THE DIFFERENCE OF MATHEMATICAL DISPOSITION BASED ON LEARNING MODELS CPS AND DT IN MATHEMATICS LEARNING FOR SECONDARY GRADERS

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ABSTRACT

This study aims to determine a significant contribution to apply learning model of creative problem solving (CPS) and the direct teaching (DT) of the mathematical disposition of junior high school students. Research was using quasi-experimental approach to the subject of research students in SMP 2 Makassar. The results showed as follows: (1) there is a change in the disposition of students' mathematical learning model as changes due to lack of activity of students to engage in building strategic competence; (2) score disposition of mathematical models of CPS and DT together included in the fair category, but with a score of 57.89% achieved by the DT model outperformed the model CPS with a score of 42.11%. (3) By learning model CPS would be able to boost students' math learning outcomes indicated by the large percentage of 78.95%, whereas the model DT by 68.42%.

Keywords: Learning Model CPS, Learning Model DT, Mathematical Disposition

A. Introduction

The development of mathematics in school activities is not only directed at the cognitive aspects, but also affective and psychomotor. In mathematics learning objectives at primary school level and secondary school, attitude appreciate the usefulness of mathematics in everyday life, an attitude of curiosity, attention and interest to the study of mathematics, as well as a tenacious attitude and confidence in problem solving (BSNP, 2006: 140), an objective that is targeted in a learning activity, including mathematics.

Learning math is not just related about learning concepts, procedural, and its application, but also related to the disposition of the interest and the interest in mathematics (NCTM, 1989). Development of interest and interest in mathematics will form a strong tendency called mathematical disposition.

The importance of disposition in mathematics is the tendency to form conscious, organized, and voluntary certain behavior that leads to the achievement of certain goals for learners of mathematics. In the context of mathematics, mathematical disposition (mathematical disposition) relates to how students perceive and solve problems; is confident, diligent, interested, and flexible thinking to explore a variety of alternative problem-solving strategies (Katz in Mahmudi, 2010: 5).

The results of preliminary observations on learning activities in class VII SMP Negeri 2 Makassar showed that, besides not achieving the expected standard of achievement of competencies,

the indicators showed that the students easily bored to learn math so that it is considered that they are somewhat lower interest to learn the subject matter of mathematics. Learning situations which do not support their motivation and enthusiasm in learning impact on the tendency of passive students so that students find it difficult to understand the subject matter of mathematics is given.

Based on TIMSS 2011, report on attitudes towards mathematics shows that the Indonesian students who enjoy learning mathematics are still below the international average. However, please math attitude can not be viewed as a whole of a mathematical disposition. This is because the mathematical dispositions are seen as more than just how to please students of mathematics (NCTM, 1989: 233). Although attitudes enjoys mathematics can not be regarded as a disposition as a whole, the attitude can be the foundation for foster a positive attitude, such as self-confidence, interest in mathematics, see the usefulness of mathematics, and others.

Katz (in Mahmudi, 2010: 5) defines a disposition as a tendency to behave consciously, frequently, and voluntary to achieve certain goals. These behaviors include self-confident, persistent, curious, and flexible thinking. In the context of mathematics, according to Katz (in Mahmudi, 2010: 5) mathematical disposition relates to how students solve problems mathematically; is confident, diligent, interested, and flexible thinking to explore various alternative resolution. In the context of learning, mathematical dispositions related to how students ask, answer questions, communicate ideas mathematically, working in groups, and solving problems.

To support the achievement of the expected disposition process, according to Karen (in Rosalin, 2008: 57), the creative problem solving (CPS) is a learning model that is centered on problem solving skills, followed by strengthening creativity. With this model is expected to generate interest at a time of creativity and pleasure in studying math students so that learning outcomes satisfactorily.

Looking at the result that model CPS is able to bring advance of problem solving skills in learning mathematics, then what about model direct teaching in learning process. Because of this, experiment research is chosen to organize treatment CPS compared with model direct teaching (DT). To know that, this paper reveals the disposition difference mathematically generated when the CPS or DT models are applied. More specifically, the information relating presented in the next section.

B. Method

This research is a quasi experiment involving two groups of students were given a different treatment. The first group received treatment model of CPS, the second group received treatment in the form of model DT.

Experiment unit in this study is graders VII of SMP Negeri 2 Makassar academic year 2013/2014 in the second semester. The sample is determined by using purposive random sampling method with the following steps: (1) Form 2 class groups from the entire class VII SMP Negeri 2 Makassar. In this study the selected class is a class that is considered homogeneous based on interviews with teachers of mathematics at the school. (2) After two classes are formed, they were chosen at random to determine the experimental class and control class. Then, one class with CPS is an experimental class and another one was treated with model DT that control class. Two different types of treatment will be studied influence.

This research activity begins with a preparatory phase in which researchers conducted preparatory learning tools that will be used in implementing the learning process. Learning device may include lesson plan, Student Worksheet, the test result of learning, learning practicality sheet and questionnaire of mathematical disposition.

Then followed the implementation stage in which the use of classroom learning model CPS for experimentation, and implementation of direct teaching model to control classes tailored to lesson plan which have been prepared. Step-by-step learning is as follows:

Table 1. Steps Learning and Teaching Creative Problem Solving and Direct Teaching

Creative Problem Solving (CPS)	Direct Teaching
1) Teacher ask information 2) Teachers prepare worksheets that have been created for the learning process. 3) Teacher make grouping 4) Teacher delivers students worksheet to each groups. Students are working together to solve the problems in the given worksheets. 5) Then the students were given a chance to express the idea as much information about an alternative solution to the problem that is supplied with each group. 6) Each group presented the group's work and other groups to respond. 7) Teacher and students clarify existing problems in these activities so that students know the solution is expected from these activities to be proposed in the classroom. 8) Teacher directs drawing conclusions about optimal solutions of various opinions of each group.	1) Teachers communicate its goals and prepare students. 2) Teachers demonstrate skills properly, or provide information stage by stage. 3) Teachers provide guidance early training. 4) Teachers check students' understanding by providing feedback. 5) Teachers provide opportunities for advanced training.

Data collection is done after the learning process carried out on the strand of Quadrilateral in both groups, with the following steps:

a. Giving achievement test in both groups after treatment. Achievement test used is subjective tests in the form of an essay by the number of about five items that had previously been validated by a validator competent in making the questions on the subject of Quadrilateral figure.
b. Distributing questionnaires mathematical disposition in both groups after treatment. Where questions in the questionnaire were 40-point declaration had been previously validated.
c. During the test work, supervision tightened so that students do not cooperate.
d. After data collection is complete, the examination is to give a score to the students' answers.

The research instrument used consisted of achievement test and questionnaire mathematical disposition. For the achievement test used is a test that includes the subject matter of mathematics. While indicators on mathematical disposition contains seven components: (1) confidence in solving mathematical problems, communicate ideas, and give reasons; (2) flexibility in exploring mathematical ideas and try different alternative methods to solve problems; (3) is determined to complete the tasks for mathematics; (4) linkages, curiosity, and the ability to find in doing mathematics; (5) the tendency to monitor and reflect on the process of thinking and performance of self; (6) assessing the application of mathematics in other fields and in everyday life; and (7) the award (appreciation) the role of mathematics in culture and values, both of mathematics as a tool, as well as the language of mathematics. Mathematical disposition questionnaire was given to the students after the treatment.

Observations carried out in the experimental class and control class, learning practicality observation sheet is used to obtain data on the achievement of teachers in the provision of treatment in the classroom, so that in the implementation of learning is really in accordance with the conditions and the process is expected. The basic concept of the preparation of the instruments of observation in this regard is the implementation of learning theories and procedures used in this study, namely the application of CPS and DT Model.

For data analysis techniques used in this study consists of, firstly, analysis of learning Practicality done in two steps, ie determining the frequency of observations for each activity in one meeting, and the

percentage of feasibility study by dividing the amount of frequency by the number of frequencies to all indicators, and then multiplied by 100%. Then, the test results and the disposition of mathematical study used a descriptive statistical analysis, the methods used to collect, process, and present data in the form of figures, tables, or graphs (Tiro & B. Ilyas, 2010: 4). For the purposes of categorization, scores of student learning outcomes qualitatively categorized by the Ministry of Education by (Purwanto, 2012: 33) are as follows :

Table 2. Interpretation Category Value of Learning Outcomes

Score Interval	Category
90 – 100	Very High
80 – 89	High
65 – 79	Fair
55 – 64	Poor
< 55	Bad

For the purposes of this analysis, compiled a minimum completeness criteria (MCC) students in learning that apply in schools where research, namely:

Table 3. Minimum Completeness Criteria

Score Interval	Category
< 70	Incomplete
≥ 70	Complete

Source: SMP Negeri 2 Makassar

Then, data on mathematical disposition was interpreted using category table below using a Likert scale:

Table 3. Mathematical Disposition Category

Average Score	Category
Skor < 60%	Very Low
60% ≤ Skor < 70%	Low
70% ≤ Skor < 80%	Fair
80% ≤ Skor < 90%	High
Skor ≥ 90%	Very High

Source: Sugilar (in Muslim, 2013: 38)

C. Result

Analysis of Practicality Learning Model

Learning practicality that is observed is teacher's activities in managing learning in classes that implement creative problem-solving learning model (CPS). After observations made visible that the learning process in classes taught using

creative problem solving learning model (CPS) is measured by percentage of 97.50% on its appropriateness.

Based on observations at the first meeting there was a learning phase is not implemented. The teacher motivated students to convey the usefulness of the material to be studied, on the second and third meeting all the stages of learning has been implemented based on the existing lesson plan and the last four meetings there was a learning phase that is not implemented according to the existing lesson plan. Based on this, it was concluded that prior to the implementation of the test result of learning, the learning process is carried out in the experimental class taught using CPS model has been implemented in accordance with existing lesson plans.

Learning practicality that was observed teachers is teacher activities in managing learning in the classroom using direct teaching. Based on the information obtained by observation sheet of learning practicality, it can be concluded that the learning process in classes taught using implemented model of Direct Teaching with its appropriateness percentage is 96.43%.

Based on observations at the first meeting of all stages of the learning accomplished in accordance with the existing lesson plan, the second meeting there was a stage that does not happen is to close the lesson with greetings and pray, while for the third meeting there was also a stage that does not happen that teachers motivate students to deliver usability the material to be studied and the fourth meeting overall learning process carried out in accordance lesson plan there. Based on this, it was concluded that prior to the implementation of the test result of learning, the learning process is carried out in the control classes taught using the direct teaching model has been implemented in accordance with existing lesson plans.

Statistical results relating to the score of learning mathematics of experimental class, if the result of learning mathematics students were grouped into five categories, the obtained distribution and percentages as follows:

Table 4. Distribution and Percentage of score learning mathematics using CPS model

No	Score	Category	Frequency	Percentage
1	0-54	Very Low	0	0%
2	55-69	Low	5	26,32%
3	70-79	Fair	4	21,05%
4	80-89	High	6	31,58%
5	90-100	Very High	4	21,05%
Total			19	100%

Table 4 above shows that of the 19 students of class VII SMP Negeri 2 Makassar, there are students who scored very low or 0%, while in the 55-69 interval contained 5 or 26.32% of students who received grades that are in the same range or in the low category, meaning the majority of obtaining good results seen as most students are scattered in the category of medium, high and very high. There are 4 students or 21.05% were scored at the interval 70-79, and 6 or 31.58% of students scored at the interval 80-89, and 4 students or 21.05% scored in the interval 90-100. There is 6 students at a high category. Thus, the average scores of learning outcomes are taught with CPS model at the high category. In the form of a bar chart becomes as shown below.

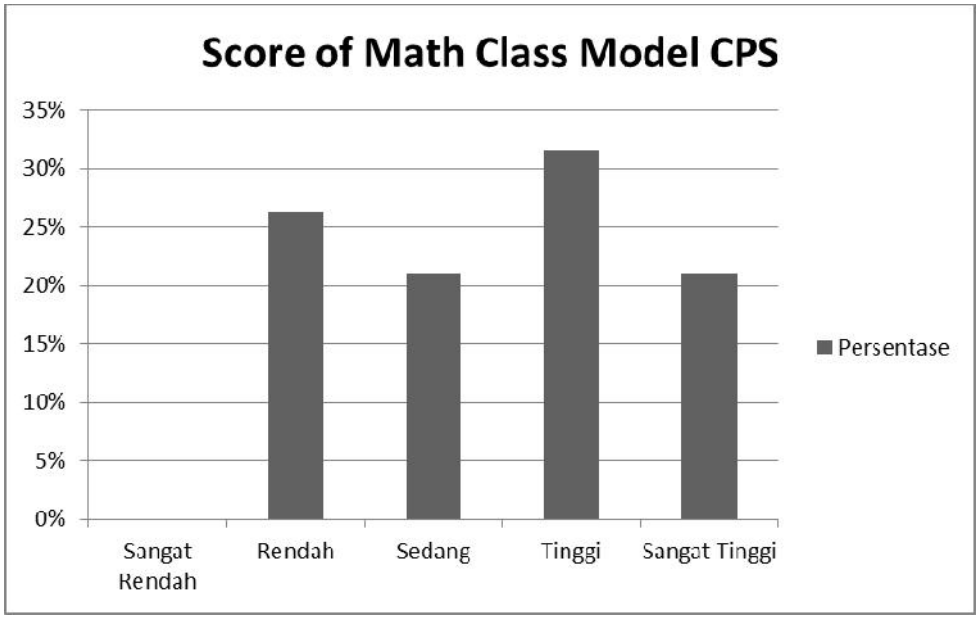

Figure 1. Percentage of mathematical learning score for students who taught using model CPS

If it is associated with completeness minimum criteria (CMC) imposed by the school, a student said criteria pass the study if it has the value of at least 70. From the diagram above shows that the number of students who meet the CMC is 15 students or 78.95%, while the number of students which does not meet the CMC is 4 students or 21.05%.

Statistical results relating to the outcome variables studied mathematics scores of students taught using model DT is presented in the table distribution and percentages as follows:

Table 5. Distribution and Percentage of score learning mathematics using model DT

No	Score	Category	Frequency	Percentage
1	0-54	Very Low	4	21,05%
2	55-69	Low	6	31,58%
3	70-79	Fair	9	47,37%
4	80-89	High	4	21,05%
5	90-100	Very High	1	5,26%
Total			24	100%

Table 5 above shows that of the 24 students of class VII SMP Negeri 2 Makassar, there are 4 students or 21.05% which is in the interval 0-54 or at the very low category, at intervals of 55-69 there were 6 students or 31.58% which obtained a value that is on the range or in the low category, terapat 9 or 47.37% of students who scored at the interval 70-79, and 4 students or 21.05% scored in the interval 80-89, and 1 student or 5.26% scored at intervals of 90-100. It seems that there are 9 students in the fair category, meaning that using DT model students' scores are mostly located at intervals of 70-79. However, more than 50% of their scores is higher or equal to 55. In the form of a bar chart becomes as shown below.

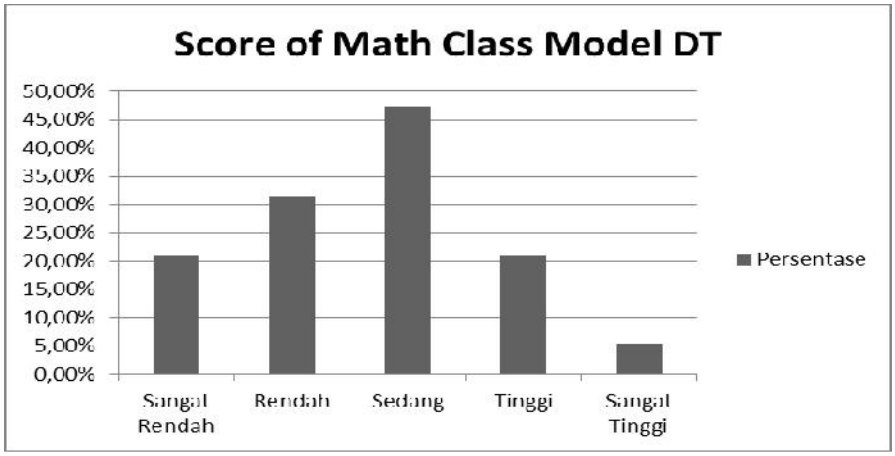

Figure 2. Percentage of mathematical learning score for students who taught using model DT

If it is associated with Completeness Minimum Criteria (CMC) imposed by the school, then the number of students who meet the CMC as many as 13 students or 68.42%, while the number of students who do not meet the CMC as many as 11 students or 57.89% of students.

Analysis of Students' Mathematical Disposition

Statistical results relating to the disposition of a mathematical variable score in the experimental class taught using creative problem solving learning model are presented in Table 6 below:

Table 6. Distribution and Percentage of score of mathematical disposition posttest students who taught using model CPS

No	Score	Category	Frequency	Percentage
1	Skor < 60%	Very Low	0	0%
2	60% ≤ Skor < 70%	Low	3	15,79%
3	70% ≤ Skor < 80%	Fair	8	42,11%
4	80% ≤ Skor < 90%	High	7	36,84%
5	Skor ≥ 90%	Very High	1	5,26%
Total			19	100%

In the table 6 above shows that of the 19 students of class VII SMP Negeri 2 Makassar, there are no students who received grades are very low or 0%, while in the very low category there are 3 students or 15.79%. This means that the majority of obtaining good results seen as most students are scattered in the category of medium, high and very high. There are 8 students or 42.11% are in the fair category, 7 students or 36.84% were in the high category, and one student or 5.26%

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are at very high category. So the average score of students taught mathematical disposition with creative problem-solving learning model in fair category. Frequency distribution of scores disposition of mathematical students taught using creative problem solving learning model shown in the bar chart below.

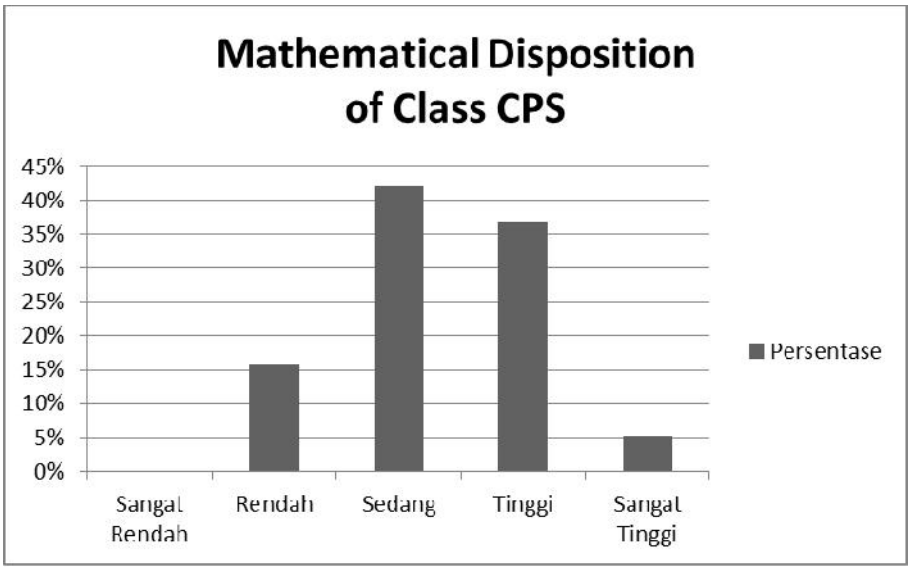

Figure 3. Percentage of mathematical disposition score of students who taught using model CPS

Meanwhile, the statistics relating to the mathematical disposition of the variable scores taught using model DT is presented in the table as follows:

Table 7. Distribution and Percentage of score of mathematical disposition posttest students who taught using model DT

No	Interval Score	Category	Frequency	Percentage
1	Skor < 60%	Very Low	0	0%
2	60% ≤ Skor < 70%	Low	1	5,26%
3	70% ≤ Skor < 80%	Fair	11	57,89%
4	80% ≤ Skor < 90%	High	9	47,37%
5	Skor ≥ 90%	Very High	3	15,79%
Total			24	100%

Table 7 above shows that there are students who scored very low or 0%, while in the low category there is one student or 5.26%. This means that the majority of obtaining good results seen as most students are scattered in the category of medium, high and very high. There are 11 students or 57.89% are in the fair category, nine students or 47.37% were in the high category, and 3 students or 15.79% are at very high category. So the average scores of students who are taught mathematical

disposition with model DT in fair category.

The following learning outcomes frequency distribution math scores of students taught using model DT shown in figure 4

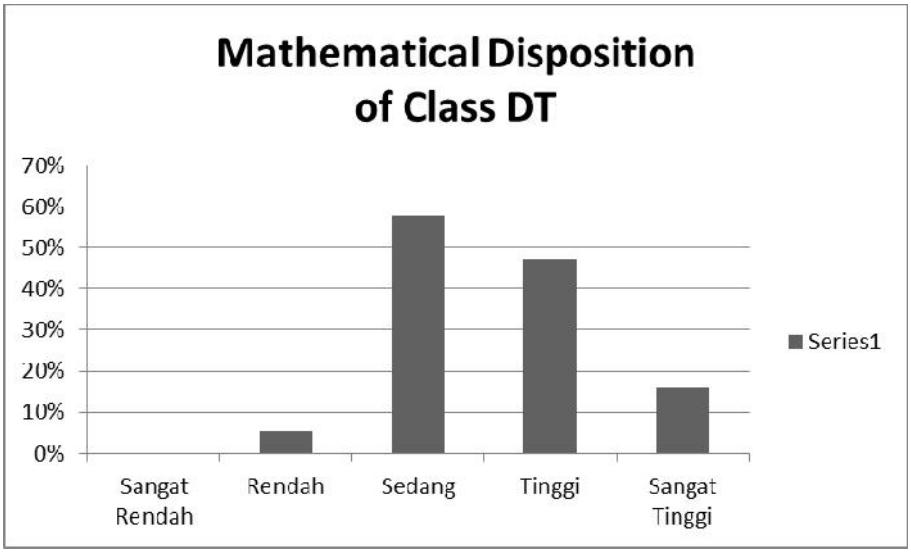

Figure 4. Percentage of mathematical disposition score of students who taught using model DT

With inferential statistical analysis obtained by value of the relationship between learning model with mathematics learning outcomes give F value of 4.380 with significance value 0.043 at the 0.05 significance level. This shows that there are differences in learning outcomes caused by differences in learning model. And when seen from the results of the analysis obtained by value p-value $<\alpha$ ie 0.010 <0.05, which indicates that the average posttest scores of students taught using creative problem solving learning model is greater than 70 (CMC). Thus, it can be concluded that there are significant use of creative problem-solving learning model for mathematics learning outcomes of students.

Further to the results of the analysis of the relationship between learning mode and mathematical disposition giving F-value of 0,656 with significance 0.423 greater than the significance level of 0.05. That is, there is no difference mathematical disposition caused by differences in learning model. Thus, it can be concluded that there is no effect of the use of model CPS significantly to the mathematical disposition.

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Discussion

According to the National Council of Teachers of Mathematics (1989), mathematical disposition includes seven components. The components were as follows, (i) confidence in using mathematics, (ii) flexibility in working math, (iii) persistent and tenacious in doing mathematical tasks, (iv) full of curiosity, (v) to reflect on the ways of thinking, (vi) appreciated the application of mathematics, and (vii) to appreciate the role of mathematics.

The components of mathematical disposition above is contained in the affective domain of mathematical competence is the goal of mathematics education in the school curriculum by 2006 are as follows, Having respect for the usefulness of mathematics in life, which has curiosity, attention and interest in studying mathematics, as well as a tenacious attitude and confidence in solving problems (Departemen Pendidikan Nasional, 2007, p. 346). It is concluded that the development of a mathematical disposition became one of the goals of the curriculum in 2006.

According to Kilpatrick, Swafford, and Findel (2001), mathematical disposition is a tendency (i) view of mathematics is something that can be understood, (ii) feel mathematics as something useful and beneficial, (iii) believes that diligent and tenacious effort in studying mathematics will to fruition, and (iv) acts as learners and workers effective mathematics.

Therefore, the research activities have been a model of learning that then compared between the model of creative problem-solving learning and direct teaching model. For the first model is not uncommon implemented by teachers in the classroom, compared to the second model. In addition to knowing the level of significance of the effect caused by both models, mathematical disposition in learning mathematics is not easy to be grown.

In addition, the dispositions of mathematics students thrive when they learn other aspects of competence. For example, when students build strategic competence in solving non-routine problems, their attitudes and beliefs as a learner becomes more positive. The more the concept is understood by a student, the student is more convinced that math can be controlled. Conversely, if students are rarely given the challenge of mathematical problems to be solved, they tend to be memorized of the follow ways appropriate to learn mathematics, and they begin to lose confidence as learners. When students feel themselves capable of learning mathematics and use them in solving the problem, they can develop the skills and

reasoning skills using adaptive procedures. Disposition of mathematics students is a major factor in determining the success of their education (Kilpatrick, Swafford, and Findel, 2001).

As the results obtained from the implementation of the study in which the ability of a mathematical disposition seventh grade students of SMP Negeri 2 Makassar active learning activities through creative problem solving learning model average scores in middle category (42.11%) and the disposition of mathematical students who are taught by Direct use of teaching models are also in the fair category (57.89%). By doing so, change the model did not significantly change in the disposition of mathematical students in learning mathematics. But the mathematics learning outcomes are more affected by the use of creative problem-solving learning model for mathematics learning outcomes of students of class VII SMP Negeri 2 Makassar.

In line with that has been done by Mulyana (2012) on MPMK not affect the increased mathematical disposition students, as well as at each school level. However, the application MPMK supposed to influence both the increase in the disposition of the students, when implemented in a fairly long time, because to develop students' mathematical disposition should be given more opportunities to master math, realize the benefits of perseverance, and feel the advantages of mastering mathematics (Kilpatrick, Swafford , and Findell, 2001).

Demand learning model is the students' creative problem solving required to always be active during the learning takes place, which is active to find a creative solution to the problem, is also actively interact with other students through group discussions and class discussions, students are not just passively receive information that is transferred by the teacher, but the students play an active role in exploring the information required in accordance with a predetermined learning indicators. However, learning situations such as this right has not been fully inspire students participating in learning activities as expected.

D. Conclusion

Based on the results of research and discussion of the conclusions of this study can be stated as follows.

- No change in the disposition of students' mathematical learning model as changes caused by the lack of involvement of the student to be involved in building strategic competence. As a result, students tend to be memorized of the follow ways appropriate to learn mathematics, and

they begin to lose confidence as learners.

- Score of mathematical disposition between class CPS and class DT are equal at the same category, namely fair category, but with a score of 57.89% achieved by model DT outperformed model CPS with a score of 42.11%. In other words, most students still tend to be attracted to older models.
- With the model CPS would be able to boost students' mathematics learning outcomes indicated by the large percentage that is 78.95%, whereas model DT by 68.42%.

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