Unesa Journal of Chemical Education
Vol. 1, No. 1, pp. 55-61 Mei 2012 *ISSN: 2252-9454*

RELATIONSHIP BETWEEN METACOGNITIVE KNOWLEDGE AND STUDENT LEARNING OUTCOMES THROUGH COOPERATIVE LEARNING MODEL TYPE THINK PAIR SHARE ON BUFFER SOLUTION MATTER

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Abstract : The study entitled "Relationship between Metacognitive Knowledge and Student Learning Outcomes Through Cooperative Learning Model Type Think Pair Share on Buffer Solution Matter" aims to determine relationship between Metacognitive Knowledge and Student Learning Outcomes after applied metacognitive knowledge through cooperative learning model Type Think Pair Share at buffer solution. The method used in this research is once group pretest-postest design, this design used in one group of subjects will be treated with the implemention of cooperative learning model Type Think Pair Share. The results of metacognitive knowledge is symbolized by the variable X and student learning outcomes is symbolized by the variable Y. And then the variable X and Y wanted to do using correlation coefficient formula. Result of research showed that there is very strong relationship between metacognitive knowledge and student learning outcomes the results of the correlation coefficient of 0.809. Result of r count rates (0.809) is greater than r-Theoretic with N = 39 at 1% significant level of 0.408, so that it can be stated that the correlation between metacognitive knowledge and student learning outcomes significantly.

Keywords: Metacognitive Knowledge, Learning Outcomes, Cooperative Learning Model Type Think Pair Share

Abstrak : Penelitian yang berjudul **"**Hubungan antara Pengetahuan Metakognitif dengan Hasil Belajar Siswa melalui Model Pembelajaran Kooperatif Tipe *Think Pair Share* pada Materi Larutan Penyangga**"** bertujuan untuk mengetahui hubungan antara pengetahuan metakognitif dengan hasil belajar siswa setelah diterapkan pengetahuan metakognitif melalui model pembelajaran kooperatif tipe *Think Pair Share* pada Materi Larutan Penyangga. Metode yang digunakan pada penelitian ini ialah *once group pretest-postest design*, dalam desain ini digunakan satu kelompok subjek yang akan diberikan perlakuan dengan penerapan model pembelajaran kooperatif tipe *Think Pair Share*. Data hasil pengetahuan metakognitif disimbolkan dengan variabel X dan hasil belajar siswa disimbolkan dengan variabel Y. Kemudian variabel X dan Y dicari hubungannya menggunakan rumus koefisien korelasi. Hasil penelitian menunjukan bahwa terdapat hubungan yang sangat kuat antara pengetahuan metakognitif dan hasil belajar siswa yaitu dengan hasil koefisien korelasi sebesar 0,809. Harga r hitung (0,809) lebih besar dari r-teoritik dengan N=39 pada taraf signifikan 1% sebesar 0,408, sehingga dapat dinyatakan bahwa korelasi antara pengetahuan metakognitif dan hasil belajar siswa signifikan.

Kata Kunci: Pengetahuan metakognitif, Hasil belajar, Model Pembelajaran Kooperatif Tipe *Think Pair Share*

INTRODUCTION

Students cognitive development according to Piaget's is divided into four stages, namely sensorimotor, preoperative, concrete operations and formal operations. However, Piaget's theory has been criticized by R. Case stated on Neo-Piagetian theory.

Neo-Piagetian theory is a modification of Piaget's theory. In contrast to Piaget's theory, Neo-Piagetian theory gives greater emphasis on social influences on cognitive development and the environment [1]. To optimize students' comprehension skills and metacognitive strategies are needed. Teach metacognitive strategies to students can lead to the improvement of their learning outcomes significantly [2].

Metacognition by Flavell [3] described as a person's knowledge about themselves and about learning how to learn. Meanwhile, Brown [4] describes metacognition consists of activities to manage and monitor human learning. Flavell tend to view metacognition of knowledge about the cognitive aspects of a person, while Brown tend to view metacognition as the set one's cognition.

Metacognitive strategies according to Brown[5], based on a person's awareness of the their knowledge metacognitive namely: declarative, procedural and conditional. Pierce[6] suggested that declarative knowledge, procedural, and conditional owned and realize students need to improve their metacognitive.

According Rompayom, P. et al[7], categorizes and defines metacognitive knowledge as follows:

Table 1 Categories and definition for the metacognitive knowledge

Categories	Definition
Declarative knowledge	Refers to the knowledge that learners have about the information or resources needed for undertaking the given tasks e.g. knowledge about: (a) purpose of a task (What is the objective in performing a given task?); (b) about task demands (What resources and steps are necessary to solve the problem); (c) about the nature of the task (What kind of given task is related to?).
Procedural knowledge	Refers to knowledge or beliefs about oneself about the given task. An individual's self-perceptions of one's capacity of how to do something.
Conditional knowledge	Refers to knowledge concerning when and why to use strategies to solve problems. Knowledge of the situations in which students may use subject-specific skills, algorithms, techniques, and method.

Rompayom,P. et al.[7]

Cognition and metacognition is essentially a series of thought and activity by human. When discussing the development of metacognition, despite not actually talk about the development of cognition itself, so it is no exaggeration to say that cognition and metacognition is a series that can not be separated. Panaoura and Philippou[5] suggests that the development of metacognition that is not an automatic process, but is the result of a long process of development of cognitive systems.

Student learning outcomes can be said to be qualified if the student is able consciously to control cognitive processes on an ongoing basis and have an impact on improving metacognitive ability. The process of learning and

quality education associated with the ability to think.

Implementation of learning in Senior High School State 18 Surabaya has not learn that students have the ability to think to realize what they have learned, empowering students to think creatively and enthusiastic and motivated to learn the object of learning through active engagement of learning, both to solve real problems in life, as well as stimulating students to always be responsive to the problems that exist in the surrounding environment.

Based on the results of pre-study questionnaire was conducted on 39 students who have been through or get the material buffer solution. The questionnaire contained 18 statements metacognitive inventory (both positive and negative statements) which consists of six statements about declarative knowledge, procedural knowledge statements about 6, and 6 conditional statements about knowledge. The results obtained from questionnaires that students' declarative knowledge of 57.7%, procedural knowledge students at 55.8%, and conditional knowledge of students by 55.2%. This shows that the awareness of students' metacognitive knowledge sufficient.

Metacognitive ability to significantly increase in the effects resulting from learning, both on students, institutions and society, because it needs to be considered learning strategies that have the potential to reveal the students' metacognitive knowledge, especially in studying chemistry.

According to Green, Mc Donald, O'Donnell and Dansereau, 1992 [8] related to metacognitive skills and strategies and metacognitive training can be developed through cooperative learning. In the cooperative learning can be developed metacognitive skills in cooperative learning occurs because of communication among group members. Communication among members of cooperative groups occur with either because of social skills, the rules of the group, the effort to learn each member of the group, and the goals to be achieved [8]. Cooperative learning contribute to the learning outcomes and help students understand difficult concepts, and can receive outstanding achievement in academic learning tasks.

Cooperative learning to solve problems in student learning, can be done with a type of cooperative learning model of Think-Pair-Share (TPS). Think of cooperative learning model of type-Pair-Share can be explained as follows Think mean think, pair means paired, and Share means share. Cooperative learning models type TPS to follow the steps thought to the problems posed by the teacher, in pairs, to discuss the ideas of the matters raised by the teacher, and share the results of discussion for all students in the class.

Advantages to using metacognitive strategies, among others, students will be able to control weaknesses in the study and then fix this; students can determine the appropriate way to learn on their own; students can solve problems in learning whether in relation to the questions given by the teacher or the issues pertaining to the learning process, and students can understand the extent to which success has been achieved in the study.

Formulation of research problems is there a relationship between student learning outcomes with students' metacognitive knowledge includes declarative knowledge, procedural and conditional through cooperative learning model type Think-Pair-Share in a buffer solution of the material in class XI science 1 SMAN 18 Surabaya.

The purpose of this study was to determine the relationship between students' metacognitive knowledge is declarative knowledge, procedural and conditional to the results of student learning through cooperative learning model of the type of Think-Pair-Share in a buffer solution of the material in class XI science 1 SMAN 18 Surabaya.

The benefits of this research is to provide information or feedback to students on metacognitive knowledge. It also provides input for the teacher to be more innovative in the learning process.

METHOD

Subjects of this study are high school students in class XI IPA 1 term 2 SMA Negeri 18 Surabaya on the material Buffer Solution.

To determine the relationship between metacognitive knowledge and student learning outcomes through the implementation of cooperative learning model type TPS (Think-Pair-Share) is to connect students' metacognitive knowledge that obtained from the metacognitive questions in a matter of cognitive postest.

Example Postest:
QUESTION 1

a. CH_3COOH/CH_3COO^- buffer solution contain 0,2M CH_3COONa and 0,15M CH_3COOH give that Ka = 1,8 x 10^{-5} mol/L. Determine: (Cognitive)
   i. Acid and base component
   ii. pH of buffer solution

a. To answer the question above, what the content knowledge related to? Explain! (Declarative knowledge)
b. Display what your thought to obtain the answer! (Procedural Knowledge)
b. Explain when and why you use such a thought process above to find the answer! (Conditional Knowledge)

The research instrument used was a test booklet consisted of pretest and postest matter. This booklet is used to view the achievement of the indicators as they are designed to plan the implementation of learning so as to know how student learning outcomes. In addition postess matter has been designed and integrated with metacognitive knowledge into the matter. Metacognitive knowledge contained in the matter, among others, declarative knowledge, procedural knowledge, and conditional knowledge.

Data collection technique is to test the method with data collection by administering tests and the results of these tests are used to determine student learning outcomes and student metacognitive knowledge includes declarative knowledge, procedural and conditional. Then between metacognitive knowledge and student learning outcomes sought to do.

Data obtained from the tests were analyzed descriptively. This test data is analyzed into two parts about the cognitive and metacognitive knowledge about covering the declarative knowledge, procedural and conditional. For about the cognitive analyzed descriptively to determine student learning outcomes.

$$Student\ Learning\ Outcomes = \frac{score\ that\ obtained}{maximal\ score}\ x\ 100$$

then analyzed descriptively by comparing the values specified SKBM SMAN 18 Surabaya subjects of chemistry that is equal to 75.

As for the question regarding students' metacognitive knowledge was analyzed according to the assessment rubric metacognitive knowledge as presented in Table 2

Tabel 2 Overview of scoring criteria

Score	Description		
	Declarative knowledge	**Procedural Knowledge**	**Conditional knowledge**
0	Nothing relevant to the task. The student does not describe what the task related to	Students do not describe which strategy they use to solve a problem, and how they solve that problem	Students do not explain when and why to use strategies to solve problem
1	Students writes nonspecific statements that are related to chemistry but they are not related to the question	Students seem to understand of the task purpose, but they make nonspecific statements that are not interrelated or connected between given information and the question	Students lists general strategies used to solve problem, but they do not explain only when or why to use that strategies or nonspecific statement
2	Students has a clear overview of what the task is related to	Students has clearly defined which strategy they use. Students explicitly consider the implications between given information and the question	The students generates clearly when and why to use strategies they use to solve problem. The overview of their strategy connects concretely to the given information and the question

Rompayom,P. et al.[7]

Data that obtained from metacognitive knowledge and student learning outcomes were statistically analyzed using the correlation formula. Data metacognitive knowledge is symbolized by the variable X and the learning symbolized by the variable Y. Then the variables X and Y wanted to do using the correlation coefficient formula. Based on Ferguson [10] prior of these variables determined the standard deviation of each variable (S X and S Y) using the formula:

$$s_X^2 = \frac{\sum(X - \bar{X})^2}{N - 1}$$

$$s_Y^2 = \frac{\sum(Y - \bar{Y})^2}{N - 1}$$

So that for the standard deviation can be set to search for roots

$$s_X = \sqrt{s_X^2}$$

$$s_Y = \sqrt{s_Y^2}$$

Having determined the standard deviation of the variables X and Y is converted to the form of standard scores using the formula:

$$z_X = \frac{X - \bar{X}}{s_X}$$

$$z_Y = \frac{Y - \bar{Y}}{s_Y}$$

Once these variables are converted to standard score form we then look for a relationship between two variables by using the formula of correlation (r).

$$r = \frac{\sum z_x z_y}{N-1}$$

Description :
r : correlation coefficient
N : number of data
z_X : standard score for variable X

z_Y : standard score for variable Y

In this study to find the correlation coefficient using the standard formula score for the data obtained is converted into a Z-score or standard score. Correlation coefficient was used to measure the degree of relationship between students' metacognitive. Generally applicable $0 \leq r\ 2 \leq 1$ so that the correlation coefficient obtained for $-1 \leq r \leq$ relationships +1.

To determine the magnitude of the correlation coefficient is the relationship can be seen in the following Table 3:

Table 3 Guidelines for Interpretation of the Correlation Coefficient

Interval Coefficients	Rate Relationship
0,000-0,199	Very Low
0,200-0,399	Low
0,400-0,599	Sufficient
0,600-0,799	Strong
0,800-1,000	Very Strong

Sugiyono[9]

RESULT AND DISCUSSION

The results obtained from the students learn about the pretest and postest made based on the indicators of learning material buffer solution. Problem pretest is used to determine the ability of students at the beginning of the buffer solution material. Problem postest used to determine the completeness of individual student learning outcomes and classical class XI science 1 student SMAN 18 Surabaya after the implementation of metacognitive knowledge through cooperative learning model of the type of material Think Pair Share in Buffer Solution.

Analysis of the results of study carried out by two approaches individually and in the classical style. SMAN 18 Surabaya on a student said to be thoroughly individually if the gain value of ≥ 75 and in the classical style can be said to be complete if 75% of students scored $\geq$ 75. Prior to the application, all students who achieved no minimum value of thoroughness. Meanwhile, after being applied metacognitive knowledge through cooperative learning model type Think Pair Share is based on the average there are 9 students postest incomplete. Traditionally after the application of metacognitive knowledge of students through cooperative learning model type Think Pair Share for 76.92% of students declared complete.

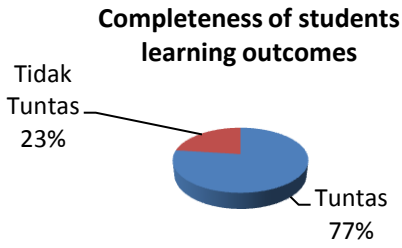

Figure 1 Completeness of students learning outcomes

Problem postest given to students have been integrated between the cognitive and metacognitive knowledge that includes declarative knowledge, procedural knowledge and conditional knowledge. Data obtained from metacognitive knowledge and student learning outcomes were statistically analyzed using the correlation formula. Data metacognitive knowledge is symbolized by the variable X and the learning symbolized by the variable Y. Then the variables X and Y wanted to do using the correlation coefficient formula. Average score of metacognitive knowledge is converted into a student learning outcomes, while the average obtained from postest transformed into the form.

Based on calculations derived r value of 0.809. Because the results obtained by calculating r 0.809 and based on the correlation coefficient table interpretation guidelines can be concluded that the correlation between students' metacognitive and has a very strong level. While based on the r-theoretical price by N = 39 r-Theoretic

be obtained at 1% significant level is 0.408. Because the price r of 0.809, it can be stated that the correlation between students' metacognitive and significant.

CONCLUSION

The results of calculating r between metacognitive knowledge and student learning outcomes at 0.809. It can be concluded that the correlation between metacognitive knowledge and student learning outcomes have a very strong level. While based on the r-theoretical price by N = 39 r-Theoretic be obtained at 1% significant level is 0.408. Because the price is greater than r r-theoretical, so it can be stated that the correlation between metacognitive knowledge and student learning outcomes significantly.

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