive style. This research used Mixed Methods with Explanatory Sequential Design. The population in this study was all 8th graders of Junior High School 1 Bojong, while two classes were obtained as samples using cluster sampling techniques. For the qualitative analysis, four students were selected purposively. Data collection techniques used observation, documentation, tests, and interviews. The results showed that: (1) Two Stay Two Stray learning with product assessment is effective on the achievement of students' mathematical representation abilities, (2) subjects showed various mathematical representation ability.

1. Introduction

Mathematical representation deserves to be emphasized and raised in the process of teaching mathematics in schools. Jitendra said that the ability to represent is an important skill for all students (Jitendra et al., 2016). There are five standards in the mathematics learning process in schools set by NCTM (2000), namely problem solving, reasoning, communication (connection), and connection (representation). The ability of mathematical representation supports students in learning to translate mathematical concepts in solving a problem. Translating complex mathematical ideas into forms of representation can help students understand the material (Permata et al., 2017).

Representation is a configuration (form or arrangement) that can describe, represent, or symbolize something in a way (Utomo, 2017). The method can be in the form of writing, symbols, pictures, or objects. Representation is also referred to as a tool to find a solution to a mathematical problem. Sabirin (2014) says that representation is a form of interpretation of students' thoughts on a problem, which is used as a tool to find solutions to those problems.

Learning mathematics in schools is abstract, so we need a way to be able to provide an understanding of mathematical concepts (Agustin et al., 2014). The concept can be used in solving mathematical problems. The ability of representation is an ability that is very important for students and is closely related to the ability to problem-solve (Surahmi, 2016). The problem-solving ability for students is an ability that needs to be there, so students are able to find solutions to problems in learning mathematics (Hendriani et al., 2017). But successful problem solving is not possible without an appropriate problem representation (Rezki, 2018). Representation is the basis for understanding problems and making plans to solve mathematical problems. Muhammad (2016) said that the ability of mathematical representation could help students develop concepts and express mathematical ideas, and make it easier for students to develop their

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abilities. Indicators of mathematical representation, according to Mudzakir, as quoted by Yudhanegara and Lestari (2014), are presented in Table 1.

Table 1. Indicators of Mathematical Representation Ability.

Aspect	Indicators
Visual representation, in the form of:	1. Present data or information back from representation to the representation of diagrams, graphs, or tables.
a. Chart, graph or table	2. Using visual representations to solve problems
b. Picture	1. Draw geometric patterns.
	2. Creating geometric shapes to clarify problems and facilitate resolution
c. Mathematical equation or expression	1. Make mathematical equations or models from other representations given.
	2. Make a conjecture of a number pattern.
	3. Resolution of problems involving mathematical expressions
d. Words or written text	1. Creating a problem situation based on data or representation provided.
	2. Write down the interpretation of a representation.
	3. Write steps to solve mathematical problems with words.
	4. Arrange stories that correspond to a representation presented.
	5. Answering questions using words / written text

The ability of representation is one of the abilities that must exist in geometry material (Melinda, 2017). Geometry is material in mathematics learning that must be taught at every level of education. Buyung, as quoted by Khoir et al. (2019), said that studying geometry is very useful for students as a basis for mastering, studying, and understanding other mathematical material. NCTM (2000) also places geometry as one of the mathematical standards. This shows that mastery of geometry material in mathematics learning is important.

Muhassanah et al. (2014) said that in studying geometry, students need to understand a concept thoroughly so that they are able to apply their geometric skills such as visualizing, recognizing flat shapes and spaces, describing images, sketching drawings, labeling specific points, and the ability to recognize differences and the similarities between geometric shapes. This shows that the ability of good mathematical representation is needed so that students can understand geometry optimally.

The ability to master geometry material for students in Junior High School 1 Bojong is still not optimal. This is based on the percentage of absorptive capacity of the 2018 National Examination of Junior High School 1 Bojong on Geometry and measurement material is 51.07%. The percentage shows that the ability of students related to geometry is still relatively low.

The results of interviews with mathematics teachers in class VIII of Junior High School 1 Bojong conducted on January 14, 2019, showed that the ability of student representation, especially in geometry material, was still not good. This was explained by the teacher concerned who said that students were still unable to paint lines according to their mathematical equations into the coordinate plane and vice versa. Students also still have difficulty when solving problems in the form of mathematical expressions. Students are also not accustomed to writing down the steps to solve the problem. This shows that the ability of student representation in Junior High School 1 Bojong, both visual, symbolic, and verbal, is less developed.

The mathematical representation indicators that will be observed in this study refer to the various mathematical representation indicators proposed by Mudzakir, namely visual representations, sketching cubes and beams to explain problems and facilitate resolution; symbolic representation, making equations or mathematical models of problems and solving problems involving mathematical expressions; and verbal representations, write steps for solving mathematical problems with words and answer questions using written words or text.

One effort that can be done to improve the mathematical representation ability of students in Junior High School 1 Bojong, especially in geometry, is to innovate mathematics learning. Masrukan et al. (2019) say that learning that only memorizes concepts given directly by the teacher will make students feel bored and difficult to solve mathematical problems. Experts argue that the cooperative model has advantages in helping students solve problems through a representation (Khairuntika, 2014). Pitadjeng, as quoted by Ramziah (2016), stated that in order for students to learn mathematics in a pleasant atmosphere, the teacher must be able to pursue pleasant situations and conditions and strategies that are also fun. One model of cooperative learning that can create a pleasant learning atmosphere is the Two Stay Two Stray learning model or "Two stays, Two guests".

The Two Stay Two Stray learning model is one type of cooperative learning that provides an opportunity for groups to share knowledge and experiences with other groups, where there are two group members who live, and there are two group members visiting (Yudhanegara and Lestari, 2015). Discussion activities were carried out by students both in groups and between groups. Pamungkas (2017) suggested that Two Stay, Two Stray learning will lead students to be active, both in discussions, questions and answers, looking for answers, explaining, or listening to the material explained by friends.

In addition to the use of learning models, the assessment of students also needs to be considered because one important aspect in the learning process is the aspect of assessment or assessment (Ulya et al., 2012). One form of assessment that is appropriate for use in learning mathematics in geometry material is product assessment. Product assessment is one form of performance appraisal, but product assessment is more focused on evaluating the manufacturing process and quality of a product (Suryati et al., 2013). The product assessment can also be used by teachers to assess student skills and assess the level of competency students have mastered.

During this time, the practice in the classroom using less varied methods and tools. Assessments involving learners' skills are less developed, whereas cognitive domain assessments are used more frequently (Anisa et al., 2017). Product assessment (product assessment) is one type of authentic assessment where students make a product according to the competency of the object being assessed is the work of students in the form of an object (Masrukan, 2014). These objects can be made of cloth, paper, metal, wood, ceramic plastics, and works of art such as paintings, drawings, and sculptures. The focus of product evaluation is work, but the work process must also be assessed. The aspects assessed in the product assessment are as follows: (1) students' skills or skills using tools and procedures, and (2) quality, both technically and aesthetically.

The ability of representation of each student is different from one another. This is because each student has a different way of receiving learning material. There are students who are quick to respond to learning material; there are students who are slow to respond to learning material. The fast or slow response given by students is called the tempo of student learning (Rahayu & Winarso, 2018). Cognitive style based on conceptual tempo is divided into two, namely reflexive cognitive style and impulsive cognitive style. Children who have the characteristics of being quick in answering problems, but not / less careful, so the answers tend to be wrong are children who have impulsive cognitive style. While children who are reflective cognitive styles are children who have the characteristics of being slow in answering problems, but careful or conscientious, so the answers tend to be correct.

Differences in students 'cognitive styles lead to different ways of solving their mathematical problems, and the differences will trigger differences in students' representation processes. Azhil et al. (2017) say that students with impulsive cognitive styles check the answers in a hurry and cannot provide solutions to the answers at the end of the answers. Therefore we need a learning model that takes into account the cognitive style of each student. Two Stay Two Stray learning can provide opportunities, especially for impulsive students, to check answers by visiting other groups (Strays). Conversely, reflective students stay in their groups (Stay) to explain their findings to students who visit. It is hoped that both reflective and impulsive students can understand mathematical concepts and are able to solve mathematical problems well.

Two Stay Two Stray learning in this study ended with the product assessment conducted at the end of learning as a form of assessment of student skills. Provision of product assessments tailored to the material being studied and pay attention to students' ability to represent. Through the manufacture of these products, it is hoped that students can better understand the material, and the teacher can also assess the extent to which competencies have been mastered by students so that follow-up can be determined for the next meeting.

Based on the description above, the problems faced in this study are: (1) whether Two Stay Two Stray learning with product assessment achieves completeness in students 'mathematical representation abilities, (2) whether students' mathematical representation ability in Two Stay Two Stray learning with product assessment better than students' mathematical representation abilities in the control class, (3) does cognitive style affect students' mathematical representation abilities in Two Stay Two Stray learning with product assessments, and (4) how students' mathematical representation abilities are viewed in terms of reflective-impulsive cognitive styles in Two Stay Two Stray learning with product assessment.

2. Method

The research method used in this study is a combination method (mixed methods) sequential explanatory design. The quantitative research design uses Quasi-Experimental Design in the form of The Nonequivalent Posttest-Only Control Group Design. The population in this study was 8th-grade students of Junior High School 1 Bojong in the 2018/2019 school year. The sample in this study was students of class VIII C as an experimental group who were given treatment in the form of learning Two Stay Two Stray with a product assessment and a control group of students of class VIII A. The sampling was based on random sampling area (cluster) techniques. The selection of research subjects is based on a purposive sampling technique.

Students are given a cognitive style test that is the MFFT (Matching Familiar Figure Test) made by Jerome Kagan and has been modified by Warli (2010). This test has been tested for validity and reliability so that it can be used immediately. Students are then classified into a reflective and impulsive cognitive style based on the time they first answered and the number of answers until they got the correct answer. The research subjects were four students, namely two students with reflective cognitive styles and two students with cognitive abilities.

Data collection methods in this study are the method of documentation, tests, observations, and interviews. The purpose of the interview is to find out the mathematical representation ability of students who have a reflective and impulsive cognitive style.

Analysis of the data in this study is the analysis of quantitative data and qualitative data. Quantitative data analysis is a prerequisite test analysis of preliminary data and analysis of test results for mathematical representation capabilities. Preliminary data prerequisite tests were conducted to find out that both classes had the same initial ability. The prerequisite test used was a two-average similarity test using odd VIII A and VIII C class PAS data. Before the two average similarity test was conducted, the normality test and the variance or homogeneity similarity test were first performed. The normality test uses the Kolmogorov Smirnov Test, the variance similarity test uses the Levene Test, and the two average similarity test uses the Independent-Sample T-Test. All three tests were carried out with the help of SPSS 18.0. and the results obtained that the sample group comes from populations that are normally distributed, have the same variance, and the initial abilities of students in both classes are the same.

Data analysis of mathematical representation ability test results is used to answer the first problem formulation; namely, the completeness of Two Stay Two Stray learning with product assessment, second, namely the mathematical representation ability in Two Stay Two Stray learning with product assessment is better when compared to control class learning, and third, the influence of cognitive style on students' mathematical representation ability in learning Two Stay Two Stray with product assessment. The first hypothesis test uses a proportion test that requires data to be normally distributed, so before conducting this test, a normality test is performed first. The data were then tested for normality using the SPSS 18.0 Kolmogorov Smirnov test. The second hypothesis test is the two different test average. Before doing this test, the two data variance tests were carried out first. This is done to determine which statistical formula will be used. The third hypothesis test uses a simple regression analysis.

Qualitative data analysis in the form of analysis of students' mathematical representation abilities in terms of reflective-impulsive cognitive style. Analysis of mathematical representation ability refers to indicators of mathematical representation capabilities, namely visual, symbolic, and verbal representations. The qualitative data analysis technique in this study was the analysis during the Miles and Huberman Model field, namely data reduction, data display, and conclusion: drawing/verification. Test the validity of the data in this study through triangulation techniques. Triangulation used in this study is technical triangulation, namely by comparing or matching the results of students' mathematical representation abilities with the results of interviews on research subjects.

3. Results & Discussions

3.1. Implementation of Treatment

Learning with the TSTS model with a scientific approach and product assessment was carried out in class VIII C for three meetings. Learning is carried out with the TSTS model using a scientific approach and product assessment. The syntax of the TSTS learning model is Class Presentation, Grouping, Team Work, Two Stay, Two Stray, and Report Team. The scientific approach stage is observing, questioning, gathering information, associating, and communicating.

The first stage is Class Presentation, and the teacher conveys material by showing an object related to the material to be studied. The second stage is grouping, where students are divided into groups consisting of 4 people where each group must have at least one reflective student member and one impulsive student member. The teacher then distributes the LKPD to each group to work on through discussion.

The third stage is Teamwork. In this stage, the students hold discussions in groups to answer the questions that are on the LKPD and find out the concept of handling the material being studied. Students are also given the opportunity to ask the teacher.

The fourth stage is the Two Stay Stage, where two people from group representatives (reflective students) remain in the group to explain the results of the group's work to members who come from other groups. Then, at the fifth stage, the Two Stray stage, two members of the group who are not on guard will pay a visit to another group to look for information. The Two Stay and Two Stray stages are carried out after group discussion. The teacher then gives the signal to start the visit. After the visit is finished, the teacher returns the signal that the visiting members return to their respective groups to present the results of their friends to the other members who are staying. This stage is called the Report Team stage after all groups return and discuss in their respective groups.

The next step is the Product Assessment stage. At this stage, the teacher is also assessed for skills. Each group will be given a task in the form of making products and carried out in groups. The product produced for each meeting is different depending on the material being studied. At the first meeting, the product students must produce sketching a cube/block in accordance with the steps they have learned before and then looking for the distance of a vertex to the midpoint of a rib. This task trains students' visual representation abilities. Next, the product that students must produce at the second meeting is to make a simple bulletin board. Previously students have been told to bring a cube/beam shaped object for the next task. The teacher suggests that these packs of snacks because they are easy to find and easy to carry. A simple bulletin board must contain material for decreasing the surface area of a cube/beam, as well as an example of the surface area of a cube/beam, in which the size of the ribcage is adjusted to the object carried by the student (cube/beam). The answers in the sample problem section should write down the work steps and involve mathematical expressions, as well as write the final answer in words. This is in accordance with indicators of mathematical representation, namely symbolic representation, and verbal representation. At the last meeting, the student's task is to make a unit cube and then arrange it according to instructions and questions on the assignment sheet. Previously students have been told to make unit cubes from nets that have been prepared on paper. This is done to make time-efficient. After that, students follow the instructions on the assignment sheet and then write their conclusions on the sheet provided by involving symbolic and verbal representations. Then the final stage is the Group Presentation. In this stage, one group comes forward to present the results of their products to the class.

After the task of making the product is finished and collected, the teacher then gives a written test in the form of a quiz to test students' understanding of the material given. There are two questions for each meeting, and the remaining must be completed within 5 minutes. The teacher then closes the learning by preceding the students to summarize the material on reflection activities, feedback related to learning, provide reinforcement, and follow up for the next material.

The implementation of cognitive style tests is done in stages before the researchers carry out teaching activities. After the implementation of TSTS learning with the product assessment is complete, a mathematical representation ability test is conducted. The mathematical representation ability test is given in the form of a description of 5 items. After the test results obtained mathematical representation ability, then the data is analyzed by researchers to then be grouped based on the types of cognitive style. Further interviews were conducted on selected research subjects.

3.2. Cognitive Style Classification

Subject selection is based on cognitive style test results. Data analysis on the results of MFFT in this study was carried out in accordance with the instrument instructions that had been developed by Warli (2010) from the adaptation of Jerome Kagan. In this test, there are two aspects that are measured, namely the first time to answer (t) and the frequency of answering until the correct answer (f) is obtained. The measurement results of each item for each student are recorded, and then the average is calculated. The median of the average time of first time answering and the median of the average number of answers from all students is used as a limit for determining students who have reflective or impulsive characteristics. Furthermore, with the median drawn lines parallel to the t axis and f axis to form four groups of students, as shown in Figure 1.

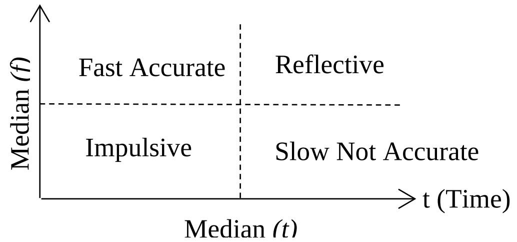

Figure 1. Reflective-Impulsive Grouping Chart

Students are grouped into Reflective and impulsive cognitive styles. Students whose average time record exceeds the median and the average number of answers is less than the median, then include students with reflective cognitive style. Students whose average time record is less than the median, and the average number of answers exceeds the median, including students with impulsive cognitive style. Students whose average time record exceeds the median, and the average number of answers exceeds the median are included in Slow-inaccurate, while students whose average time record is less than the median, and the average number of answers less than the median are included in the fast- accurate. The results of grouping students based on cognitive styles are presented in Table 2.

Table 2. Cognitive style classification of student class VIII C

Student Cognitive style				
Re	Im	FA	S-NA	DT
E-06	E-01	E-03	E-19	E-12
E-09	E-02	E-14	E-32	E-27
E-10	E-04	E-29		
E-15	E-05			
E-16	E-07			
E-20	E-08			
E-22	E-11			
E-24	E-13			
E-25	E-17			
E-26	E-18			
E-28	E-21			
E-30	E-23			
	E-31			

Explanation:
Re : Reflective
Im : Impulsive
FA : Fast Accurate
S-NA: Slow Not Accurate
DT: Double Trends

Based on Table 2, it was found that in the experimental class, 37.50% of students had reflective cognitive style, 40.63% impulsive cognitive style, 9.38% of students were fast accurate, 6.25% of students were slow inaccurate, and 6.25% of students had a double tendency (2 children are reflective and slow are not accurate. Reflective and impulsive students have a proportion of 78.125% greater than the proportion of students who are fast, accurate, slow-inaccurate, and the double tendency is 21.875%.

Then two children were chosen, each with reflective and impulsive cognitive styles to be the research subjects. The conditions for selecting research subjects are (1) impulsive subjects taken from students who record the time the fastest and have many choices of answers, while the reflective subjects are chosen based on the longest time and have the fewest answer choices, (2) students are able to communicate well when express opinions, (3) recommendations from capable teachers. The research subjects are presented in Table 3.

Table 3. Research Subject

Cognitive Style	Student's code	Average	
		Time	Frequency
Reflektif	E-09	43,21	2,38
	E-24	42,46	1,85
Impulsif	E-23	10,89	2,92
	E-31	9,25	3,69

3.3. Completeness of Students' Mathematical Representation Ability in Two Stay Two Stray Learning with Product Assessment

Based on the test results of students' mathematical representation ability, completeness presentation in the experimental class was 90.625%, and in the control class was 64.516%. Furthermore, quantitative data on the results of the VIII C class mathematical representation ability will be analyzed through the hypothesis 1 test, namely the classical completeness test using the proportion test (one party, right side) and included in parametric statistics where the population is normally distributed. So before this test is done, prerequisite normality test.

The normality test was carried out by the Kolmogorov Smirnov test with SPSS 18.0. In the normality test the Sig (2-Tailed) value in the experimental class column is 0,917 > 0,05 = α and for the control class column is 0,940 > α, so H_0 is accepted. So the data from the experimental and control classes come from normally distributed populations.

Then the completeness test is carried out with a proportion test (one party, right party). This test is carried out to find out that TSTS learning with product assessment achieves completeness in students' mathematical representation abilities. Classical completeness in this study is if more than 75% of students obtain a minimum score of minimum criteria of mastery learning 70. The hypothesis in this study is the percentage of mastery learning classically tests the ability of mathematical representation in the classroom using TSTS learning with a product assessment of more than 75%. The calculation results obtained z_{count} value is 2.04142 and $z_{table} = z_{(0,5-0,05)} = z_{(0,45)} = 1{,}645$. Because $z_{count} = 2{,}04142 > 1{,}645 = z_{(0,45)}$ then H_0 is rejected. So the proportion of the number of students who have achieved mastery learning outcomes on the surface area and volume of the cubes and beams is more than 75% of all students in the experimental class.

The completeness of TSTS learning with product assessment shows that the TSTS learning model combined with product assessment can improve students' mathematical representation ability. This is due to the TSTS learning that takes into account the cognitive style of students, and the product assessment is done repeatedly. Students who visit will dig up information from other groups visited, then submit the results of the search to the group to be discussed again. At the same time, students who live in groups will convey the results of their discussions to students who visit their groups. The application of the TSTS learning model will indirectly make students become accustomed to finding their own knowledge through discussion, both in groups and between groups, especially for students with impulsive cognitive styles. Children with impulsive cognitive styles become accustomed to seeking their own knowledge and are not in a hurry in making decisions so that the mistakes of impulsive students can be slightly reduced. The application of TSTS learning makes students able to solve problems by combining some of the information they get from other groups, so students who have learning difficulties will feel more understanding because they get an explanation from their own friends. This is in line with the research conducted by Khairuntika (2014), which concluded that the cooperative learning model TSTS had increased the ability of mathematical representation that is higher than students who use discussion learning. The addition of product assessment as a form of skills assessment adds to the ability of student representation, both visual, symbolic, and verbal representation. The combination of TSTS learning models with product assessments will provide new experiences for students in learning mathematics. Ulya et al. (2012) mention the advantages of product assessment is that it can make students more enthusiastic and interested in learning mathematics. Students will be more enthusiastic and have a high interest in learning mathematics.

The addition of product assessment as a form of skills assessment adds to the ability of student representation, both visual, symbolic, and verbal representation. This is because the products made by students are related to the three indicators of mathematical representation used. At the first meeting, students are asked to make a product in the form of images of cubes/blocks in accordance with the steps that have been taught before. This can improve students' visual representation abilities. At the second meeting, students were asked to make a bulletin board containing a summary of material about the surface area of the cube/beam and sample questions that were adjusted to the objects carried by students. In the example problem section, students are asked to write their completion steps in a concise and clear manner. This is in accordance with indicators of verbal representation, which is to write steps for completion with words. After that, students begin to work on the problem by first writing down what is known, what is asked, the formula used, and then solve the problem by involving mathematical expressions. This is in accordance with the symbolic representation indicator, which is writing a mathematical model and solving problems involving mathematical expressions. Then at the end, students rewrite the results using words in accordance with indicators of verbal representation, namely answering questions using words. At the third meeting, students were asked to model the volume of cubes and beams using unit cubes. This will make students more aware of the concept of volume cube, block, or a combination of both.

Application of the TSTS learning model can make students find their own knowledge by discussing both within and between groups so that it will increase students' understanding of the material being studied. The addition of product assessments in TSTS learning can certainly improve students' representational abilities, both visual, symbolic, and verbal representations. Therefore, learning TSTS combined with product assessment can improve students' mathematical representation abilities.

3.4. Comparison of Students' Mathematical Representation Ability in Two Stay Two Stray Learning with Product Assessment with learning in the control class.

Based on the test results of the mathematical representation ability of the experimental class (VIII C), the highest value is 96.43, the lowest value obtained is 59.53, and the average is 80.358. While the test results of the mathematical representation ability of the control class (VIII A), i.e., the highest value is 91.67, the lowest value obtained is 50, and the average is 74.145. The average mathematical representation ability of students in the TSTS learning model with product assessment is higher than the control class that uses the Discovery Learning model. This can be seen in the distribution of the mathematical representation ability of the experimental class and the control class presented in Figure 2.

In this study, two different mean tests were used. The average two different tests (one party, right party) was conducted to test whether the mathematical representation ability of students who took part in TSTS learning with a product assessment was better than the mathematical representation ability of students in the control class or not. The hypothesis in this study is the average value of the test of mathematical representation ability of students who take the TSTS learning with product assessment is more than the average value of the test of mathematical representation ability of students who take learning in the control class.

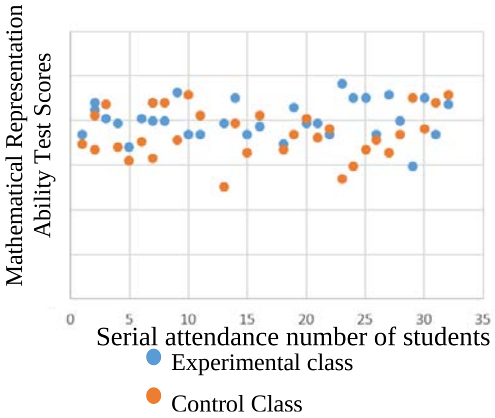

Figure 2. Distribution of Test Results for Mathematical Representation Ability

Before conducting the two different tests on average, a variance similarity test is performed first. This is because the test statistics used in the two different test averages depend on the variance of the two samples. The variance similarity test used in this study is the Levene test. In the Levene test, the sig value obtained in the Test of Homogeneity Variance is 0.171, where α = 0.05. Because the value of Sig = 0.171 > α, then H_0 is accepted. So the data from both sample groups have the same variance. Because the two variances are the same, the test statistic used in the one-party average test is the t-test.

The calculation results obtained t_{count} is 2.483 and the value of $t_{(1-\alpha)} = t_{(1-0,05)} = t_{(0,95)} = 1{,}66980$. Because $t = 2{,}483 > 1{,}66980 = t_{(0,95)}$ then H_0 is rejected. So, the average mathematical representation ability of students who take TSTS learning with product assessment is better than the ability of students' mathematical representation in the control class.

The cause of students who take TSTS learning has increased mathematical representation ability higher than students who take discussion learning is because, in TSTS learning, there is a process of staying and visiting which in this process, students who visit and receive guests are required to be able to communicate with other groups by representing mathematical problems in other forms so that students who are invited to communicate can understand what is conveyed by their friends (Khairuntika, 2014). The same thing was stated by Herawati (2015), who said that the increase in student learning outcomes classically and individually due to the use of the Two Stay Two Stray cooperative learning model had involved students learning activities and increased their understanding of the material being taught. The implementation of the TSTS learning model with product assessment in the experimental class went well. The learning atmosphere in the class is not monotonous, so students participate in learning enthusiastically. TSTS learning also requires students to conduct inter-group discussions, which can be an opportunity for students to re-examine the answers that have been found in the group so that the correct answers are obtained. In addition, the product assessment provided can also increase student interest in the material provided. It also trains students' creativity so that students do not feel bored with the given task. The products produced in each meeting indirectly accustom students to improve students' mathematical representation abilities, both visual representations, symbolic representations, and verbal representations.

3.5. The Effect of Cognitive Style on Mathematical Representation Ability in Two Stay Two Stray Learning with Product Assessment.

Based on the results of regression analysis using SPSS 18.0, the regression equation $\hat{Y} = 74{,}669 + 0{,}021X$ was obtained. From the results of the analysis obtained the fact that cognitive style has a positive influence on the ability of students' mathematical representation in learning TSTS with a preliminary assessment of 14.4%. This is in line with research conducted by Soemantri (2018), who said that cognitive style has an influence on student defeat where impulsive cognitive style makes more mistakes than reflective students.

Learning is done at the time the research takes place using the TSTS model with product assessments; researchers apply strategies so that students with reflective and impulsive cognitive styles can be more optimal in learning. One of them is by the division of groups. The division of groups here is done so that each group has a diverse cognitive style. This means that impulsive cognitive style students are not accustomed to solving problems in a hurry, and students with reflective cognitive style will help impulsive students to be more careful in solving a problem so that later they will get maximum results. With the implementation of this strategy, as many as 90,625% of students in the experimental class were obtained for all types of cognitive styles. Although in this study, there are still indicators not fully mastered by students, so that further research is needed.

3.6. Ability of Mathematical Representation Judging from the Reflective-Impulsive Cognitive Style in the TSTS Learning Model with Product Assessment.

The results of students' mathematical representation ability tests were analyzed by taking into account indicators of aspects of mathematical representation ability, including (1) visual representation, namely sketching cubes and blocks to explain problems and facilitate resolution; (2) symbolic representations, i.e., make equations or mathematical models of problems and solve problems involving mathematical expressions; and (3) verbal representations, i.e., writing steps for solving mathematical problems with words and answering questions using words.

Four research subjects were selected: 2 students with a reflexive cognitive style and two students with an impulsive cognitive style and then conducted interviews with 4 of the research subjects related to mathematical representation indicators.

The following is an example of the results of students' reflective and impulsive cognitive style of work on item number 1.

(1) Students with Reflective Cognitive Style

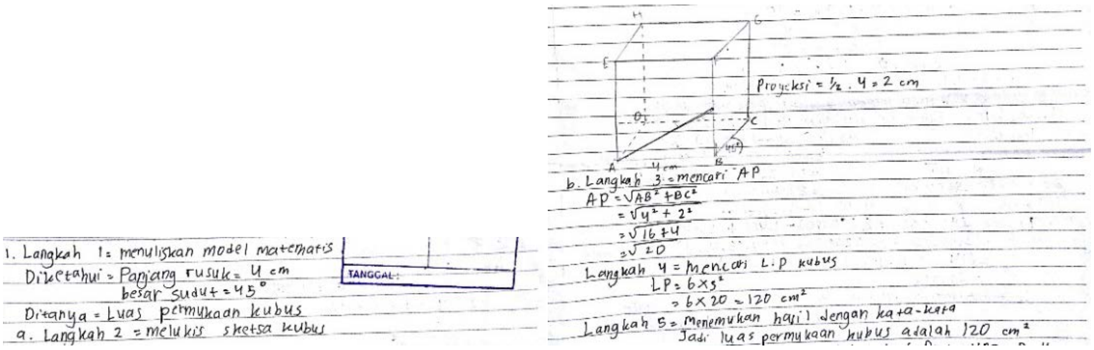

Figure 3. The examples work of the reflective student.

Based on the results of student work in Figure 3 and analysis of interview results, it was found that in the visual representation indicator, the reflective subjects drew sketches of the cube well so that they could be used to facilitate problem-solving in part b. The length of the rib, the size of the angle, and the placement of the point P, as the midpoint of the rib BF, are drawn precisely according to the request in the problem. An orthogonal line calculation using a projection comparison is also written. On the symbolic representation indicator, the reflective subject is able to make the Pythagorean Theorem equation correctly, namely $AP = \sqrt{AB^2 + BC^2}$, so that the length of AP can be obtained correctly. The reflective subject also writes what is known and asked according to the problem and is able to determine the cube surface area formula correctly and can solve it correctly. Then on the verbal representation indicator, the reflective subject writes the completion steps briefly and precisely. The reflective subject also rewrites the final result using words correctly.

(2) Students with Impulsive Cognitive Style

Based on the results of student work in Figure 4 and analysis of interview results, it was found that the indicator of visual representation, it can be seen that the impulsive subject sketched the cube well. The length of the rib, the size of the angle, and the placement of the point P, as the midpoint of the rib BF, are drawn precisely. However, the calculation of orthogonal lines using projection comparisons is not written down. On the symbolic representation indicator, the impulsive subject is able to make the Pythagorean Theorem equation correctly so that the length of the AP can be obtained correctly. The impulsive subject also writes the known and asked questions according to the questions and formula of the surface area of the cube correctly. The mistake of the impulsive subject is to find the surface area of the cube by using a 4 cm long rib, even though what is asked for in the problem is the AP rib length. It can be seen that the subject impulsive is in a hurry to do the problem and incorrectly entered the required rib length. This error causes the final results obtained at point b to be incorrect. Then on the verbal representation indicator, the impulsive subject writes the completion steps briefly and precisely. The results of the analysis of the mathematical representation ability of students above are made in general inference in Table 4.

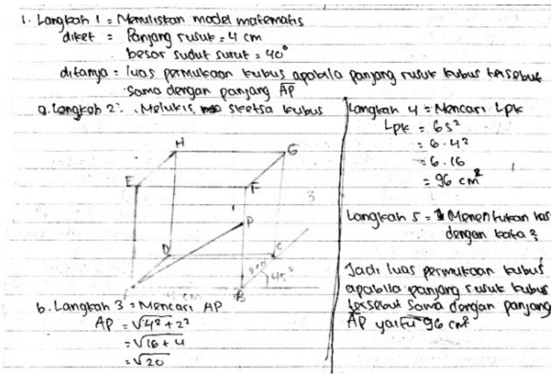

Figure 4. The examples work of the impulsive student.

Table 4. Results of Analysis of Mathematical Representation Capabilities of Research Subjects

Student's code	Cognitive style	Categories of Achievement on Mathematical Representation Indicators				
		Visual	Symbolic		Verbal	
			1	2	1	2
E-09	Re	SB	B	B	SB	B
E-24	Im	SB	SB	B	SB	B
E-23	Re	SB	B	B	SB	B
E-31	Im	B	C	SK	SB	SK

Explanation:
SB : Very Good
B: Good
C: Good Enough
SK: Not Good

The ability of mathematical representation in students with reflective cognitive styles is almost the same. The difference between reflective students E-09 and reflective students E-24 lies in the symbolic representation indicator 1, which is writing a mathematical model. E-24 reflective students write what they know is more complete than E-09 subjects. Conversely, the ability of mathematical representation in students with impulsive cognitive styles is almost always different. This is in line with Utomo's research (2017), which says that reflective students of class VII Salafiyah Syafi'iyah Middle School have the same ability of representation, and impulsive students have different mathematical representation abilities.

The ability of mathematical representation of students with reflective cognitive style is better than the ability of representation of students with impulsive cognitive style. Mistakes that are often made by students with impulsive cognitive style are errors in counting. In interviews, students with impulsive styles also mentioned that they often did not re-make corrections when they were about to collect the results of tests, so that when there was an error in contacting, they did not correct it. Errors in counting are also caused by students who are too hasty in answering questions, so the calculations are missed, and the results are not right. This is in accordance with the results of research conducted by Azhil et al. (2017), where students with impulsive cognitive styles check answers hastily and cannot provide solutions to their answers at the end of their answers. Nevertheless, there are still students with impulsive cognitive styles who have mathematical representation abilities that are almost the same as students with reflective cognitive styles. Therefore, in learning, teachers should pay attention to the cognitive style of students.

Learning must be able to improve students' mathematical representation abilities even with different cognitive styles. The Two Stay Two Stray learning model with product assessment can improve students' mathematical representation abilities, especially if group formation involves mixing students with reflective and impulsive cognitive styles, so they can work together. Therefore, one of the learning models that can be applied to improve the mathematical representation ability of students with different cognitive styles is the Two Stay Two Stray learning model with product assessment.

4. Conclusion

Based on the results of research and discussion, conclusions can be drawn, namely: (1) Mathematical representation ability of students on cube and beam material in Two Stay Two Stray cooperative learning with product assessment achieving completeness (2) The ability of mathematical representation of students in the Two Stay cooperative learning model Two Stray with product assessment is better than students' mathematical representation ability in the control class, and (3) cognitive style has a positive influence on mathematical representation ability in learning Two Stay Two Stray with product assessment with a coefficient of determination of 0.144 or an effect of 14.4 % of students 'mathematical representation abilities, and (4) students' mathematical representation abilities with Reflective-impulsive cognitive styles are as follows. In the aspect of visual representation, students with reflective and impulsive cognitive styles are able to make geometry drawings well and translate images to clarify problems well. But sometimes, students with impulsive cognitive styles make mistakes. In the aspect of symbolic representation, students with reflective cognitive styles are able to make mathematical models well and solve them by involving mathematical expressions correctly so that the right results are obtained. Impulsive cognitive style students are also able to make mathematical models well and solve them by involving mathematical expressions well, but errors often occur so as to obtain incorrect results. In the aspect of verbal representation, students with reflective and impulsive cognitive styles can write the completion steps clearly and correctly, but the indicators answer with words, students with impulsive cognitive style do not write it correctly because of the mistakes they made in previous calculations.

Based on the results of the study, suggestions that can be given by researchers for mathematics teachers in class VIII Junior High School 1 Bojong namely (1) Two Stay Two Stray learning with product assessment can be used as an alternative to develop students' mathematical representation abilities, especially in cube and beam material, with notes that products made by students can improve students' mathematical representation ability, (2) reflective subjects have better mathematical representation abilities than impulsive subjects, but do not rule out the possibility that impulsive subjects can match reflective subjects in their mathematical representation abilities, this shows that teachers need provide learning strategies that are appropriate to each cognitive style because cognitive styles have a positive influence on students' mathematical representation abilities, (3) Further research needs to be carried out to raise the same theme by using a more varied measuring instrument to increase the n students' mathematical representation ability so that they can improve this research better.

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