The Influences of Metacognitive Awareness and Cognitive Style Towards Students Mathematics Achievement at SMP Negeri 1 Lamasi

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ABSTRACT
This study aims to determine the description of metacognitive awareness, cognitive style, and learning outcomes of mathematics, the influences of metacognitive awareness and cognitive style on mathematics learning outcomes of eighth-grade students of Junior High School 1 Lamasi. The type of research used is ex-post facto. The population and sample in this study were all students of class VIII Junior High School 1 Lamasi with a sample of 108 people. This study's data collection techniques include a questionnaire, GEFT test, and mathematics learning outcomes test. Statistical analysis used to process research data is descriptive statistical and inferential statistics. The results showed that: 1) the students' metacognitive awareness was in the high category. 2) Students' cognitive style tends to be in the FI type category, which means these students work more independently and think analytically. 3) Students' mathematics learning outcomes are in the high category.

***Keywords**: Metacognitive, Cognitive Style, Learning Outcomes of Mathematics.*

1. INTRODUCTION

Today's development is quite rapid; more efforts are needed to prepare human resources to develop their potential to become qualified people. Mathematics is one of the subjects that are in the spotlight in the world of education. Mathematics is assessed as a subject that can improve the quality of human resources itself. Mathematics plays an important role in education, which can help students to think critically, structured, and analytically directed. Mathematics calculates and memorizes existing formulas and guides students to understand the process, analyze it, communicate it, and evaluate it [1].

Metacognitive awareness is students' awareness in planning and controlling student learning by using student methods/strategies to improve student achievement. Metacognitive Awareness trains students to think about what they need to do, what they need, and how to achieve it. The learning efforts needed by students in learning and understanding mathematics include learning by involving their metacognitive awareness. Metacognitive awareness is related to students' awareness in learning, especially when solving problems; it can cause them to lack understanding of what is being studied and how to solve problems. It has an impact on less than optimal learning outcomes [2]. Particularly, problems are accepted as cases containing a description of the question and concern individuals who do not have the necessary algorithms and systematic knowledge to answer the questions [3].

One consideration in learning that cannot be ignored is cognitive style. The differences between individuals regarding stable attitudes, choices, or strategies that determine a person's typical ways of receiving, remembering, thinking, and solving problems are called "cognitive styles" or cognitive styles consisting of Field Independent (FI) and Field Dependent (FD) [4].

Based on observations made by the author with a teacher in the field of mathematics studies at SMP Negeri 1 Lamasi, it was found that students' learning methods were generally less active. Students tend to wait for an explanation from the teacher rather than studying the material independently. Students are mostly passive and

only record the information given by the teacher. In addition, learning that can empower students, such as empowering metacognitive thinking, tends not to be implemented optimally to make the learning process less meaningful. In addition, the differences in the characters possessed by each individual have a major influence on their learning according to their respective styles or ways which are certainly different from one child to another. These problems make student learning outcomes less than optimal.

The existence of problems such as the above, the authors are interested in conducting research entitled The Influence of Metacognitive Awareness and Cognitive Style on Mathematics Learning Outcomes of Students of SMP Negeri 1 Lamasi.

Based on the description above, the proposed problem formulation is as follows: (1) How to describe metacognitive awareness, cognitive style, and mathematics learning outcomes? (2) Is there any influence of metacognitive awareness on the mathematics learning outcomes of eighth-grade students of SMP Negeri 1 Lamasi? (3) Is there any influence of cognitive style on the mathematics learning outcomes of eighth-grade students of SMP Negeri 1 Lamasi? (4) Does metacognitive awareness and cognitive style influence the mathematics learning outcomes of eighth-grade SMP Negeri 1 Lamasi?

2. LITERATURE REVIEW

To avoid inappropriate perceptions regarding the variables discussed in this study, the researchers need to explain the variables in this study, namely as follows.

2.1. Metacognitive Awareness

Metacognition is defined as knowledge of their cognitive processes and products [5], added again by Oszoy [6], who defines metacognitive awareness as the ability to use knowledge to regulate and control cognition. Cognitive control is meant for awareness of understanding and learning performance. Veenman [7] also states that metacognitive awareness includes awareness of how a person learns, evaluates his learning needs, generalizes, and implements appropriate learning strategies for him.

According to Flavel [6], metacognition consists of 2 main components: metacognitive knowledge and metacognitive regulation. Metacognitive knowledge includes sub-aspects of declarative knowledge, procedural knowledge, conditional knowledge, and aspects of metacognition regulation consisting of sub-aspects: Planning, information, management strategies, compliance monitoring, debugging strategies, and evaluation.

Based on the description of metacognitive awareness above, it can be concluded that Metacognitive Awareness is an awareness of thinking about what is known and what is not known, meaning that students know how to learn, know their learning abilities. Metacognitive awareness is necessary for successful learning, considering that metacognitive awareness allows students to manage cognitive skills and see their weaknesses so that improvements can be made in subsequent actions.

2.2. Cognitive Style

The cognitive style defined by Keefe [7] is part of a learning style that describes behavior habits that are relatively fixed in a person in receiving, thinking, solving problems, and storing information. Shirley and Rita have their definition of cognitive style. They state that cognitive style is an individual characteristic in thinking, feeling, remembering, solving problems, and making decisions [8]. In other words, Uno defines that some individuals are easier to receive information that is well organized, neat, and systematic. Meanwhile, other individuals are easier to receive information that is not artfully arranged and not too systematic.

Cognitive style is an individual's preferred way of receiving, processing information and solving problems at hand. If individuals tend to be independent and not affected by environmental and social situations, they are included in the Independent Field (FI) category. Meanwhile, if the individual depends on the environment and society, it is included in the Field Dependent (FD) category [7].

2.3. Math Learning Results

"Learning outcomes are abilities that students have possessed after they have experienced the learning process" Sudjana [9]. In the teaching and learning process, the teacher does his job not only to convey material to students but also to assist success in delivering subject matter, namely by evaluating teaching and learning outcomes.

Efforts to provide an evaluation of teaching and learning, namely to determine students' mathematics learning outcomes. Teaching and learning evaluation activities are closely related to measurement activities in the form of learning outcomes tests. The result of the test is nothing but a value. [9] "Evaluation is the provision of

ways of working, solutions, methods, materials, etc." Viewed from this perspective; there needs to be a certain criterion or standard in the evaluation.

The results of learning mathematics can be concluded that the results that are owned or obtained by students after they experience the process of learning mathematics are marked by a value scale in the form of letters, symbols, or numbers, and this is usually used as a benchmark for success or failure of the student in learning mathematics.

3. RESEARCH METHODOLOGY

3.1. Location

The location of the research was carried out at SMP Negeri 1 Lamasi on Jln. Andi Jemma, Lamasi Village, Lamasi District, Luwu Regency, South Sulawesi Province.

3.2. Research Type and Design

3.2.1. Types of research

The type of research used is ex-post facto research. [10] Ex-post facto research is research in which the independent variables have been treated, or treatment was not carried out at the research time. This research is usually separated from experimental research. This research will be conducted with a quantitative approach.

3.2.2. Research design

The research variables of this study were metacognitive awareness (X1) and cognitive style (X2), as independent variables, and mathematics learning outcomes (Y), as dependent variables. The independent variable or commonly called the independent variable, is the variable that affects or causes the dependent (bound) variable to arise. The dependent variable (bound) is a variable that is influenced or becomes a result of the existence of an independent variable.

The description of this research paradigm is presented in Figure 1:

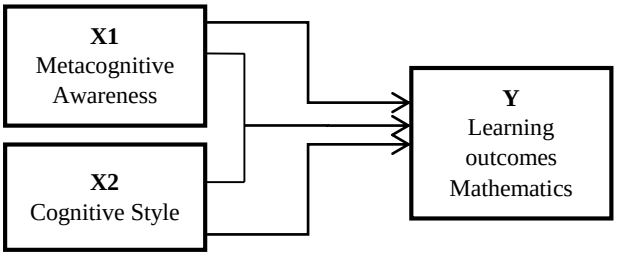

Figure 1. Research design

3.3. Population and Sample

The population in this study were all eighth-grade students of SMP Negeri 1 Lamasi, totaling 288 students from 9 classes. The class is assumed to be homogeneous. The samples that were selected as samples were 108 students. Students who are considered samples are students who attend all research activities, with 108 students.

3.4. Research Instruments

The research instruments used in the research are:

3.4.1. Metacognitive Awareness

The instrument to determine students' metacognitive awareness was using a metacognitive awareness questionnaire which was adapted from the Metacognitive Awareness Inventory (MAI) according to Green [11] which consisted of 52 items, then adapted into 30 items, adjust the questionnaire by validating it with the validator to paraphrase the sentence and eliminate some points in the indicators that are considered difficult for students to answer.

Aspects that include metacognitive awareness are aspects of metacognitive knowledge, consisting of declaration knowledge, procedural knowledge, and conditional knowledge, and aspects of metacognitive regulation, including sub-aspects planning, information management strategies, monitoring understanding, debugging strategies, and evaluation. There are four choices on the MAI used, namely Very Appropriate (SS), Appropriate (S), Not Appropriate (TS), and Very Unsuitable (STS). For positive statement items, the answers are SS=4, S=3, TS=2, STS=1. For negative statement items, SS=1, S=2, TS=3, STS=4.

3.4.2. Cognitive Style

Table 1. Descriptive Statistics of Metacognitive Awareness in Class VIII SMP Negeri 1 Lamasi.

Statistics	Statistical Value
Number of Samples	108
mean	89.43
median	90.00
Mode	95
Standard deviation	10.39
Variance	108.11
Minimum value	41
Maximum value	108

The data that will be used for cognitive style is from the Group Embedded Figures Test (GEFT) instrument test, which consists of 25 items divided into 3 parts, of 7 items in part I exercise, and 18 items in parts II and III are the core of GEFT. . Each correct answer, which

means that the subject can correctly thicken the shape of a simple picture hidden in a complex picture, is given a score of 1. The analysis to classify students into FI and FD cognitive styles. If students get a score of ≤50% of the ideal score (score 0 – 9), then students are classified as having FD cognitive style, and if students get a score > 50% (score 10-18), then students are classified as having FI cognitive style [5].

3.4.3. Student Learning Outcomes Data

Data on mathematics learning outcomes were obtained by giving tests to students. The tests given are learning outcomes tests that have been compiled and have been revised by the validator.

3.5. Data collection technique

The collection is done by giving instruments to students who are research samples. The author carried out this data collection in stages according to the research plan and schedule. Data collection techniques in this study were carried out using:

3.5.1. Questionnaire/ Questionnaire

Researchers can use a questionnaire to obtain data related to the respondents' thoughts, feelings, attitudes, beliefs, values, perceptions, personality, and behavior. In other words, researchers can measure various characteristics by using a questionnaire.

3.5.2. Math Learning Results Test

The test used is multiple-choice, totaling 25 questions, 4 alternative answer choices, namely A, B, C, and D.

4. RESULTS AND DISCUSSION

4.1. Research result

4.1.1 Metacognitive Awareness

Based on the results of the research instrument validation test, it was found that the number of questionnaire items was as many as 30 items that had been used as a data collection tool in the study. It is found that of the 108 samples studied; the research sample has an average score (mean) of metacognitive awareness in class VIII students of SMP Negeri 1 Lamasi about 89.43 with a standard deviation score of 10.39, and a variance score of 108.11. If the score of metacognitive awareness in class VIII SMP Negeri 1 Lamasi is classified into 5 categories, the results areas in the following table:

Table 2. Distribution of the frequency of metacognitive awareness in class VIII SMP Negeri 1 Lamasi

F	Score	Category	%
1	30 X 52.5≤<	Very low	0.92
0	52.5 X 67.5≤<	Low	0
28	67.5 X 82.5≤<	Currently	25.92
56	82.5 X 97.5≤<	Tall	51.85
23	97.5 X 120≤≤	Very high	21.29

Based on Table 1, it is known that of the 108 students who became the research sample, there was 1 person or 0.92% of the students were in the very low category, 28 people or 25.92% of the students were in the medium category, 56 people or 51.85% of the students were in the high category. And there are 23 students or 21.29% students in the very high category. If we pay attention to the frequency of metacognitive awareness, most of the students, 56 people, are in the high category. Thus, it can be said that the score of metacognitive awareness that became the research sample was included in the high category.

4.1.2 Cognitive Style

Based on the research instrument validation test results, it was found that the number of GEFT tests was as many as 24 items that had been used as a data collection tool in the study. The results of descriptive statistical analysis related to students' perceptions of Field Dependent (FD) and Independent Field (FI) cognitive styles are as follows:

Table 3. Descriptive statistics on cognitive style FI and FD in class VIII SMP Negeri 1 Lamasi.

Statistics	Statistical Value
Number of Samples	108
mean	9.69
median	10.00
Mode	12
Standard deviation	3.27
Variance	10.74
Minimum value	2
Maximum value	17

Based on the table above, it can be stated that from the 108 samples studied; it can be seen that the research sample has an average score (mean) of cognitive style in class VIII students of SMP Negeri 1 Lamasi is 9.69 with a maximum score of 17 and a variance score of 10.74.

If the cognitive style scores in class VIII SMP Negeri 1 Lamasi are classified into 2 categories, the results are as in the following table:

Table 4. Frequency distribution cognitive style in class VIII SMP Negeri 1 Lamasi.

F	Cognitive Style Score	Category Cognitive Style	(%)
59	9 X 18<≤	*FI*	54.63
49	0 X 9≤ ≤	*FD*	45.37

Based on the table above, it is known that of the 108 students who became the research sample, 59 students or 54.63% of the students were in the Independent Field (FI) category. There were 49 students, or 45.37% of the students in the Dependent Field (FD) category. , thus it can be said that, in general, the cognitive style scores in the sample are more dominant in the Independent Field (FI) category.

4.1.3 Math learning outcomes

If the score of mathematics learning outcomes in class VIII SMP Negeri 1 Lamasi is classified into 5 categories, the results are as in the following table:

Table 5. Frequency distribution of mathematics learning outcomes in class VIII SMP Negeri 1 Lamasi

F	Score	Category	%
1	0 HB 40 ≤ <	Very low	0.92
11	40 HB 60≤ <	Low	10.18
28	60 HB 75≤ <	Currently	25.92
64	75 HB 90≤ <	Tall	59.25
4	90 HB 100 ≤ ≤	Very high	3.70

Based on the table, it is known that of the 108 students who became the research sample, there was 1 person or 0.92% of the students were in the very low category, there were 11 students, or 10.18% of the students were in a low category, there were 28 students or 25.92% students are in the medium category, there are 64 students or 59.25% students in the high category, and there are 4 students or 3.70% students in the very high category. If we pay attention to the frequency of mathematics learning outcomes, most students, namely 63 people, are in the high category. Thus, the mathematics learning outcomes scores in the sample in this study are high or good.

4.2 Discussion

Many factors can influence students' mathematics learning outcomes. This study examines the effect of metacognitive awareness and cognitive style on mathematics learning outcomes for eighth-grade students of SMP Negeri 1 Lamasi. The normal test for the residual variable by looking at the significant value is known that the data comes from a normally distributed population. There are significant differences in variance from several tests conducted on the independent and dependent variables. This means that simple linear regression and multiple regression can be used as hypothesis testing tools.

4.2.1 The Effect of Metacognitive Awareness on Mathematics Learning Outcomes of Class VIII Students of SMP Negeri 1 Lamasi

Based on the descriptive statistical analysis results, it is known that the variable metacognitive awareness (X1) of class VIII SMP Negeri 1 Lamasi is in the high category from the number of samples. The average metacognitive awareness of students is 89.43.

Based on the results of the analysis with the help of SPSS obtained a positive correlation coefficient which indicates there is a strong influence between metacognitive awareness on students' mathematics learning outcomes because the p-value <0.05, so H0 is rejected and the research hypothesis is accepted, so there is a positive influence of metacognitive awareness on students' mathematics learning outcomes class VIII SMP Negeri 1 Lamasi which means that the higher the level of metacognitive awareness, the higher the level of student learning outcomes in mathematics and conversely the lower the level of metacognitive awareness, the lower the level of student learning outcomes in mathematics. This is reinforced by Coutinho's opinion, which states a positive relationship between learning outcomes and metacognition [11].

The results of this study are in accordance with Jusman's opinion that metacognitive awareness is related to a person's awareness of his thinking process [12]. The lack of students' metacognitive awareness in learning, significantly when solving problems, can cause them to lack understanding of what is being studied and not understand how to solve problems so that their learning achievement becomes less than optimal.

4.2.2 The Effect of Cognitive Style on Mathematics Learning Outcomes of Class VIII Students of SMP Negeri 1 Lamasi

Based on the results of descriptive statistical analysis, it is known that the cognitive style variable (X2) in class VIII SMP Negeri 1 Lamasi is in the Independent Field (FI) and Field Dependent (FD) categories with an average of 9.69 with the number of students included in the Field Dependent category. Independent (FI) are 59 students, while for the Field Dependent (FD) category, there are 49 students. So it can be concluded that the

students of SMP Negeri 1 Lamasi are in the Field Independent (FI) category.

The magnitude of the influence between the cognitive style variables (X2) on mathematics learning outcomes (Y) based on the results of the analysis with the help of SPSS obtained a positive correlation coefficient which indicates there is a strong influence between cognitive style on students' mathematics learning outcomes because the p-value < 0.05 so H0 is rejected and the research hypothesis is accepted so that there is a positive influence of cognitive style on mathematics learning outcomes of class VIII students of SMP Negeri 1 Lamasi which means that the higher the level of cognitive style, the higher the level of student learning outcomes of mathematics and vice versa, the lower the level of cognitive style, the lower the level of cognitive style. Also, the level of students' mathematics learning outcomes. This is reinforced by Uno's opinion that cognitive style is a typical student way of learning,

This is evidenced by Mailili's opinion, which states that cognitive style contributes to mathematics learning outcomes. Therefore, individual student differences are a concern in learning mathematics, especially in selecting methods, media, or evaluation [13].

4.2.3 The Effect of Metacognitive Awareness and Cognitive Style on Mathematics Learning Outcomes of Class VIII Students of SMP Negeri 1 Lamasi

The mathematics learning outcomes of class VIII SMP Negeri 1 Lamasi is in the medium category with an average of 72.81. The high achievement of students' mathematics learning is also influenced by internal factors and external factors in students.

Based on calculations using the SPSS program to test the hypothesis, namely how the influence of metacognitive awareness and cognitive style together on learning outcomes in mathematics, the value in the ANOVA table column F, the F-count value is 4.076 with a probability of 0.020. Where 0.020 < 0.05 so H0 is rejected. This means a jointly significant influence between metacognitive awareness and cognitive style on mathematics learning outcomes.

The results of this study indicate that there is an effect of metacognitive awareness (X1) and cognitive style (X2) on students' mathematics learning outcomes. Based on the results of multiple regression correlation data obtained a significant regression model so that the resulting regression model can be used to predict students' mathematics learning outcomes scores based on metacognitive awareness and cognitive style, with the presence of students' cognitive style variables, the influence of metacognitive awareness on students' mathematics learning outcomes increases.

Putra's (2013) research on the relationship between cognitive styles and learning achievement shows a positive and statistically significant correlation between cognitive style and learning achievement. In addition, Una's study concludes that there is a positive relationship between students' cognitive style and mathematics learning outcomes [14]. Cognitive style has been reported as one of the significant factors influencing learning outcomes in various subjects at school. In addition, Jusman's research says that formal reasoning ability directly has a positive effect on mathematics learning achievement after going through metacognitive awareness, achievement motivation does not directly affect mathematics learning achievement,

Likewise, the opinion of Handel, Artelt, and Weinert stated that someone who involves his metacognitive awareness would be better at learning and completing a task than those who do not use his metacognitive awareness [15]. A number of studies report that there is a significant improvement in learning when this metacognitive awareness is included as part of classroom learning [12].

Ratunaman stated that there was a significant difference between the mathematics learning outcomes of the FI student group compared to the FD student group. For each type of learning outcome, the acquisition of FI students is superior to those of FD students. Una (2013) states that students' metacognitive awareness emphasizes students' awareness in studying something related to strategic knowledge, cognitive knowledge, and self-knowledge. Meanwhile, students' cognitive style will relate to students' ways of remembering, solving, and overcoming the problems they face [14]. The metacognitive awareness that students have will try to improve the cognitive processes that have been passed in accordance with their learning styles which are indirectly through these two variables,

5. CONCLUSION

Based on the research results, the conclusions obtained are that metacognitive awareness and cognitive style have a positive influence on mathematics learning outcomes for eighth-grade students of SMP Negeri 1 Lamasi. Or in other words, metacognitive awareness and cognitive style together have a significant influence on

the mathematics learning outcomes of eighth-grade students of SMP Negeri 1 Lamasi. Therefore, parents, schools, and teachers are needed to increase awareness of learning and learning styles in students.

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