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The Attitude of Junior High School Students Toward Solving Mathematical Problems in Learning with a Jigsaw Cooperative Model

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***Abstract*— Problem-solving has an important role in mathematics education; therefore this study aims to explore the attitudes of students according to gender towards mathematical problem solving and the ability to solve problems in learning with a Jigsaw cooperative model. The attitude instrument and problem-solving test were given to 30 students of grade 9 junior high school after learning with a cooperative jigsaw model. The results showed a similarity in the ability to solve the problem of female and male students, and the correlation between those three components is positive and significant, meaning that those three components are consistent. Student attitudes affect their ability to solve problems. The research was finding that the Jigsaw learning model can bring up a positive attitude towards solving mathematical problems. Therefore it is suggested that teachers can bring up positive student attitudes towards solving mathematical problems with the Jigsaw learning model.**

Keywords: attitude, mathematical problems, Jigsaw cooperative model

I. INTRODUCTION

The background or the reason someone needs to learn to solve mathematical problems is the fact that people who can solve problems will live productively in the twenty-first century. People who are skilled at solving problems will be able to race with their needs, become more productive workers, and understand complex issues related to global society [1]. The ability to solve problems can be practiced at school, and one of the memorable subjects for practicing problem-solving is mathematical subjects [2-3]. This is by the demands in the 2013 curriculum, where students are required to develop skills in solving mathematical problems. TIMSS 2015 data that the average score in the acquisition of mathematics subjects is in the bottom order. Indonesia was ranked 44 out of 49 countries, obtaining a score of 397 [4].

According to Muhammad [5], one of the factors causing the low performance of Indonesian students is the weak ability of problem-solving non-routine or high-level problems, the evaluation system in Indonesia that still uses low-level questions and students are still accustomed to obtaining and using formal mathematical knowledge in class. The success of mathematics learning cannot be separated from the various factors that influence it. One factor that plays an important role is a factor that originates from students who are commonly called student characteristics. One of the characteristics of students in learning is attitude. Dimyati and Mudjiono [6] state that attitude is the ability to provide an assessment of something that carries itself by the assessment. So if a student has a happy attitude towards a lesson, he will try to learn the lesson he likes. According to Bruno (in [7]), "Attitude is a relatively settled tendency to act with good or bad ways towards certain people or goods." Thus the attitude is very influential in improving student learning outcomes because if students already have a happy attitude or tend to a lesson. This can affect the learning outcomes achieved by these students.

According to Hawkins and Mothersbaugh [7], the attitude has three components, namely: cognitive (trust), affective (feeling), and behavior (response tendency). The cognitive component consists of consumer trust in an object [8]. Affective components are feelings or emotional reactions to an object. The component of behavior is a tendency to respond with certain behaviors towards an object or activity [8].

Teaching and learning process is the core of educational activities at school. One of the principles in implementing education is students actively take part in educational activities carried out because the teaching and learning process is an interactive activity between two human elements. They are students as the learning party and the teacher as the party teaches. A learning process is said to be good if the process can generate effective learning activities, to obtain maximum learning results. Maximum learning outcomes can also be seen from how students' learning attitudes are classed during the teaching and learning process.

The learning process in each elementary and secondary education unit must be interactive, inspiring, fun, challenging, and motivate students to participate actively and provide sufficient space for initiative, creativity, and independence in accordance with the talents, interests, and physical and psychological development of students (Republic of Indonesia Minister of Education Regulation No. 41, 2007: 6). If we look closely at what is stated in the Ministerial Regulation, it shows that the active role of students in learning is a must. This shows that learning activities designed by the teacher must be oriented towards student activities.

One effort to develop problem-solving skills is to improve the learning process. The learning process can be improved by using learning models recommended by experts and researchers. One learning model that can be used to improve problem-solving skills is the Jigsaw cooperative model.

Jigsaw type cooperative learning model is a cooperative learning model that focuses on the work of small groups of students. The statement was the same as Lie stated [9] that the Jigsaw model of cooperative learning is a model of cooperative learning by means of students learning in small groups. They consist of four to six heterogeneous people, and students work together on positive and responsible interdependence independently.

According to Rusman [10], this jigsaw learning model is also known as cooperative experts, because members of each group are faced with different problems. However, the problems faced by each group are the same; we call them a team of experts whose task is to discuss the problems faced. Next, the results of the discussion are taken to the original group and delivered to the group members.

Jigsaw type cooperative learning allows students to be able to discuss, think, express opinions, analyze peers 'opinions so that students' reasoning abilities will be trained continuously. Slavin [11] explains that in Jigsaw type cooperative learning, students are assigned to groups of five team members to work on academic material that has been broken down into sections for each member. The teacher assigns students to discuss in teams and then assigns the responsibility of each member to teach the other members.

This research was conducted to find answers about the attitudes and abilities of junior high school students towards solving mathematical problems in learning using a Jigsaw cooperative model. The sub-problems of this research are stated by:

- Do the scores of students' attitudes towards problem-solving differ from each other by gender?
- Are the scores of students' attitudes towards problem-solving different from each other based on
- Components of attitude?
- What is the relationship between the three components of attitude to see the consistency of cognitive, affective, and conative components?
- Do students' abilities in problem-solving differ from one another by sex?

II. METHODS

This research uses a descriptive survey model. The descriptive survey model aims to reveal the situation as it was then or now [12]. In collecting primary data, researchers used a questionnaire with a Likert scale and a semantic differential scale. Likert scale is the most popular form of attitude scale, because it is easy for researchers to prepare and interpret, and easy for consumers to answer. They mark or write numbers that correspond to their level of "agree" or "disagreement" with each of a series of statements that describe the attitude towards the object being studied [13]. This Likert scale is used to measure the cognitive, affective, and behavioral components.

The format of the questions used in this questionnaire is close-ended questions, where respondents are given a choice in answering these questions. The questionnaire was created by making questions that are divided based on three components of attitude, namely the cognitive component, the affective component, and the conative component.

Respondents were selected using a convenience sample, where the researcher chose members of the population who could be reached to gather information (Schiffman and Kanuk, 2010: 64). In this case, the respondents chosen were students from the class supported by researchers consisting of 30 students of class IX in junior high school, 11 people (37%) were male, and 19 people (63%) were female. Processing data collected using the SPSS 23 program so that the results of the analysis are obtained with accurate results. The researcher analyzes the data obtained by using correlation analysis because the researcher wants to find out how the relationship between the three components of the attitude, to see how the consistency of the three components. Also, the researchers used an independent t-test to find out if there were significant differences in the attitudes of students towards mathematical problem solving between male students and female students

III. RESULTS AND DISCUSSION

The data obtained from the questionnaire is qualitative and therefore the data must be transformed into quantitative data, where data from qualitative to quantitative are as follows: (a) Alternative answers 1 / Strongly agree/are given a weight of 5, (b) Alternative answers 2 /agree/given weight 4, (c) Alternative answer 3 / less agree/given weight 3, (d) Alternative answer 4 / disagree/given weight 2, (e) Alternative answer 5 / strongly disagree/give weight 1. With SPSS 23 computer program assistance, analysis of the results of students' attitude questionnaire answers in this study (items no. 1-22) can be seen in the following table:

TABLE I. RESULTS OF INDEPENDENT T-TEST SCORES OF STUDENTS 'ATTITUDE SCALES FOR MATHEMATICAL PROBLEM SOLVING' BY GENDER.

	Gender	N	Mean	Sd	t	p
Cognitive component	Male	11	30.27	3.74	1.09	0.286
	Female	19	28.21	5.58		
Affective component	Male	11	29.91	4.45	-3.127	0.004
	Female	19	35.05	3.96		
Conative component	Male	11	14.45	1.97	-5.392	0.000
	Female	19	18.63	2.09		
The Total Score	Male	11	82.73	9.45	1.32	0.878
	Female	19	77.95	9.60		

From table 1 above it can be seen that there are significant differences between male and female students in the affective component of problem-solving ($t = -3,127$, $p < 0.05$) and the conative component ($t = -5,392$, $p < 0.05$). On the other hand, it is seen that there is no significant difference in the attitudes of students by sex towards problem-solving on the cognitive component ($t = 1.09$, $p > 0.05$) and on the total score of student attitudes ($t = 1.32$, $p > 0.05$).

TABLE II. THE INDEPENDENT T-TEST RESULTS FROM STUDENTS' ABILITY TO SOLVE MATHEMATICAL PROBLEMS BY GENDER.

	Gender	N	Mean	Sd	t	p
Problem-solving abilities	Male	11	75.91	20.10	1.44	0.884
	Female	19	79.74	22.20		

Based on table 2, for students' problem-solving abilities, it appears that there is no difference in problem-solving abilities between male students and female students ($t = 1.44$, $p > 0.05$)

TABLE III. PEARSON CORRELATION OF COGNITIVE COMPONENTS, AFFECTIVE COMPONENTS, AND CONATIVE COMPONENTS

Correlations				
		COGNITIVE	***AFFECTIVE***	***CONATIVE***
COGNITIVE	Pearson Correlation	1	,704**	,366*
	Sig. (2-tailed)		,000	,046
	N	30	30	30
AFFECTIVE	Pearson Correlation	,704**	1	,501**
	Sig. (2-tailed)	,000		,005
	N	30	30	30
CONATIVE	Pearson Correlation	,366*	,501**	1
	Sig. (2-tailed)	,046	,005	
	N	30	30	30
a. **. Correlation is significant at the 0.01 level (2-tailed).				
b. *. Correlation is significant at the 0.05 level (2-tailed).				

The relationship between the three components of cognitive, affective, and conative attitudes can be seen in Table 3, which was obtained with the help of the SPSS 23 computer program. From Table 3, it appears: There is a significantly strong and positive relationship between the cognitive component and the affective component with a correlation of 0.704 and $p < 0.05$.

From the analysis of the relationship between the cognitive component and the conative component, a correlation of 3,366 was obtained with $p < 0.05$. It states that there is a significant and positive relationship between students' attitudes on the cognitive component and the conative component.

For the affective component and the conative component, the results of the data analysis shown in table 3 show a correlation of 0.501 with $p < 0.05$. This means that there is a significant relationship between the conative component and the affective component.

The results of the study show the type of jigsaw cooperative learning has a positive impact in terms of student attitudes and students' problem-solving abilities. This is in line with the opinion of Tran & Lewis [14], who concluded that Jigsaw's cooperative learning gives positive results on students' attitudes in learning and social relationships between friends

in a pleasant learning environment. In theory, the goal of using cooperative learning is to be able to improve thinking skills, solve problems, and integrate and apply their abilities and knowledge [15]. This is by the study of Johnson &Holubec [16], which says in cooperative learning with an interpersonal exchange will encourage the use of thinking strategies with higher levels, higher levels of reasoning, and metacognitive strategies. In addition, the results of the research Dwi Astuti Rin&Maman Agus Abadi [17] stated that with cooperative learning the type of jigsaw students can explain and elaborate what has been learned, listen to the perspectives and ideas of others, monitor the participation and contribution of each other, give each other feedback, and engage in intellectual conflict.

The results of the data analysis showed that the problem-solving ability of male and female students in Jigsaw type cooperative learning was in the good category with an average of 75.91 for male students and 79.74 for female students, this is in line with the results of research by Suherman et al. [18] showing problem-solving abilities, attitudes, self-confidence and the ability to think critically of the students can be improved through cooperative learning.

IV. CONCLUSION

Research has shown that students' attitudes towards mathematical problem solving and mathematics learning with a Jigsaw cooperative model can have an impact on mathematical problem-solving abilities. From the results of data analysis, it was found that there were no significant differences in the scores of students' attitudes and problem-solving abilities viewed from gender. For the affective component and the conative component, there are significant differences between male and female students. The correlation between the three components, namely the cognitive component, the affective component, and the behavioral component show that there is a significant relationship, which means that changes in one component will cause changes in the other components, and the changes are positive, which means that the three components are consistent. Finally, the positive attitude of students towards solving mathematical problems can be elicited with the Jigsaw learning model.

From the research results, it is suggested that teachers can bring up positive student attitudes towards solving mathematical problems with the Jigsaw learning model.

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