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dan

**Fakulti Pendidikan dan Pembangunan Manusia
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September 2012

Preface

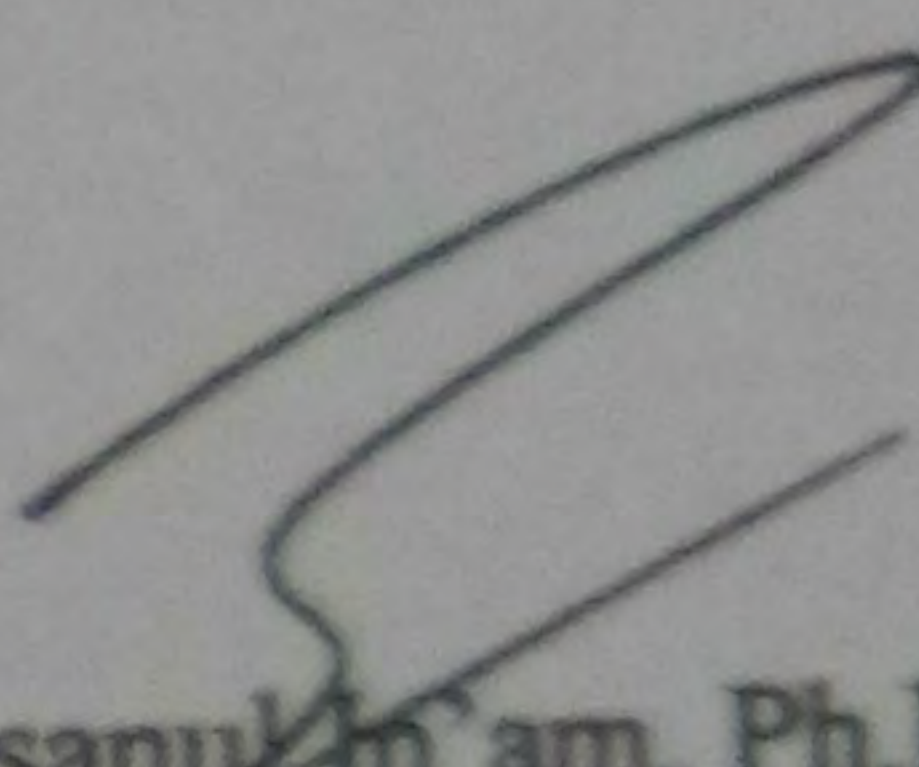
The betterment of the quality of education may be made by improving the quality in the teaching learning process either in or out of the classroom. Therefore, the Educational Policy and Development Department, Graduate Program, University of Muhammadiyah Malang has made some cooperations with either domestic or foreign institutions. And one of the cooperations has been built with Universiti Pendidikan Sultan Idris Tanjongmalim Perak Malaysia since 2009.

During the last three years, students of Educational Policy and Development Department, Graduate Program, University of Muhammadiyah Malang (UMM) has done field studies by visiting schools and universities in Singapore, Malaysia and Thailand. An this year, on the basis of the MoU made between the UMM and University Pendidikan Sultan Idris, on Saturday, September 8, 2012, an international seminar was held in Universiti Pendidikan Sultan Idris.

The participants of this International Seminar are students and lectures of University of Muhammadiyah Malang, University of Muhammadiyah Gresik, University of Muhammadiyah Ponorogo and also those from Universiti Pendidikan Sultan Idris. In this seminar, held in the hall of Fakultas Pendidikan dan Pembangunan Manusia (FPPM) UPSI, the main presenters are the Dean of FPPM UPSI, Prof. Madya Dr. Noorshah Saad, Prof. Dr. Setyo Budi from University of Muhammadiyah Gresik, Indonesia and Dr. Sambari Halim Radianto.

Last but not least, it is expected that this seminar may be beneficial for all the participants, especially the students of the Educational Policy and Development Department, Graduate Program University of Muhammadiyah Malang after they get opportunities to apply knowledge they got from their learning activities in the campus.

Tanjongmalim Perak, September 8 2012
Editor



Akhsanul Hamam, Ph.D

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TRACING THE STUDENTS' METACOGNITION IN SOLVING MATHEMATICS PROBLEM IN STAIN TULUNGAGUNG

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Abstract: The research aims are: 1) to describe the students' metacognition in solving mathematical problem in STAIN Tulungagung, 2) to describe the level of the students' metacognition in solving mathematical problem in STAIN Tulungagung. This type of research is qualitative; the data collection methods that are used are test, metacognitive questionnaires and interviews. Tests are conducted in order to determine the troubleshooting procedure, metacognitive questionnaire are undertaken to determine the level of student metacognition, and interviews are conducted in order to get data to support the analysis of the students' metacognitive level. The analysis showed that the mean score of the students' perceptions of metacognitive treatment way of the four metacognitive aspects, i.e., aspects of self-evaluation has the lowest mean score of 2.74, among the other four metacognitive aspects. Meanwhile, the highest mean score is the aspect of consciousness with the score of 3.03 and thoroughly the obtained mean is at 2.91 and is included in good category. Thus it can be said that the general perception of the third semester students of A class of the Mathematics Study Program of metacognitive treatment way in solving calculus problems is in good category. This may help students in the process of thinking in solving problems in calculus so that it can assist to determine the stage of the finishing process to obtain the correct results.

Keywords: Metacognitive, Problem Solving of Mathematics

In the effort to improve the quality of teaching and learning in Indonesia, the government always reform the curriculum. Some of the reforms which have been implemented are the improvement on the curriculum for senior high school in 2004. The curriculum of 2004 was improved to develop the standard of competency and the basic competency into the operational curriculum tingkat satuan pendidikan, called as Kurikulum Tingkat Satuan Pendidikan which is abbreviated as KTSP (Mulyasa E, 2006).

The process of teaching which is conducted in relation to cognitive, affective and psychomotoric fields and accompanied by metacognitive teaching will enable the improvement of the students awareness to what has been learned. The result of the learning is called qualified when the students consciously able to controll their cognitive process continuously; additionally this will give an effect on the improvement on their metacognitive ability.

Teaching the students by using the old paradigm (monotonous) that is using homogeneous strategy of learning, and the source of learning relies too much on the use of textbook, in fact, results in graduates who really appreciate similarity and cannot accept difference. Different behaviour is seen as mistake which should be punished, consequently this will hamper the ability to think critically, the ability to think creatively, and the ability to solve problems (Ibrahim and Suparmi, 2009). The focus of Mathematics learning is problem solving approach. It is implemented to give enough knowledge to the students in order to have the ability to solve various problems in Mathematics and to acquire knowledge and to form particular mindset and treatment in solving the problems. This has a very close relation with one's character building, both in solving problems that he/she face and his/her daily attitude.

Metacognitive relates to the student's knowledge on their own mindset and their ability to use particular learning strategy precisely. Therefore, they can be taught with strategies to evaluate their own understanding, to count the time they need to study something and choose an effective plan to study and solve problem (Trianto, 2007). In order to get the optimum result in solving Mathematics problem, well-organized steps must be implemented. So that it enables a systematical problem solving to be carried out and the result is not only a correct solving but also a well-structured mindset when solving the problem.

One of the forms of Mathematics problem is an *open-ended* problem. It is a problem which needs more than one correct answers or a problem which needs various strategies to get one correct answer. Therefore, in solving *open-ended* problem holistical and systematical ways of thinking are needed, especially to draw strategy in showing alternatives for the correct answers or strategies heading towards one correct answer for the given problem (Siti Khabibah, 2006).

Metacognitive has strong relationship with problem solving. It also plays important role in it, especially in solving Mathematics problem with an *open-ended* type. Metacognitive is a process where someone thinks about his/her mindset, which involves an active control in arranging and evaluating one's way of thinking.

According to Suherman, Metacognitive is a word having relation with knowledge on him/herself as a student and the way he/she controls and adjust his/her attitude (Suherman, 2001). One's success in solving problem relies much on his/her awareness on what he/she knows and the way to implement it.

A book entitled *Models of Teaching* mentions that in metacognition there is a process of "letting the student in on the secret," so that students can build their own knowledge and ability, decide one particular learning strategy to use, solving problem, and choose which knowledge to study (Joyce Bruce, 1996). On the other hand, learning characteristics which uses metacognitive ability efficiently is not seen in the process of teaching and learning at school. The teacher is considered as the source of knowledge whereas the students are in empty state that they receive the knowledge. In fact, the abilities inside the students are varied and if these abilities are used properly the process of learning will be more effective, especially in terms of reading.

O'Neil & Brown define metacognitive as a process of thinking on the way they think in building strategy to solve problem (O'Neil & Brown, 1997). In other words, Mohamad Nur states that metacognitive relates to the students thinking on the way they think and the ability to use the correct learning strategies. For example, one with visual type of learning would be aware that making card is the best way to understand and memorize a large amount of new information (Muhammad, 2000).

Teaching and learning process cover three steps, they are; planning, implementation and thinking about planning and implementation in order to improve the quality. Conversely, metacognitive treatment consists of four aspects, they are: a) the aspect of awareness, this aspect relates to the acquisition of awareness towards activities which will be conducted including their own thinking, the strategy to use, the need to plan, process of thinking and the effort to understand the question; b) the aspect of cognitive strategy is an activity conducted to plan ways to understand and solve problem, which cover aspects of main ideas, relation with the existing knowledge, the meaning of the question, the use of possible strategies to solve the problem, the choice of the correct sentence; c) aspect of planning, consists of an aspect to understand the meaning of the question, knowing what to do and how to do it, deciding the next question and understanding the question before solving it; and d) the aspect of self evaluation is the activity that should be done after another process as an effort to review the result of the work, there must be strength and weakness. These aspects corrects the way to solve the problem, and correct the mistake, be aware of questions that is missed, look at the progress of the completion carefully and change the strategy when needed, proof the process during answering the question whether it is wrong or right (Ahsanul In'am, 2011).

Various ways have been done to improve students' ability in terms of cognitive, affective and psychomotoric fields in developing creativity. The improvement of the student ability is done through the improvement of quantity and quality of the teachers, lesson planning, and the development on the use of the students' work sheet. However, not many teaching that uses metacognitive ability that is exposed. The process of qualified teaching and learning relates to the ability to think. So far, the teaching has not teach the student to have the ability to think to be aware of what they have studied, enable the student to think creatively and enthusiastically as well as to be motivated to know the object of study through an active learning both in solving problem in real life and stimulate the student to responsive towards of the problem surrounding them (Susilo, 2007). The improvement of significant metacognitive ability is the effect resulted by learning either on the student, the institution or the society, therefore, a potential learning strategy must be considered in order to uncover metacognitive ability.

In terms of learning, problem solving should be taught to the students since it has particular goals. According to Charles, Lester and O'Daffar in Laurens state that the goal of teaching the students on problem solvings in Mathematics are: (1) to develop thinking skill; (2) to develop the ability to select and use the strategies to solve problems; (3) to develop attitude and conviction in solving the problems; (4) to develop the ability to monitor and evaluate their own thinking during solving the problem (Laurens, 2009).

The goal for teaching the above problem solving has something to do with metacognition. Metacognition relates to one's awareness on arranging the process of thinking, the ability to select and use strategies of thinking, to act and to be sure in solving the problem, ability to monitor and evaluate their own thinking while solving the problem (Bruning et.al., 1995).

Some results of the study show that metacognition plays important role in solving problem. The result of study by Chamot et.al mentions that students who could understand the highest level of Mathematics and get information on metacognitive strategy training (covering planning, monitoring and evaluating their own study) have better ability in managing their study (Chamot, 1992: 1-34). Research conducted by Straw and

Spelling-Denison in *Pandora* and *Philippe*, show that students who are able to know and manage their cognition (evaluate their metacognition), and aware of their ability show better ability to think strategically than those who are not aware of their system of cognition (Panaoura, et al., 2001). An effective way of solving problem can be gained by giving opportunities to the students to implement metacognitive strategy in solving problem (Hollingworth et. al, 2001). From the above result of studies, it is concluded that metacognition and problem solving have a strong relation.

Based on the above statements, we can say that metacognitive strategy is important for everyone to have it. Therefore, the writer needs to analyse the students metacognition in solving Mathematics problem in STAIN Tulungagung.

Research Methodology

This research describes how the students' metacognitive in solving calculus problem by tracing the assignment on calculus material and giving questionnaire on metacognition in order to know the students' metacognition. Besides, in doing the interview, the researcher tries to be as neutral as possible as well as comprehensive in order that the subject could show their cognition in solving problem on calculus. There are two cases in calculus, they are 1) problem on the implementation of *derivation* and 2) problem on the implementation of *integral*.

The researcher is the key instrument since she plans, conducts, collects the data, analyses the data, concludes and makes the report. Therefore, the researcher meets the criteria of qualitative research. The research takes place at the State Islamic College (STAIN) of Tulungagung, in Mayor Sujadi Timur Street No 46 Tulungagung. The reason behind choosing the site is based on the following considerations: 1) the students of STAIN Tulungagung still experience difficulties in applicative problem solving that the researcher wants to know how is the students' metacognition, and 2) there has never been any research on the students' of STAIN Tulungagung's metacognition in solving mathematics problems.

The subject of the research is the third grade students of A class which consists of 29 students, they are the students of Mathematics study program of STAIN Tulungagung. Three of them are taken as the subject of the research in order that the research able to answer the problems of the study comprehensively. The reason for choosing the third semester is that the students have enrolled in calculus I and also calculus II classes, therefore the students could solve problems on the implementation of *derivation* and *integral*. Additionally, the reason for taking the A class is that the class is considered as the international class, therefore the researcher wants to know the international class students' metacognition.

In this research the procedure that is taken to collect the data is done through various techniques: by using test that is solving problems, the questionnaire on metacognition and interview. All of these are then analyzed by using descriptive statistic :1) Test, in this case consists of two problems, the first problem is on the implementation of *derivation* and the second problem is on the implementation on *integral*, the test are given to all students of the third grade of the A class who become the subject of the research. The result of the test is analyzed through the procedure to solve problem which will be the guideline for analysing the research report; 2) The questionnaire on metacognition covers four aspects, they are: awareness, cognitive strategy, planning, and self evaluation. The instrument used to know the steps on metacognitive treatment in solving calculus problem is based on the instrument by O'Neil dan Abedi (1996) in *Reliability and Validity of State Metacognitive Inventory: Potential for Alternative Assesment*; 3) The interview is conducted in order to get data in the form of action of the subject of the research on the students' metacognition in solving the implementation problem on calculus, besides in order to know the identity and the activity of the subject of the study; 4) The documentation, in order to complete data from the result of test, questionnaire and interview. The documentation is in the form of picture, photograph, recording which has relation with the research focus.

Finding And Discussion

The result of the study on Metacognitive treatment steps is based on data taken from the result of test instrument, questionnaire and interviews with the third semester students of A class of Mathematics education study program, STAIN Tulungagung. The discussion on metacognitive treatment steps in solving calculus problems starts from the discussion based on the instrument on metacognitive treatment and then completed with the result of the interview.

The Aspect of Awareness on Metacognition

Table 1
Response on self awareness in metacognition

Question	Responses				Mean
	Less	Good Enough	Good	Very Good	
I am aware of my way of thinking	0 0%	3 10.34%	17 58.62%	9 31.03%	3.2
I am aware of the strategy of thinking to use and when to use it	0 0%	6 20.69%	22 75.86%	1 3.45%	2.82
I am aware of the need to plan my step	0 0%	4 13.79%	22 75.86%	3 10.34%	2.97
I am aware of the process of thinking inside of me	0 0%	3 10.34%	17 56.62%	9 31.03%	3.2
I am aware of my own effort to understand problem before trying to solve it.	0 0%	7 25%	15 53.57%	6 21.43%	2.96
Mean	0 0%	4.6 15.97%	18.6 64.58%	5.6 19.44%	3.03

Based on table 1, the result of the data from the respondent can be categorized into two; the first are the students who have good awareness both on the process of thinking in solving the problems that they face, in this case the response shows Good and Very Good. The second problem is the students who have less awareness on the proces of thinking in solving problem that they face in this case the response as less and good enough.

From table 1, that is table on metacognitive awareness aspect, the data shows that the lowest Mean reaches 2.82 that relates to the students awareness on the use of strategy of thinking and when to use it in solving problem. Question No.5 gets the highest number and percentage that is 22 (75.86%) for the category of Good. On the other hand, from the categories of less and good enough, the number of percentage reaches 6 (20.69%). From these two data we can conclude tha the students have the awareness on strategy of thinking and use it in good category, although Mean of this question is as high as 2.82.

The next is the students awareness on the way of learning as well as their awareness on thinking, which shows the same Mean score, that is 3.2. from these two aspects (question No. 1 and 13), the highest response is given to good category with the percentage of 17 (56.62%). Meanwhile, the score for less and good enough categories reaches 3 (10.34%). From these data, it is concluded that students have good awareness on the way of thinking and the process of thinking in solving problems that they face, in this case the data shows that the highest Mean score reaches 3.2.

The awareness aspect on the need to plan an action (question No.9) and also the awareness on the effort to understand the problem before trying to solve it (question No.17) show almost the same Mean score that is 2.97 and 2.96. moreover, score and percentage show a good level of the students' awareness in terms of planning as well as the effort to understand problem before solving it. The percentage shows 18 (64.72%) whereas the percentage of less and good enough categories which are the minorities show 5.5 (19.40%).

From table 1 on metacognitive awareness we can conclude that the students have a good level of thinking awareness to solve problem. It is shown by the mean score which reaches 24.2 (84.02%). Conversely, the number of the students who have less awareness on the process of thinking to solve problem are the minority and the mean score reaches 4.6 (15.97%)

The Aspect of cognitive strategy on Metacognition

The second aspect is the aspect of cognitive that covers five questions which will explain the way the students understand one particular subject, that they can decide the best strategy to solve problem. The result of the data is presented in table 2 as follows:

Table 2
Response on cognitive strategy in Metacognition

Question	Responses				Mean
	Less	Good Enough	Good	Very Good	
I try to find main ideas in solving the problem	0 0%	7 24.14%	16 55.17%	6 21.68%	2.97
I question myself on things related to those works what all the things that i have known	2 6.90%	6 20.69%	15 51.72%	6 20.69%	2.86
I think on the meaning of the problems before starting to answer it	1 3.45%	4 13.79%	19 65.52%	5 17.24%	2.97
I use double ways of thinking on strategy and technique to solve the problem	1 3.45%	12 41.40%	13 44.85%	3 10.35%	2.62
I choose and organize related information to solve the problem	0 0%	7 24.15%	19 65.55%	3 10.35%	2.86
Mean	0.8 2.76%	7.2 24.83%	16.40 56.66%	4.6 15.86%	2.86

From table 2 on metacognitive strategy it is known that the condition of the respondent in terms of the way they decide and use cognitive strategy in solving problem. The respondent are categorized into two groups, the first is a group of students who could decide and use good cognitive strategy in solving problem, it is shown by the number of respondent from good and very good categories. The second is a group of students who have less understanding on the strategy of thinking in solving problem, it is shown by the number of respondent from the categories of less and good enough.

From table 2, the aspect on cognitive strategy on metacognition the lowest mean is reached, that is 2.62. this shows that the level of the students awareness on the use of strategy and double thinking technique to solve problem is the lowest among the four aspects in terms of the level of awareness of the use cognitive strategy in metacognition. However, the result of the data dissemination from the respondent still show good category with the of 16 (55.20%). While the students who have less strategy on double thinking to solve problem are the minority with the percentage of 13 (44.85%).

Furthermore, the aspect of strategy to find main idea in solving problem relates to strategy to think of the meaning of the problem before giving the answer. This aspect gets the same mean as high as 2.97, whereas the level of category given on the data from the respondent is on good category with the percentage of 17.5 (60%). This number is higher compared to the level of less with the percentage of 5.5 (18.97%)

In terms of the students' strategy to ask themselves on the relation between the assignments and what they have known as well as the strategy to choose and organize related information to solve problem, reach the same mean score, that is 2.86. the ability of the students in these two strategies are in good categories. This is shown by the data from the respondent with the percentage of 17 (58.64%), whereas the minority percentage of 6.5 (22.42%) shows the category of having less understanding.

The overall data from the respondent on the aspect of cognitive strategy on metacognition shows mean score of 2.86, with the majority score on good category and very good category of 21 (72.41%) while the number of minority respondent from the category of having less understanding reaches 8 (27.59%). From the data and by referring to metacognitive treatment towards the respondent, it is concluded that generally the students have a good awareness on the strategy of thinking in solving problem.

The Aspect of metacognitive planning

The third aspect is the aspect of planning on metacognition, the result from the respondent of STAIN Tulungagung is presented in table 3 as follows:

Table 3
Response of planning in Metacognition

Question	Responses				Mean
	Less	Good Enough	Good	Very Good	
I try to understand the purpose of the problem before answering.	1 3.45%	3 10.35%	17 58.65%	8 27.60%	3.1
I try what is signalled in solving the problem	1 3.57%	5 17.85%	16 57.12%	6 21.42%	2.96
I make sure to understand what thing to do and how to do it.	1 3.45%	8 27.60%	17 58.65%	3 10.35%	2.76
I decide the way to solve the problem	1 3.57%	4 14.28%	19 67.83%	4 14.28%	3.3
I try to understand the problem before trying to solve it	0 0%	2 6.90%	14 48.30%	13 44.85%	3.3
Mean	0.8 2.80%	4.4 15.38%	16.60 58.04%	6.8 23.78%	3.01

The aspect of planning on metacognition consists of five statements from the respondent as shown in table 3, which gives information on the dissemination of the students' response on related aspect. The aspect of metacognitive planning can be categorized into two: the first is a group of students who have related planning on problem solving, it is shown by Good and Very Good responses. The second is the students who have less planning in solving problem it is shown by the response less and good enough.

The students who have understood of what should be done and how to do it, have the lowest mean reaching 2.76. However, the level of the students' awareness is on good category, and it is shown by the percentage of 17 (58.65%), and this percentage is higher than the less category which reaches 8 (27.60%).

Meanwhile, the aspect of the students planning in trying to understand the problem before trying to solve has the highest mean which reaches 3.3 with the majority respondent in good category reaching 14 (48.30%) whereas the percentage for the minority category is quite great, that is 2 (6.9%). It shows that the majority of the students have good awareness towards the planning in understanding the problem before solving.

The aspect of planning which relates to determining the way to solve problem has the majority score with the good percentage as high as 19 (67.83%). Whereas the percentage for the minority score is only 4 (14.28%). This shows that the students have had good planning in relation to the decision to solve problem.

The aspect of the students' cognitive planning related to the decision on what is signalled in problem solving reaches the percentage of 16 (57.12%) for good category and the simple category or the minority reaches the percentage of 5 (17.85%). This shows that students have good planning on deciding what is signalled in solving problem. Conversely, the aspect of the students planning related to the aspect to try to understand the goal of the problem before answering it reaches the percentage of 17 (58.65%) for good category. Whereas the less category has the percentage of 3 (10.35%). Therefore, from the data of the respondent it is concluded that the students have good awareness on planning to understand the goal of the problem before trying to solve it.

Generally, from the data of the respondent in table 3, the mean score reaches 3.01 with the majority respondent in good and very good category as high as 3.40 (81.82%), while the minority respondent with less and good enough categories at the percentage of 5.2 (18.18%). From the overall data, it is concluded that generally the students have already had good awareness in making plan on way of thinking in solving problem.

The aspect of self evaluation on metacognition

The fourth aspect is the aspect of self evaluation on metacognition. Like other aspects, groups of the respondent are divided into two: the first is a group of students who have awareness on self evaluation on metacognition in solving the problem, it is shown by the dissemination of good and very good categories. The second is the group of students who have not had awareness of self evaluation to solve problem, which is shown by the result of the data of the respondent of less and good enough categories. The result of the data from the respondent for the aspect of self evaluation in metacognition can be seen on table 4. As follows:

Table 4
Response on Self-evaluation of the Metacognition

Question	Responses				Mean
	Less	Good Enough	Good	Very Good	
I review my work while doing it	1 3.45%	6 20.69%	16 55.17%	6 20.69%	2.93
I study my mistakes	1 3.45%	8 27.59%	18 60.09%	2 6.90%	2.72
I almost always know how many problems that I can solve.	1 3.45%	11 39.29%	14 50%	2 7.14%	2.52
I control my development and change the strategy when needed	0 0%	7 24.14%	19 65.52%	3 10.34%	2.97
I study my accuracy while working on the problem	1 3.45%	12 41.38%	15 51.72%	1 3.45%	2.55
Mean	0.8 2.78%	8.8 30.56%	16.4 55.56%	2.8 9.72%	2.74

From the table 4, it is known that the aspect of self evaluation on metacognition consists of five items of instrument. There are two items of the five which have almost the same lowest mean score they are 2.52 and 2.55 they are the awareness towards self evaluation related to the number or burden of problem to be solved as well as self evaluation towards controll on the accuracy of the result from the completion of the problem. These two items have the majority result of the data from the respondent with good category as high as 14.5 (50.86%). While the number of the minority with less category shows the percentage of 11.5 (40.34%), from the data we can conclude that a group of the students who have good awareness on self evaluation on the burden of the problem can control the accuracy of the result that they can avoid mistake which is resulted by less carefulness in completing the problem. Therefore, they get better result.

From the other three items, the highest mean score is 2.97, that is on the awareness on self evaluation in relation with controll on self progress and in the change of strategy in solving problem to get better result. From the above table it is known that in this item, the number of the student with good category reaches the percentage of 19 (65.52%) and 7 (24.14%) in the category of good enough, that it can be concluded that the majority of the students have good awareness on self evaluation especially on the control to self progress and evaluation on the change of the strategy.

The aspect of self evaluation is related to review on the result of the on going work which reaches the mean score of 2.93. in this item, the majority of the students with good category are at the percentage of 16 (55.17%) and 6 (20.69%) are the category of good enough. From the data it is concluded that the students' self evaluation on the review on the on going work is at good level. The aspect of self evaluation related to review on mistakes reaches the mean score of 2.72, with the majority score on good category of 18 (60.09%) and the minority score on good enough category of 8 (27.59%). From the data, it is concluded that the students have good awareness on self evaluation in relation with reviewing mistakes that they get optimum result from the problem solving.

From the overall data from the respondent the mean score is 2.74 with the majority percentage at 19.2 (65.28%) in good and very good categories whereas the minority of the less and good enough category reach the percentage of 9.6 (33.34%). From this data it can be concluded that generally the students have good level of awareness on the aspect of self evaluation on metacognition in solving problem.

Students coming from the smart group show that the four aspects in metacognition are in good category; however, the students from less and good enough categories still have less awareness, strategy, planning and self evaluation in solving the problem that the four aspects are categorized as good enough.

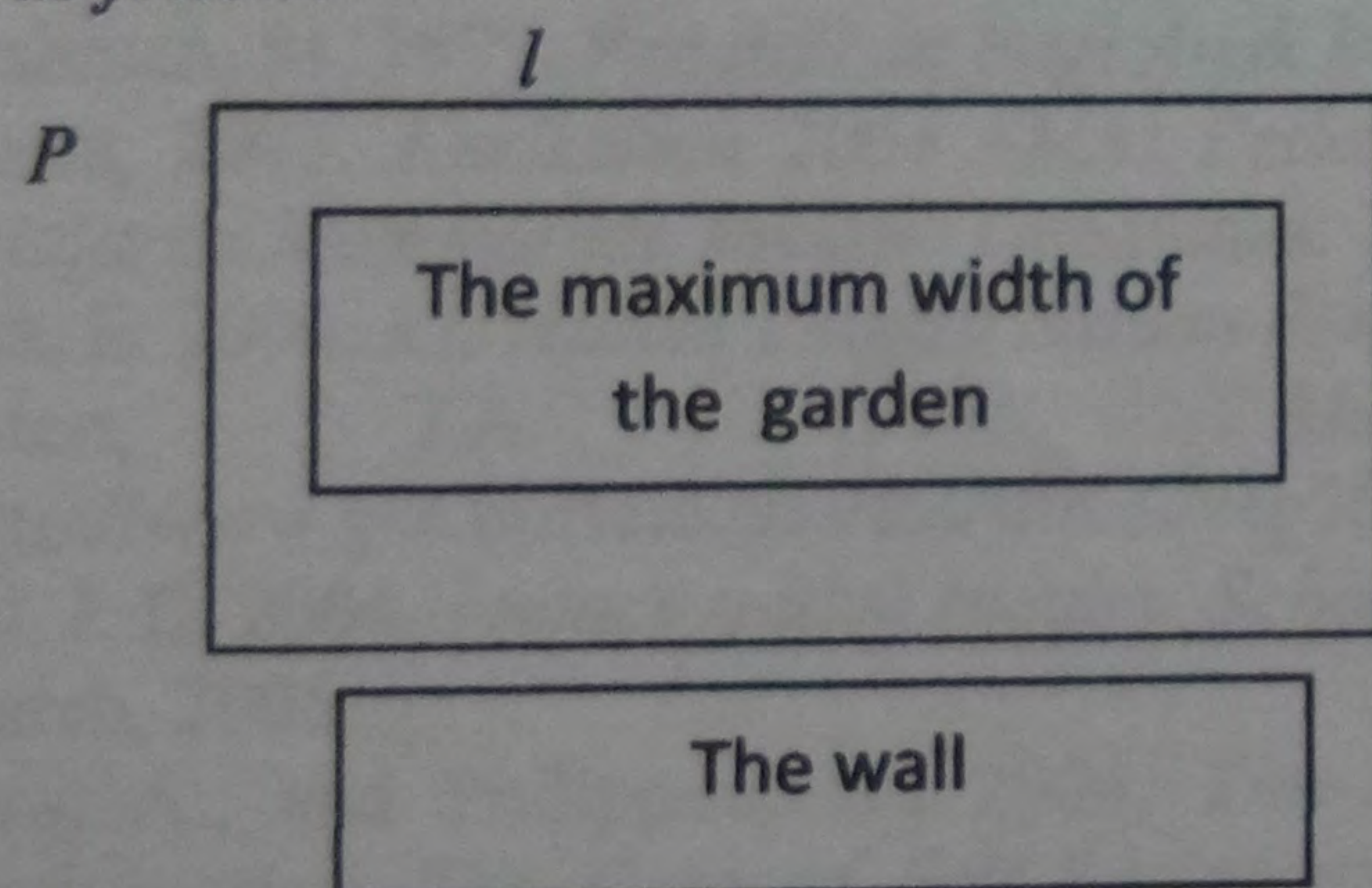
From the four aspects of instrument of metacognitive treatment steps in solving calculus problem, the final result of the data can be simplified as follows :

Table. 5
Mean Score in Metacognitive treatment step in solving calculus problem

Metacognitive treatment	The lowest Mean	The highest Mean	Overall Mean
Awareness	2.96	3.20	3.03
Cognitive Strategy	2.62	2.97	2.86
Planning	2.93	3.30	3.01
Self Evaluation	2.52	2.97	2.74
Overall Mean			2.91

From table 5 we can see the explanation of Mean score on the students perception on the four aspects of metacognitive treatment. Among the four metacognitive aspects, the aspect of self evaluation has the lowest mean score, that is 2.74 while the highest Mean score is on the aspect of awareness at the percentage of 3.03 generally the total mean score is 2.91 including the good category. Therefore it is concluded that generally the student perception on metacognitive treatment in solving calculus problem is in good category. This can help the students in the process of thinking in solving calculus problem that it can help the completion that we can get the correct.

It is supported by the result of the interview with the student as follow: "before starting to write the answer I try to read the question again and again till I understand it. After that I remember the basic formula of the circumference and width that I will use to search for the length of the sides of the garden that we can get the optimum width of the garden, where $K = 2p + 2l$ and $L = p \times l$." As the first step, what will you write as the first step to solve the problem that you face? "At first i have to write variables that will be used in counting. I decided P as the variable to represent length of the garden at the right angles with the house whereas L represent the width of the garden in row with the house. There are many models for these symbols. It really depends on the person who work on it, my friends use the alphabets like x and y, m and n, k and l". What is your next step? "I make Mathematics model in order to form a Mathematics equivalent". How could you make Mathematics model? "The easiest way to make a Mathematics moel is by illustrating a picture as follow:



After drawing an illustration, i make equivalent which relates to maximum width that we search for. And the first basic equivalent that i use is $2p + l = 200$. And then what equivalent that support the counting? There is one more equivalent that i have to make so that i get widht equivalent $A=p.l$, so we can make substitution from the first and second equivalent that result in a new equivalent, that is:

$A = p(200-2p)$ where $l=200-2p$ and when it is multiplied we will get a new equivalent after being substituted. That is $A = p(200-2p)$ so that we get

$A = 200p - 2p^2$ and one more theoreme to determine the maximum width, that is the differencial from the equivalent. And if we derive A, the process will come faster. That we get the equivalent $A' = 200 - 4p$.

by using the theorema does the process come to an end?

Not yet, there are some more steps in the process of counting. It is the last step of the process of reviewing the whole result."

Than 2nd question, what are the steps that you will take to solve the problem? "At first i have to make mathematics model by using illustration. I have to be able to use integral theorema in counting on the width of one particular unit. In counting, I have to be able to see opportunity which is subject make mistake and correct the mistake that i might made."

The interview with the students shows that the students have followed metacognitive treatment in solving calculus problem, which cover four aspects in metacognition, they are; awareness, cognitive strategy, planning and self evaluation.

Process of learning which has relation with cognitive, affective, and psychomotoric fields and is implemented along with metacognitive learning will enable the improvement of students awareness on what they have studied. The result of the study is qualified when the students consciously able to controll cognitive process continuously and give an effect to the improvement of metacognitive ability.

The implementation of metacognition in learning problem solving in Mathematics could build the students' character, for example they will be accustomed to practice reflective thinking, alternative thinking and are accustomed to work systematically, controll various activity, make good planning before doing an activity, monitor and evaluate their activity. Therefore, metacognitive strategy should be given to the students.

Conclusion

The result of the analysis shows that Mean score of the students' perception toward metacognitive treatment are classified into four categories. Self-evaluation aspect shows the lowest Mean score among the four aspects; that is 2.74, whereas the highest Mean score Mean comes from awareness aspect; that is 3.03. In general, the number of Mean reaches 2.91 and this is in a good category. In conclusion, the students; perception towards metacognitive treatment in solving calculus problem is in good category. Additionally, this helps the students in the process of thinking especially in solving calculus problem that it can decide a step to solve so that the correct result can be achieved.

There are four steps in metacognitive treatment; they are awareness, cognitive strategy, planning and self-evaluation. Based on the students' interviews, these four steps in metacognitive treatment help the students in solving calculus problem in STAIN Tulungagung and it improves in their result of study.

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