The Influence Of Metacognitive Development On The Activities And Learning Outcomes Of Participants In Class VII Mapel Informatics at SMP Brebes Regency

Nora Triningsih, Burhan Eko Purwanto, Rahmad Agung Nugroho
{ noratriningsih43@guru.smp.belajar.id}

Magister of Pedagogy, Universitas Pancasakti Tegal, Indonesia

Abstract. This study aims to describe the learning activities of grade VII students in Informatics subjects through metacognitive development in Brebes district junior high schools and to describe the learning outcomes of grade VII students in Informatics subjects through metacognitive development in Brebes Regency Junior High School. Based on the results of research and discussion, it can be concluded that there is an influence of metacognitive development on the activities and learning outcomes of grade VII maple informatics students in SMP Brebes Regency with the significance value of the pretest student learning outcomes is 0.130 which means ≥ 0.050 (0.130≥0.050) and F of 1,885.

Keywords: Metacognitive, Learning activities and outcomes, Informatics

1. Introduction

Basically, this 21st century competence has been adapted in the education system in Indonesia through the 2013 Curriculum. In fact, not only the concept of 21st century skills, but the 2013 Curriculum also adopts two other main concepts: scientific approach and authentic assessment. The scientific approach is used to familiarize students with how scientists think and learn with the 5M procedure: observing, questioning, exploring/collecting data, associating and communicating. The assessment with an authentic approach is intended to be able to significantly measure the learning outcomes of students in aspects of attitudes, skills, and knowledge [1] Significant in this context is that the assessment is carried out comprehensively, so that complete information is obtained about students' learning progress. Thus, it can be concluded that the 2013 Curriculum is a refinement of the previous curriculum (KTSP 2006) and emphasizes character education and complete mastery of competencies from aspects of attitudes, knowledge, and skills. Even though 21st century education is required to emphasize *critical thinking* and *problem solving*, *creativity* and *innovation, communication, collaboration*, and global awareness. The return of ICT which was converted into Informatics subjects became one of the subjects that was brought back to hone students into humans who think critically and are able to compete in the global era later. According to [2], metacognitive is a process of high-level cognition and a process to deliver knowledge and development of learners in planning, monitoring, and reorganizing learning strategies. Metacognitive refers to a person's knowledge of the processes and products of that

person's cognition independently [3] Metacognitive also refers to a person's understanding of knowledge so that a deep understanding is formed in the form of a clear description of the knowledge learned [4].

In general, metacognitive learners involve the knowledge and awareness of learners about everything related to their cognitive activity. Students who have metacognitive abilities will have full awareness of their thinking processes so that the learning process continues. [5] explained that students with good metacognitive development will be better able to solve problems, make decisions and think critically, more motivated to learn, better able to regulate emotions, and better able to overcome difficulties faced in the learning process. Metacognitive abilities help learners understand the material and solve the problems faced. Therefore, the metacognitive abilities of learners are considered necessary to be developed in learning activities.

Metacognitive refers to higher-order thinking that involves active control in the cognitive process of learning to solve a problem. Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress on task completion are natural metacognitive. Metacognitive is the ability to think where the object of thinking is the thought process that occurs in oneself. In the context of learning, students know how to learn, their abilities and learning modalities, and the best learning strategies to learn effectively. In general, metacognitive learners involve the knowledge and awareness of learners about everything related to their cognitive activity. Students withacognitive abilities will have full awareness of their thinking processes so that the learning process contcontinues They explained that students with good metacognitive development will be better able to solve problems, make decisions and think critically, more motivated to learn, better able to regulate emotions, and better able to overcome difficulties faced in the learning process.

Metacognitive abilities help students understand the material and solvethe problems faced. Therefore, the metacognitive abilities of learners are considered necessary to be developed in learning activities. In the course of informatics students in grade 7 of SMP N 5 Brebes and SMP N 1 Losari Brebes, the learning applied by teachers is still dominated by aspects of knowledge and understanding of concepts, not yet requiring students to be active and train students in 3 thinking and discovering existing concepts themselves. Learners tend to memorize concepts more often without knowing how the process to discover. This affects the lack of students' ability to think to solve problems. This is in line with research conducted [6] which states that students' lack of critical thinking influences the problem-solving ability of weak students, so teachers must be able to choose the right strategy to conduct learning according to classroom conditions. Portfolio assessment is one of the class-based assessments (*assessment for* learning) of a set of student works arranged systematically and organized taken during the learning process within a certain period of time which is used to determine students' learning progress.

There are several scopes of material in Informatics subjects: Computer Engineering, Computer Networks (Internet), Data Analysis, Algorithms and Programming, Social Impact of Informatics, and Computational Thinking. The scope of material applied to Informatics subjects such as algorithms and programming has connotations as something that is difficult to do and is usually only done by people with special education or training. Working on a program also takes a long time to produce good work. Therefore, programming is considered something difficult to do. Understanding algorithms is very attached to the word logic, namely the ability of humans to think with reason about a problem, produce a truth, be proven, and be accepted by reason. Logic is often

associated with human intelligence. A human being who can logic well is usually referred to as an intelligent person. Even in solving a problem, logic is necessary. Of course, a deep understanding of the material is needed. This is because the Algorithm material involves many complex related discussions. The learning process that provides space for students to analyze, synthesizing, and creating is an important thing to apply. The provision of a set of tasks or works that are close to the daily lives of students is believed to be able to increase understanding of the Algorithm material. The provision of a set of tasks (portfolio assessment) aims to facilitate the mastery of learning material as required in basic competencies or indicators of competency achievement. This is supported by Jantimala (2007) who states that portfolios are effective in helping learners to understand Algorithms.

Based on the background of the problem, several problems can be identified as follows. (1) Does metacognitive development affect the learning activities of grade VII students in Informatics subjects in junior high school in Brebes district? (2). Does metacognitive development affect the learning outcomes of Class VII students in Informatics subjects in Junior High School Brebes district?

This study aims as follows. (1) To describe the learning activities of grade VII students in Informatics subjects through metacognitive development in junior high schools in Brebes district. (2). To describe the learning outcomes of grade VII students in Informatics subjects through metacognitive development in SMP Brebes Regency. The results of this research are expected to provide theoretical and practical benefits, which are as follows. (1) Theoretical Benefits This research can produce a thesis on the influence of metacognitive development on the activities and learning outcomes of Class VII students in Informatics subjects in junior high school Brebes district, thereby adding pedagogical insights. (2). Practical Benefits For teachers to provide alternative assessment forms in training or developing students' metacognitive abilities. For students, it is expected to foster their interest in learning to improve metacognitive abilities. This is further expected to affect the learning achievement of students. For other researchers, the results of this study are expected to be used as input and reference for further research on the discussion of students' metacognitive abilities.

2. **Literature Review**

Learning activities are activities or activities that can cause learning actions. Thus, the definition of learning activities is an activity that leads to learning actions that change a person to acquire a new skill. Activities are a very important part of the learning process, because teaching and learning activities will not occur without activity. Activities are not only necessary to learn certain things but all lessons. Student learning activities are the core of learning activities at school. The definition of learning [7] is as follows: (1) Learning is modification or strengthening behavior through experience (learning is *defined as the experiencing*). According to this understanding, learning is a process of activity and not a result or purpose of learning. Learning is not just remembering but broader than that, which is experiencing. Learning outcomes are not a mastery of training results but a behavior change; (2) Learning is a process of changing individual behaviour through interaction with the environment. In interaction occurs a series of learning experiences. According to psychological understanding, learning is a process of change, namely changes in behaviour as a result of and interaction with the environment in meeting the needs of life. These changes will be evident in all aspects of behavior. Learning is a process of effort made by a person to obtain a new change in behavior as a whole, as a result of one's own experience in interaction with his environment.1 Durton defines learning as a change in an individual as a result

of the interaction of his environment to meet needs and make him more able to preserve the environment adequately. "*Learning is a change the individual due to interaction of that individual and his environments which fills a need and makes him capable of dealing adequality with his environment". According to Hilgrad and Bower, to learn means: to gain knowledge, comprehension, or mastery of trough experience or study, to fix in the mind or memory; memorize; to acquire trough experience, to become in forme of to find out*". According to this definition, learning means acquiring or mastering knowledge through experience, remembering, mastering experience, and obtaining information or discovering. Thus, learning has the basic meaning of activity or activity and mastery of something. [8] learning is a process characterized by changes in oneself. Change as a process can be shown in various forms such as changing individual students' understanding, knowledge, behavior and other aspects. Previous study defines learning as a process of change in the human person, and the change is shown in the form of increasing the quality and quantity of behavior such as increasing skills, knowledge, attitudes, habits, understanding, skills, thinking power and other abilities. Metacognitive can produce learners with higher-order thinking competencies because it spurs learners' motivation to learn and improves learning outcomes [9]. In general, metacognitive is a picture of understanding and controlling one's learning. They states that metacognitive is part of the ability to self-monitor personal knowledge (selfknowledge monitoring). A learner can direct control over his metacognitive processes to actively seek information. With metacognitive, a person can quickly evaluate what they know (what they think they know) so that remembering information is not wasted.

The more often learners manage their metacognitive thinking processes, the more capable learners are in controlling goals, motivation, and attention in learning. The application of metacognition in learning activities gives rise to something referred to as metacognitive knowledge and metacognitive activity. Metacognitive knowledge involves monitoring and reflecting on one's thoughts, such as knowledge of a task or how to use a particular procedure to solve a problem. Metacognitive activity refers to a person's awareness to adjust and manage their thinking strategies at the time of solving problems and thinking about a goal (Santrock, 2013). Etymologically, portfolio comes from two words: port, which means report, and folio, which means full or complete. According to experts, portfolios have several meanings. Some see it as an object / tool and some see it as a method / technique / way. Portfolio as a physical object is a collection of results (evidence) of an activity that someone does [10]. Portfolio as a method / technique / method is an approach or assessment model that aims to measure the ability of students to build and reflect on a job / task or work through the collection of materials that are relevant to learning objectives.

According to [11] who explained that portfolio assessment is a collection of learning outcomes / student works (test results, individual assignments, practicum reports, and tangible results of other objects) to assess the learning progress process either analytically, holistically, or a combination of both. Portfolios are used in learning activities to show students' efforts, progress, and achievements in their learning process[12]. So, a portfolio is a collection of student work in the form of a collection of documents that are useful in tracing the history of the development of results or anything that has been achieved in learning activities. According to the Big Dictionary Indonesian, an algorithm is a logical decision-making sequence for problem solving. Algorithms can also be interpreted as a sequence of problem solving that is arranged systematically using logical language to solve a problem. In computer science, an algorithm is a set of instructions or formulas that contain steps for problem solving. Understanding algorithms is very attached to the word logic, namely the ability of humans to think with reason about a problem, produce a truth, be proven and

be accepted by reason. Logic is often associated with human intelligence. A human being who is able to logic well is usually referred to as an intelligent person. Even in solving a problem, logic is absolutely necessary.

3. Methods

The approach in this study is quantitative, because the research is presented with numbers. It is under the opinion [13] which suggests quantitative research is a research approach that is widely required to use numbers, starting from data collection, interpretation of the data, and the appearance of the results. The quantitative approach is a research design using statistical processing figures, structure and controlled experiments [14]. Meanwhile, according to Saifuddin Azwar, the quantitative approach is an approach that emphasizes its analysis on numerical data (numbers) processed by statistical methods [15]. In facilitating the process of designing and processing data, in this study researchers use the Experimental method, **Experimental** research methods are included in quantitative research methods. Previous study state that experimentation means trying, seeking, and confirming. It causal or causal relationships are at the core of experimental research. A causal relationship is a causal relationship, this means that if the independent variable changes its value it will change the dependent value. For example, if the incentive value is increased and lowered, it will change the value of employee performance. [16] states that the understanding of experimental research methods is used if researchers want to know the causal influence between independent and dependent variables. This means that the researcher must be able to control all variables that will affect the *outcome* unless an independent variable (*treatment*) has been established. It can be concluded that the definition of experimental research methods is a quantitative research method used to determine the influence of independent variables (treatment / treatment) on dependent variables (results) under controlled conditions. Conditions are controlled so that no other variables (other than treatment variables) affect the dependent variable, namely methods that relate and interpret data related to facts, circumstances, variables, and phenomena that occur during research and present as they are. (M. Subana, 2005). In this study, a survey method with multiple regression analysis was used. The survey method is used because researchers want to understand about a phenomenon that occurs in thatlocation. How to collect research data is by conducting surveys (taking data directly on objects in the field). According to Ridwan, multiple regression analysis is used to determine how much influence two or more independent variables have on the dependent variable [17].

The research was conducted at SMP Kabupatem Brebes in grade VII, organising Informatics subjects, namely SMPN 5 Brebes, SMPN 1 Losari, and Brebes regency. The research was conducted in both schools due to funding and time considerations. This study does not use random sampling because it involves students and teachers who are actively learning, so that this study does not interfere with the course of learning activities according to the applicable educational calendar. This study uses a *Quasi Experiment* Design with Nonrandomized Control Group Pre-test - Post-test Design or *Pre-test-Post-test* Group Control Not Randomly (Sukardi, 2013: 186) or often referred to as Nonequivalent Control Group Design (Sugiyono, 2013: 116). This study involved students of SMP Negeri 5 and SMP N 1 Losari with experimental class students and control class students . The approach used is pre-test – post test design to obtain truly accurate data from the three classes that are the subjects of this study. Population and Sample According to Sugiyono (2011;18), population is a generalized area consisting of, objects / subjects that have certain quantities &; characteristics set by researchers to be studied and then drawn conclusions.

There are various kinds of sampling techniques to determine the sample to be used in research According to [13] the population is the entire research subject. Theopulation in this study is all grade VII students of SMP Negeri 5 and SMP Negeri 1 Losari in Brebes regency who organize Informatics learning.

4. Results and Discussion

The number of grade VII students of SMP Negeri 5 Brebes regency amounted to 28.1 students and the number of grade VII students of SMP Negeri 1 Losari kabaupaten Brebes amounted to 326. Thus the population number is 607. Sampling formula based on Isaac and Michael's table. with s 10% in the total for the population of 281 sampled 138 while for SMP Negeri 1 losari from its population of 326 147 students were taken (sampling based on the Isaac Michael table with s 10%) so that the sample used in this study amounted to 285. The first step of the study was to collect pretest score data for all grade VII SMP Negeri 5 and grade VII students of SMP Negeri 1 Losari. Based on the identification of activities and learning outcomes, the results of students with learning outcome scores that have lownoise are used as experimental groups.

Based on activities and learning outcomes, score intervals can be obtained for each student's learning outcomes ranging from low, medium, and high. The interval to determine the category of student learning outcomes scores is reducedin the following ways:

Max total score : 90
Minimum total score : 50
Score range: 90 – 50 divided by 3 categories (low, medium, high)
Interval Class Length: 23 : 3 = 13.3 in this study rounded to 13

From the length of the interval class, the category of student learning outcomes canbe presented in table 1. below :

Table 1. Student Learning Outcome Score Categories

Score	Category
50 – 63	Low
64 – 77	Keep
78 – 90	Tall

From the scores of student learning outcomes, students who have low learning outcomes amounted to 42 students, students who had moderate learning outcomes numbered 95 while students who had high learning outcomes amounted to 148 students.

5. Result and Discussion

Testing is a test of the normality of data distribution. According to [18] the value of normality assumptions must be taken into account to useparametric statistical tests. Data that has a normal distribution means that it has a normal distribution as well. With data like this can represent the population or show that the sample data comes from a normally distributed population. Such data allows detecting true discrepancies or existing relationships. Normal distribution test is a requirement for all statistical tests [19].

There are several techniques that can be used to test data normality, including the chi-squared test, lilliefors test, and kolmogorov-smirnov test. In this study used the kolmogorov-smirnov test. Kolmogorov-s mirnov is a *goodness-of-fit* test*, a* note, the degree of congruence between theoretical distributions. This test establishes whether the scores in the sample can be plausibly ascribed to a population with a certain distributive. Thus, the test includes

calculating the cumulative frequency distribution that will occur below its theoretical distribution, as well as comparing that frequency distribution with the cumulative frequency distribution of observations. The theoretical distributionis a representation of what is expected under H0. This test applies a point where the two distributions—the theoretical and the observed—have the greatest difference. By looking at the sampling distribution, we can tell whether the big difference is possible just by chance. That is, the sampling distribution indicates whether large observed differences are possible if the observations are really a random sample of the theoretical distribution. Using the Kolmogorov-S mirnov normality test SPSS assistance can be seen in table 2 below:

Table 2. Kolmogorov-S mirnov Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Learning activities and outcomes
N		285
Normal Parameters[a,b]	Mean	75.01053
	Std. Deviation	10.247804
Most Extreme Differences	Absolute	.124
	Positive	.092
	Negative	-.124
Kolmogorov-Smirnov Z		2.085
Asymp. Sig. (2-tailed)		.000

a. Test distribution is Normal.
b. Calculated from data.

Based on the results of the normality analysis test with Kolmogorov Smirnov, it is known that the magnitude of theOlmogorov-Smirnow Z K test is 2.085 with the probability of error of the analysis results greater than 5% or 0.05, these results prove that the variables of Activity and Learning Outcomes are normally distributed. **Homogeneity Test** A homogeneity test is a test of difference between two or more populations. All population characteristics can vary from one population to another. The homogeneity test is intended to show that two or more groups of sample data come from populations that have the same variance, thus the similarity of two variances is used to test whether the distribution of data is homogeneous or not, namely by comparing the two variances (Sukestiyarno, 2014).

The homogeneity test of Learning Activities and Outcomes can be seen in the table below:

Table 3. Test of homogeneity of learning activities and outcomes

Test of Homogeneity of Variances				
	Levene Statistic	**df1**	**df2**	**Sig.**
SMP N 5 BREBES SMP N 1 LOSARI	.552[a]	22	258	.950

a. Groups with only one case are ignored in computing, the test of homogeneity of variance for SMP N 5 BREBES SMP N 1 LOSARI .

Based on the results of the homogeneity test with lavene, it is known that the magnitude of the F test is 0.552 with the probability of error of the analysis results greater than 5%, and obtained Sig. of 0.950 these results prove that the variables of Activity and Learning Outcomes are *homogeneous*. **Test the hypothesis** of the problem in this study, namely whether metacognitive development has an effecton the learning outcomes of Class VII students in Informatics subjects in junior high school Brebes district By looking at inferential statistics whose function is to analyze sample data that has been used in research. The sample data and results of this study will be generalized. With a significance test of 0.05% that tests samples from the population in this study can berealized to the population. Hypothesis can be interpreted as a temporary answer to research problems until proven through collected data (Arikunto, 2006). The hypothesis in this study is that there is an influence, namely Metacognitive development affects the learning outcomes of Class VII students in Informatics subjects in Junior High School Brebes district. In this research, the hypothesis test uses the One Way Anova Test. The One Way Anova test was used to compare the average of two groups derived from two different samples. The test statistics used are the One Way Anova test. The population normality test as a prerequisite test and the population variance homogeneity test to determine the One Way Anova test have been carried out. Hypothesis testing using a comparative test of two samples, namely with One Way Anova with a significance level of 0.05. If the significance is more than 0.013, it means that the two classes have a balanced average. The results of processing average difference test data can be seen in the following table:

Table 4. ANOVA

LEARNING OUTCOMES ACTIVITIES					
	Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Between Groups	4471.228	25	178.849	1.885	.013
Within Groups	11479.235	121	94.870		
Total	15950.463	146			

Based on Table 4.7, it is obtained that the significance value of the pretest student learning outcomes is 0.130 which means ≥ 0.050 (0.130≥0.050). This means that in the initial conditions (before treatment) the two sample groups have the same activity ability and learning outcomes, and from the probability value of significance obtained F of 1.885. with a significance probability value of 0.130 ≥ 0.050 which means that the hypothesis is accepted, namely the influence of metacognitive development on learning activities and learning outcomes of Class VII students in Informatics subjects at SMP Brebes district. **Discussion** The metacognitive approach is a learning designed using metacognitive strategies, involving students' metacognitive skills when solving problems by referring to metacognitive activities, namely planning, monitoring and evaluating (*reflection*)) towards the completion of a particular task through the guidance of the teacher. The metacognitive approach provides awareness for students to be able to ask themselves, through these questions students know the cognitive processes and cognitive activities practicedin learning Informatics. Learning with a metacognitive approach involves students actively as the center of learning, in this case actively controlling their thinking and learning processes. Learning with a metacognitive approach begins with the teacher explaining the topic to be studied, after that students are given lesson material to take place by answering questions given by the teacher. After that the teacher gives questions on the same topic and does it individually and the teacher provides feedback (feedback) then summarizes learning with students so that students

get meaningful learning. One of the obstacles is that students are passive in following learning, so that when teachers provide opportunities to ask questions, few students ask. The obstacles that occurred at the first meeting slowly began to diminish at the next meeting. At the next meeting, researchers have been able to carry out learning using an overall metacognitive approach well, where students seem to actively follow learning. Students also begin to be interested and enthusiastic in learning. Students begin to actively ask questions to develop knowledge. With portfolio assessment helps class-based assessment (assessment *for* learning) of a set of student works that are arranged systematically and organized taken during the learning process within a certain period of time which is used to determine the development of student learning so that Students have self-control over the learning process they do with input or feedback given by the teacher. With portfolio assessment in learning activities, it can improve students' critical thinking skills because students will learn more actively in thinking and understanding subject matter.

In the learning carried out in the control class in this study, students were motivated to increase learning activities because of students' independence in learning and starting to express their opinions and ideas. On the other hand, the experimental group had students who had difficulty absorbing informatics subject matter. As for the influence of learning and learning outcomes in experimental classes in the control class, it can be seen that the initial results of learning informatics of experimental and control class students. This can be seen from the average pretest and posttest results of both classes.

Table 5. Pretest Average and Post Test Average

AVERAGE PRETEST			AVERAGE POST TEST		
low	**keep**	**tall**	**low**	**keep**	**tall**
2.334	6.543	12.110	2.354	6.743	12.151

From the results showed that the significance value of the pretest student learning outcomes was 0.130 which means ≥ 0.050 (0.130≥0.050). This means that in the initial conditions (before treatment) the two sample groups have the same activity ability and learning outcomes, and from the probability value of significance obtained F of 1.885. with a probability value of significance of 0.130 ≥ 0.050 which means that the hypothesis is accepted, namely the influence of metacognitive development on Learning activities and learning outcomes of Class VII students in the Informatika subject at SMP Brebes district.

6. Conclusion

Based on the results of research and discussion, it can be concluded that there is an influence of metacognitive development on the activities and learning outcomes of grade VII maple informatics students in SMP Brebes Regency with the significance value of the pretest student learning outcomes is 0.130 which means ≥ 0.050 (0.130≥0.050) and F of 1,885. The author suggest to stimulate critical thinking and understanding and build students' knowledge of various strategies such as dialogical, open question and answer, positive reinforcement, increasing the availability of student involvement and creating a classroom environment bydeveloping m otivation. Students are expected to always choose, understand the purpose, relevance of the task and always involve themselves in the learning process, work together, be open with the teacher and his colleagues what students feel in the learning process. This research only focuses on metacognitive development so that the need for other variables such as self-efficacy and motivation and so on. Suggestions for research include the need for qualitative research such as

survey research research, or PTK as data collection for the completeness of data and student expressions in metacognitive development. Different research designs allow for different or the same results so as to broaden the understanding of metacognitive development.

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