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The Effect of Metacognitive Ability on Learning Outcomes of Geography Education Students

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Abstract

The objective of this study was to analyze the effect of metacognitive ability to improve the geography learning outcomes. This research is expo facto with a quantitative approach. Data was collected from 55 students from the geography education department. Data collection methods used in this study was questionnaires and documentation. The results showed that the metacognitive abilities of students had an average value of 44.57 or that metacognitive abilities were an insufficient category. There was a significant influence of metacognitive abilities on student learning outcomes as evidenced by t count = 6.508 > t table = 1.674. The contribution of the influence of metacognitive abilities on biogeography learning outcomes was equal to 0.444 or 44.4%, while the remainder of 66.6% was influenced by other factors.

Keywords: metacognitive abilities, learning outcomes, expo facto

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1. Introduction

The development of intelligence is affected by the development of cognitive abilities. Cognitive abilities continue to develop in line with the educational process that they take and their physical development. Subsequent cognitive development is managing or regulating cognitive abilities to respond to each situation or problem. Cognitive aspects certainly do not run individually but must be controlled by each individual. Thus, an important person has an awareness of the ability to regulate their thinking abilities if they want to use their cognitive abilities (Flavell, 1979).

Metacognitive is generally defined as the activity of monitoring and controlling one's cognitive. It can further be defined as what we know about our cognitive processes and how we use this process to learn and remember (Nugrahaningsih, 2012). Students who are aware of metacognitive abilities are able to know what strategies and conditions are most suitable for them when they study. However, one does not realize that what is done is a metacognitive activity. The level of metacognitive abilities possessed by individuals with one another is different depending on the learning activities they do (Nugrahaningsih, 2012).

The metacognitive concept is divided into two, i.e. metacognitive knowledge and metacognitive regulation. These two sub-components are related to each other (Flavell,1979; Schraw & Dennison, 1994). The two simultaneous levels of thinking are

students thinking about learning. A student who practices metacognitive will ask himself. The question is about what learning or process occurs when he learns. Metacognitive ability consists of two components. These components are 1) metacognitive knowledge (metacognitive knowledge) and 2) experience or metacognitive regulation (metacognitive experiences or regulation) Livingston (1997). A similar opinion was expressed by Mulbar (2008) if there are two components included in metacognitive, namely (a) what we know or don't know, and (b) regulation of how we learn.

Then each part of the metacognitive is divided into several parts. Declarative, procedural, and conditional knowledge is very important for developing conceptual knowledge (content knowledge). Regulation refers to students' knowledge of the application of strategies and the ability to monitor the effectiveness of their strategies. When students manage they're cognitive develop and monitor their learning strategies based on their knowledge (Schraw & Dennison, 1994; Kuntjojo, 2009).

The two metacognitive have compo-nents, i.e. metacognitive knowledge and metacognitive regulation, each of which has sub-components as mentioned below (Schraw & Dennison, 1994). Knowledge about cognition. Knowledge of cognition is knowledge of matters relating to cognition, which includes three sub-components. The first component, declarative knowledge, is knowledge about oneself as a learner as well as strategies, skills, and learning resources needed for learning purposes. 2) Procedural knowledge is knowledge about how to use whatever is known in declarative knowledge in its learning activities. 3) Conditional knowledge is knowledge about when to use a procedure, skill, or strategy and when these things are not used, why a procedure takes place and in the conditions in which it takes place, and why a procedure is better than the procedures other.

Metacognitive abilities consist of two sub-components, i.e. knowledge of cognition and regulation of cognition. Knowledge of cognition according to Kuntjoyo includes three things, including the following: 1) Declarative Knowledge Is knowledge about yourself as a learner as well as strategies, skills, and learning resources that are needed for learning purposes. 2) Procedural Knowledge, it is knowledge about how to use known knowledge in the knowledge of oneself for their learning activities. 3) Conditional Knowledge (Knowledge Conditional) is knowledge about when using a procedure, skill, and strategy. If these things are not used, then why does a procedure take place and under the conditions of how it takes place, and why a procedure is better than other procedures. Conditional knowledge is obtained from students' declarative and procedural knowledge. This knowledge can condition strategies or skills that are appropriate for learning activities and adjust to the needs of students themselves. Regulation/experience of cognition is a process used to implement the cognitive activity in achieving cognitive goals in students (Schraw & Dennison, 1994, Kuntjojo, 2009).

Furthermore, metacognitive skills are derived from the following components. First, planning is the ability to plan learning activities. Second, information management strategies are the ability of strategies to manage information regarding the learning process carried out. Third, comprehension monitoring is the ability to monitor the learning process and things related to the process. Fourth, debugging strategies is the ability to debug strategies, namely strategies

used to correct wrong actions in learning. Fifth, evaluation is the ability to evaluate the effectiveness of his learning strategy, whether he will change his strategy, give up on the situation, or end the activity (Schraw & Dennison,1994; Kuntjojo, 2009).

Metacognitive abilities are useful for students because abilities are related to the strategy of how a person learns or learning how to learn and thinking about thinking (Livingstone, 1997). Flavell (1979) believes metacognitive is useful in terms of communication, self-control, memory, problem solving, and personality development. While Schraw & Dennison emphasized metacognitive abilities are another form of self-reflection, self-monitoring, or self-awareness and learning activities that have been carried out. Metacognitive abilities are related to controlling cognitive components that allow students to understand the tasks or problems faced and then try to make sure that all of these tasks or problems have been resolved correctly. Students with high metacognitive abilities not only think about completing assignments but will always evaluate themselves to make sure that the assignment has been completed. Educational experts from Yosemite Community College District (YCCD) and Mesa College also emphasized that for the century of knowledge, the learning outcomes (student's learning outcome) demanded included: problem-solving skills, skills, global communication, IT skills, and self-awareness (YCCD, 2005).

Even semester of 2018/2019, geography education students have several compulsory subjects. Some of these subjects experienced an average decline in the value between the mid-semester evaluation and last semester's evaluation values. The averages of biogeography course values decrease between the mid-semester values and last semester values. Biogeography studies the distribution of plants and animals, types of biomes, migration, and its factors. The material is abstract and requires logic to understand it. According to Wallace Biogeography is the science of how the spread of species (animals and plants) on the surface of the Earth and how that spread occurs. This means that students have an awareness of learning than other classes. The results showed that metacognitive abilities had a positive and significant influence on academic achievement in programming courses. Metacognitive abilities can help develop good thinking management skills so that they show good academic achievement compared to students who have low metacognitive abilities (Nugrahaningsih, 2010; Mulbar, 2008; and Tibrani 2017). Based on the description, this journal aims to find out how much metacognitive abilities affect their learning outcomes and how it works affects them.

2. Method

The research method used is a quantitative approach. Data obtained during the study will be processed, analyzed, and processed further with the basics of the theory being studied to find answers to the phenomenon of a problem so that it can be obtained an overview of the effect of metacognitive abilities on learning outcomes in Biogeography courses. The research subjects were Geography Education Study Program students who took Biogeography courses in the 2018/2019 Academic Year as many as 55 people. The instruments used were the MAI questionnaire (Metacognitive Awareness Inventory) as many as 52 modified questions regarding language and terms.

a. Data Normality Test

Data normality testing is used to test whether continuous data is normally distributed so that analysis with regression data analysis can be carried out (Sugiyono, 2011). The data in this study are interval scale then in the normality test using the Kolmogorov-Smirnov test (K-S), the criteria used are if p> 0.05 then the data distribution is said to be normal.

b. Linearity Test

Linearity test aims to determine whether two variables have a relationship that is linear or not significantly. This test is a prerequisite in linear regression analysis. The test uses F linearity → p <0.05 at the significance level of F 5%. Two variables are said to have a linear relationship if the significance (Linearity) is more than 0.05.

F Linearity → p <0.05 F deviation from linearity p> 0.05

c. Hypothesis testing

Testing this hypothesis using the t test to determine the contribution of independent variables to the dependent variable, a single regression line equation to predict how far the value of the dependent variable when the independent variable is raised-lowered. This regresses analysis is used to test hypotheses using the following steps:

1) The coefficient of determination (R2) essentially measures how far the model's ability to vary the dependent variable.
2) The t test is performed to test the significance of multiple regression coefficients with the following formula:

The t-test is used to determine the significance of the influence between variables. If t count > t table at a significance level of 5% then it is significant. If t-count < t-table, then the effect of independent variables on the dependent variable is not significant.

3. Result and Discussion

The results revealed that the average metacognitive abilities of students showed sufficient level with a value of 44.57. The value of the knowledge component is 46.71 and the regulation is 46.08.

Both values are sufficient. The results are presented in Table 1 as follows.

Table 1. Average Student Metacognitive Abilities

Metacognitive Ability	Average	Category
Metacognitive Ability	44,57	Sufficient
Component		
knowledge	46,71	Sufficient
regulation	46,08	Sufficient

Table 2 presents the results of solving cognitive abilities. The questionnaire of metacognitive abilities consists of 52 statement items which are divided into two (2) sub-variables and eight (8) indicators. Based on the results of the analysis, the metacognitive ability variable has the highest value = 51, the lowest value = 30, the average value (mean) = 44.57. The results showed that in the knowledge sub-component the highest value was a conditional component of 100% and the lowest component was a declarative component of 82%. Conditional knowledge is an awareness of the conditions of a learning situation and knows the reasons for using or choosing a particular strategy. Declarative knowledge is knowledge about you as a

learner and learning strategy, skills, and learning resources needed.

Table 2. Percentage of Metacognitive Abilities for Each Indicator

Metacognitive Ability	Component	Amount		Percentage	
		Sufficient	Lack	Sufficient	Lack
Knowledge	Declarative	45	10	82	18
	Procedural	50	5	91	1
	Conditional	55	0	100	0
Regulation	Planning	55	0	100	0
	Comprehension	53	2	94	6
	Information	50	5	91	1
	Debugging	51	4	93	7
	Evaluation	50	5	91	1

Based on the output table correlations, it can be seen that metacognitive ability has a strong/close relationship with student learning outcomes (correlation coefficient value 0.666) and is significant at the 5% significance level (Sig. 0,000 <0.05). The positive Pearson correlation coefficient can be interpreted that an increase in metacognitive values tends to improve biogeographic learning outcomes.

The subcomponent of the regulation of the percentage of students who get a high enough score is the planning component of 100%. Planning skills are skills in designing something that will be done. Planning skills include planning and setting goals before learning, meaning that in this case students identify and activate certain abilities, tactics, and processes. The lowest component is information and evaluation with a percentage of 91%. Skills to sort information are one's skills in managing learning strategies used automatically to obtain information that has been obtained. Management skills information learners can sort out important information which then expresses the information he has obtained in his own words. Evaluation skills are skills in assessing the final product of the task and the efficiency with which the task is carried out, this can include re-evaluating the strategies used in the process of managing one's learning. Evaluation skills include the ability to assess the learning steps taken, summarize the material that has been studied, and assess its performance in working on tasks or questions given by the lecturer.

Table 3. Correlation

		MAI	Learning Outcomes
MAI	Pearson Correlation	1	.666**
	Sig. (2-tailed)		.000
	N	55	55
Learning Outcomes	Pearson Correlation	.666**	1
	Sig. (2-tailed)	.000	
	N	55	55

** Correlation is significant at the 0.01 level (2-tailed)

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.666[a]	.444	.434	3.098

a. Predictors: (Constant), MAI

Based on Table 4, it can be seen that the R Square value of 0.444 can be interpreted statistically that by 44.4% the variable metacognitive ability affects the variable student learning outcomes. While the remaining 55.6% is influenced by other variables. The hypothesis which states that metacognitive abilities have a significant effect on Biogeographic Learning Outcomes, Ho is accepted.

Table 5. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	406.428	1	406.428	42.357	.000[b]
	Residual	508.554	53	9.595		
	Total	914.982	54			

a. Dependent Variable: Learning Outcome
b. Predictors (Constant), MAI

Table 6. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	48.434	3.190		15.182	.000
	MAI	.468	.072	.666	6.508	.000

a. Dependent Variable: Learning outcome

Constant value/intercept (a) is obtained 48.434; slope/regression coefficient value (b) is obtained 0.468 with sig value. 0,000. Thus, the regression equation can be written as follows:

$$Y = ao + boX = 48.434 + 0.468X$$

If the metacognitive ability variable (x) rises by one unit, then the learning outcome (y) can be predicted to increase by 0.468 (47%) in the constant 48.434.

The regression test based on the ANOVA table above obtained an F value of 42.357 with Sig. 0.000, due to the value of Sig. smaller than 0.05, it can be concluded that the regression equation coefficient is significant. Based on the picture the value of the t count is 6.508. Because the value of t arithmetic is greater than 6.508> 1.674 so it can be concluded that Ho is rejected and Ha is accepted, which means there is an influence of metacognitive abilities on learning outcomes in biogeography.

Based on the results of the linearity test the value of Sig is known whilst deviation from Linearity of 0.579. Because of the value of Sig. 0.579> 0.05, it can be concluded that Ho is rejected and Ha is accepted, meaning that there is a linear relationship between variables of metacognitive abilities and learning outcome variables. Students' metacognitive abilities consist of metacognitive knowledge and metacognitive skills. Indicators of metacognitive knowledge include declarative, procedural, and conditional knowledge and indicators of metacognitive skills include planning,

managing information, monitoring, and evaluation.

Dunning *et. al.* (2003) states that metacognition skills are important in learning and are important determinants of academic success. Students who have good metacognition skills show good academic success compared to students who have poor metacognition skills. This means that students' metacognition skills have significant positive implications with the success of learning (Tibrani 2017).

Table 7. ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Learning Outcomes* MAI	Between Groups	(Combined)	558.115	18	31.006	3.128	.002
		Linearity	406.428	1	406.428	41.000	.000
		Deviation from Linearity	151.688	17	8.923	.900	.579
	Within Groups		4356.867	36	9.913		
	Total		914.982	54			

A person's learning outcomes can be seen from changes in behavior, both in the form of mastery of knowledge, thinking skills, and motor skills. Bloom classifies learning outcomes into 3 domains or domains, namely cognitive, affective, and psychomotor domains. The learning outcomes emphasized in this study are learning outcomes in the cognitive domain. The cognitive domain is concerned with developing intellectual capabilities and skills (in Sukmadinata, 2009).

The relationship between metacognitive abilities in line with biogeographic learning outcomes is in line with several statements. Hopkins (2011) stated that metacognition is a partial mediator for achieving better academic success. The sentence means Danial if metacognition can be a good intermediary to improve mastery of concepts or teaching material. High metacognition skills will also contribute highly to improving learning outcomes. Conversely, low cognitive ability means low learning outcomes. Based on the question of learning outcomes instruments that only contain mastery of the concept indicates that the limitations of mastery of concepts or material can reduce the value of learning outcomes. This is an indicator of changes in metacognition. Danial (2010) states that reflection and metacognition are the main basis in the learning process to form expert and independent students.

The learning process will leave traces in a person and will be temporarily stored in his memory. Memory has an important role in the learning process not only in the dimension of memorization, but also in the dimensions of critical thinking, learning, connecting, remembering, and using all the knowledge and abilities that have been acquired (Tibrani 2017). The results of learning obtained during the learning process, stored in memory and then can be extracted from memory when needed.

Piaget's model of intellectual development explains the existence of developments that intelligence is built in a period in a series composed of stages that are interrelated or related. These stages determine its development. This development is a fundamental process where each element of learning is a function of the overall development. Thus, one's intellectual development determines what can be learned.

Metacognitive skills influence students 'thinking so that it indirectly affects cognitive

learning outcomes and students' ability to store memories of things learned better known as retention. Corebima (2006) argues that one of the benefits of metacognitive skills is that it can help students become self-regulated learners who are responsible for the progress of their learning and adapt their learning strategies to achieve task goals. Livingston (1997) states that metacognitive holds a critical role that is very important for successful learning. Learning outcomes or achievement is the realization of potential skills possessed by someone (Sukmadinata, 2009).

Students are at an intuitive level and are very dependent on the way the material is shown to them as in Biogeography learning. If the new concept is given too far from the scheme, it might not be able to assimilate it. Woolfolk (2010) mentions that metacognitive refers to ways to raise awareness about the process of thinking and learning that is carried out and this awareness will be realized if one can start thinking by planning, monitoring, and evaluating results and thinking activities.

Metacognition harmonizes differences in knowledge and abilities (Tibrani 2017). This is important for developing metacognitive skills for all children. Based on the nature of metacognition it is seen that metacognition is very important to be developed for someone. Based on the analysis of the RPP of the Biogeography lecture for the 2018-2019 academic years, it can be seen that the lecture method that has been done has varied. The use of discussion methods was held at several meetings. Metacognition can be developed through a process or form of learning that can train metacognitive knowledge and metacognitive regulation.

4. Conclusion

Based on the results of the research and discussion it can be concluded that there is a linear relationship between the variables of metacognitive abilities and learning outcome variables. The average cognitive value of students is 44.57 which means it is enough to indicate the value of learning outcomes which is also quite by the regression formula Y = ao + boX = 48.434 + 0.468X. Based on the findings of this study, it is suggested: (1) paying attention to the ability of metacognition in the learning process is important to every lecturer, and (2) measuring the ability of metacognition could be done by an experimental method to further study the increasing learning outcomes due to metacognitive abilities.

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