IDENTIFICATION THE CHARACTERISTIC AND LEVEL OF STUDENT'S METACOGNITIVE IN SOLVING REACTION RATE CHEMISTRY PROBLEMS

Syahirul Alim and *Rusly Hidayah
Chemistry Department FMIPA Universitas Negeri Surabaya
email: ruslyhidayah@unesa.ac.id

Abstract

The purpose of this study is to identify characteristic and level of student's metacognitive in solving reaction rate chemistry problems at class XI SMA Negeri 18 Surabaya. In collecting data, the researcher uses document method and interview method, then it would be tested its validity using triangulation method. The results showed that characteristic and level of student's metacognitive in solving problems each group were different, that is, high ability group had metacognitive characteristic: planning (P-1, P-2, P-3, P-4, P-5), monitoring (M-2, M-3, M-5), and reflection (R-1, R-3) in accordance with appropriate metacognitive level indicator is planning (EP-2, EP-3, FP-1, FP-2), monitoring (EM-2, FM-1), and reflection (FR-1) so the level is reflective use, then the medium ability group has metacognitive characteristic: planning (P-1, P-2, P-3, P-4), monitoring (M-2, M-3), and reflection (R-1) corresponding to appropriate metacognitive level indicators is planning (BP-3, CP-1), monitoring (BM-2, CM-1), and reflection (BR-1) so the level is semi strategic use, then the low ability group has metacognitive characteristic: planning (P-1, P-2, P-3) and monitoring (M-2, M-3) corresponding to the appropriate metacognitive level indicator is planning (BP-2, BP-3), monitoring (BM-1, BM-2), and reflection (AR-1) so the level is aware use.
Keywords: Characteristic, Level, Metacognitive

INTRODUCTION

Curriculum in Indonesia has been developed since the period before 1945 until today, it is curriculum 2013. Change of curriculum aims to improve the quality of the learning process and the design of learning that exist in schools. The development of the curriculum is considered as the future determinant of the nation's children. Therefore, a good curriculum will be expected to be implemented in Indonesia so that it will produce a bright future of children of the nation that has implications for the progress of the nation and state.

Surata (2013) mentions that one of the key issues in the implementation of the curriculum 2013 is the emphasis on providing metacognitive knowledge to the medium level. In Permendikbud Number 54 of 2013 on Competency Standards of Primary and Secondary Education Graduates for the dimension of knowledge stated that, "Learners should have factual, conceptual, procedural, and metacognitive knowledge in science". These four knowledge are bloom taxonomy revised by Krathwohl [1].

Based on interviews with chemistry teachers at SMA Negeri 18 Surabaya on February 10, 2015, teachers in the process of assessing student learning outcomes only emphasize value regardless of their metacognitive skills. In fact, metacognitive knowledge and skills can be used as a means of developing students' potential and creativity. This is because the metacognitive process is used to direct one's thinking in solving a problem.

Based on the data guideline of chemistry daily tests class XI of SMA Negeri 18 Surabaya in 2013 and 2014, students' grades on reaction rate chapter have a lower rank than other chemistry chapter. Therefore, researchers focused on research on the reaction rate chapter.

It can be concluded that research to know the characteristic and level of student's metacognitive is important. Because, with the data obtained characteristic and level of student's metacognitive, many benefits to be gained by various parties, be it school, teachers, and students.

Based on the description of the background stated above, the purpose of this study is to examine more about the characteristic and level of student's metacognitive class XI SMA Negeri 18 Surabaya.

Desmita (2010) stated that metacognitive is knowledge and awareness about the process of cognition, or knowledge of the mind and how it works. Metacognitive has a very important meaning because it guides metacognitively in completing strategies to improve future cognitive abilities. The function of cognition and metacognition is the cognition used to solve problems whereas metacognition is used to direct one's thinking in solving a problem. The difference between metacognition and cognition is that cognition refers to the use of known knowledge, whereas

metacognition refers to its awareness and understanding with respect to that knowledge [2].

Weinert and Kluwe (1987) Stated that metacognition is second order cognition that has the meaning of thinking about thinking, knowledge of knowledge, or reflection on actions [3].

In his research Woolfolk (2013) explains that there are at least two separate components contained in metacognition, that is, declarative and procedural knowledge of the skills, strategies, and resources needed to perform a task. Knowing what to do, how to do it, knowing the preconditions for ensuring the completeness of the task, and knowing when to do it [4].

According to Swartz and Perkins (in Laurens, 2009) there are several levels of student awareness in thinking when finishing that Tacit Use is the use of mind without consciousness. Types of thought related to decision making without thinking about the decision. In this case, students apply strategies or skills without special awareness or through trial and error and originally answer in solving problems. Aware Use is the use of conscious thought. This type of thinking relates to students' awareness of what and why students do that thinking. In this case, the student realizes that she must use a problem-solving step by explaining why she chose to use the move. Strategic Use is the use of strategic thinking. Types of thinking relate to the individual arrangement in his thinking process consciously by using specific strategies that can improve the accuracy of his thinking. In this case, students are aware and able to select specific strategies or skills to solve the problem. Reflective Use is the use of reflective thinking. Types of thinking relate to individual reflection in the thinking process before and after or even during the process taking into account the continuation and improvement of the results of his thinking. In this case, the student realizes and corrects the mistakes made in the troubleshooting steps [5].

Based on the results of research on metacognitive, Sophianingtyas (2013) stated that, "High ability group of metacognitive group consisting of T_1 and T_2 subjects is reflective use, metacognitive level in medium ability group consisting of subject S_1 and S_2 is strategic use , and the metacognitive level in the low ability group consisting of subjects R_1 and R_2 is aware use". With this data, the researcher gives very important information to the teacher of SMA Negeri 4 Bojonegoro which is the metacognitive level of the students of X-7 class, which with this data can be used by the teacher to evaluate the learning process,

and arrange lesson plan according to the student's knowledge condition [6].

In the research of metacognitive self-regulation of XI grade students of SMA Negeri 2 Lamongan after implementation guided inquiry learning model on reaction rates material, Hidayah (2014) showed that the students self-regulation has increased especially in monitoring, followed by evaluating and planning skill. As many as 66.67% students in low level jump to moderate and 13.04% students in moderate jump to high level. This result are supported with students learning outcomes that can reach classically master y of learning is 86.11%, metacognitive test and interview that show same level as in MCA-I data, students activities during learning shows that the activities support self-regulation in monitoring skill dominantly, implementation of guided inquiry is effective with good and very good criteria, so it can promote metacognitive self regulation [7].

In his research Sholih (2014) stated that "Characteristic of metacognitive in high groups perform planning activities, monitoring and evaluation so that it has a reflective use metacognitive level. While the metacognitive characteristic of the medium and low ability groups do the planning and monitoring activities so that it has a metacognitive level of strategic use for the medium ability group and the awareness of the use for the low ability group" [8].

METHOD

This research type is descriptive research, because researcher try to describe the student's metacognitive in solving problem of chemistry form essay tests. This study is also a qualitative research as McMillan and Schumacer (2006) stated that it uses the method of investigation, by way of direct face to face and interact with people in the field of research [9].

Subjects in this study were students of class XI-MIA 5 SMAN 18 Surabaya in the odd semester which has a variety of abilities and has received the material reaction rate. The data collected were field notes, students' written test result, and interview result. Based on the data collection, the candidate of interview's subject are 9 students consisting of 3 students with high ability, 3 students with medium ability, and 3 student with low ability.

Technique of taking data in this research that is by method of document and interview. In collecting data, the researcher uses the result of written test (document). The writing test is given by the teacher to the students of class XI MIA-5. The results of written tests are used as documents to

assist interview process. Interviews are conversations with specific intentions conducted by two parties: the interviewer (researcher) and the interviewee (the research subject). Interviews conducted on each subject so that it can be known trends in the characteristic and level of metacognitive subjects in the solution of the problem. Interview activities are recorded using a hidden tape recorder. It aims to simplify the transcript process without making the interviewee uncomfortable. In the interview process the researcher will keep digging the information to get real data. Can be said real if the information obtained during interviews on the subject of the question has been done in accordance with the actual information, not manipulation. In order for no information to be missed and the data obtained is guaranteed its validity, then the interview process will be recorded. After the document of the students' work result of the written test method and interview result collected then check the validity of the data using triangulation technique. Moleong (2011) stated that triangulation is a technique of checking the validity of data that utilizes something else in comparing the results of interviews against the object of research [9]. The type of triangulation technique used by the researcher is the method triangulation technique. According to Norman K. Denkin (in rahardjo, 2010) Triangulation method is done by comparing data information in different ways as it is known, in qualitative research the researcher uses interview, observation, and survey methods. To obtain the truth of reliable information and a complete picture of certain information, researchers can use free interviews or structured interviews. Or researchers use interviews and observations or observations to check the truth. In addition, researchers can also use different informants to check the truth of information, through various perspectives or views expected to results that close to the truth [11].

Data analysis conducted during this research is data reduction phase, data presentation stage, and conclusion drawing stage. The reduction done in this study is an activity that refers to the process of selecting, selecting, classifying, and organizing or simplifying raw data obtained from the field resulting in the reduction of unnecessary data. The researchers analyzed the results of the interviews showing the steps of students in using their metacognitive skills to solve chemical problems in the form of questions. Data presentation is a set of organized and categorized information that makes it possible to draw conclusions from the data. The data were analyzed and classified based on their metacognitive abilities of medium and low ability

groups to solve chemistry problems and determine the characteristic and level of student's metacognitive based on data emerging from each capability group. In this phase of withdrawal of conclusions, conclusions are drawn on each interview activity to the subject. In each subject, the interview results of each activity determined the metacognitive steps used in solving the chemistry problems and placed the subject on the metacognitive characteristic and levels used in solving the chemistry problems in the form of essay by analyzing the activity (behavior) done subject of research based on indicators that have been made.

RESULTS AND DISCUSSIONS

Based on the results of research that has been tested its validity using triangulation method and discussion, then in this research found findings in the form of characteristic and level of student's metacognitive in solving chemistry reaction rate class XI MIA-5 SMA Negeri 18 Surabaya.

Here are the characteristic of student's metacognitive based on high, medium, and low ability group.

Table 1 The Characteristic of Student's Metacognitive in High Ability Group

Metacognitive Characteristic	Subject			Conclusion
	T_1	T_2	T_3	
Planning	P-1	P-1	P-1	P-1
	P-2	P-2	P-2	P-2
	P-3	P-3	P-3	P-3
	P-4	P-4	P-4	P-4
	P-5	P-5	P-5	P-5
Monitoring	M-2	M-2	M-2	M-2
	M-3	M-3	M-3	M-3
	-	M-5	M-5	M-5
Reflection	R-1	R-1	R-1	R-1
	R-3	R-3	R-3	R-3

High ability group with subject T_1, T_2, T_3 do the planning activity in solving the problem that is by thinking / reading / writing what is known on the problem (P-1), by giving certain signs on the data of concentration of substance and reaction rate in the table, and set goal rather than problem (P-2) that is by giving an underscore, circle line marks or other signs in accordance with the mind expression on the question about. According to Flavell (1979) in metacognitive planning there are aspects of planning, namely awareness of knowing the information, and pinpointing the direction of where they will go further in a problem. Then the subject also sets out a problem-solving strategy (P-3), determines the achievable results of its calculations (P-4), and plots a representation (drawing table, drawing circle and graffiti, and explanatory text) to support its understanding (P-5) [12]. In his research

Woolfolk (2013) explains that there are at least two separate components contained in metacognition, that is, declarative and procedural knowledge of skills, strategies, and resources needed to perform task. Knowing what to do, how to do it, knowing the preconditions for ensuring the completeness of the task, and knowing when to do it [4].

In addition, this high ability group also conducts monitoring activities by using formula rules in problem solving (M-2), monitoring something that is considered error: in the form of graffiti and correction (M-3), and monitoring by arguing that there is an explanatory text (M-5). According to Flavell (1979) in metacognitive there are aspects of Monitoring, which monitor what they know and how to do it by questioning themselves and describing in their own words to understand simulations [12].

The high ability group also performs reflection activities in solving the problem that is reflecting that the concepts or objectives have been achieved (R-1) that is by re-examining the answer so as to give a sense of confidence in the subject, as well as analyze the data table on the problem (R-3). The aspect of metacognitive activity proposed by Flavell (1979) is Regulation, comparing and discriminating more likely solutions. In this case, the regulation means reflection or evaluation [12].

Table 2 The Characteristic of Student's Metacognitive in Medium Ability Group

Metacognitive Characteristic	Subject			Conclusion
	T_1	T_2	T_3	
Planning	P-1	-	P-1	P-1
	P-2	P-2	P-2	P-2
	P-3	P-3	P-3	P-3
	P-4	P-4	P-4	P-4
		P-5	P-5	P-5
Monitoring	M-2	M-2	M-2	M-2
	M-3	M-3	-	M-3
Reflection	R-1	-	R-1	R-1

Medium ability group with subject S_1, S_2, S_3 do the planning activity in solving the problem that is by thinking/reading/writing what is known on the problem (P-1), by giving certain signs on the data of concentration of substance and reaction rate in the table, and set the goal rather than the problem (P-2) that is by giving an underscore, circle line marks or other signs in accordance with the mind expression on the question about. According to Flavell (1979) in metacognitive planning there are aspects of planning, namely awareness of knowing the information, and determine the direction of where they will go further in a problem. Then the subject

also establishes a problem solving strategy (P-3), and sets out the achievable results of its calculations (P-4) [12]. According Desmita (2010) Metacognitive has a very important meaning because metacognitive guide in completing strategies to improve cognitive abilities in the future [2]. According to Maulana (2013) learning with a metacognitive skill approach as a learning that instills awareness of how to design, monitor and control what they know; what it takes to do and how to do it [13].

In addition, the medium ability group is also doing monitoring activities (monitoring) that is using the rules of the formula in problem solving (M-2), and monitor something that is considered error: in the form of graffiti and correction (M-3). According to Flavell (1979) in metacognitive there are aspects of Monitoring, which monitor what they know and how to do it by questioning themselves and describing in their own words to understand simulations [12]. According to Maulana (2013) Learners with metacognitive knowledge are aware of their strengths and limitations in learning. This means that when students know their mistakes, they realize to admit they are wrong, and try to fix it. The learners with their metacognitive knowledge are aware of their strengths and limitations in learning. This means that when students know their mistakes, they realize to admit they are wrong, and try to fix it [13].

The medium ability group is also doing reflection activities in solving the problem that is reflecting that the concepts or objectives have been achieved (R-1) is to re-examine the answer so as to give a sense of confidence in the subject. According to Brown (in Weinert and Kluwe, 1987), it suggests that metacognitive processes or skills require special mental operations by which one can predict, and evaluate their own thought processes [3].

Table 3 The Characteristic of Student's Metacognitive in Low Ability Group

Metacognitive Characteristic	Subject			Conclusion
	T_1	T_2	T_3	
Planning	P-1	P-1	-	P-1
	P-2	P-2	P-2	P-2
	P-3	-	P-3	P-3
Monitoring	M-2	M-2		M-2
	M-3	M-3	M-3	M-3
	M-6	-	-	-
Reflection	-	-	-	-

Low ability group with subject R_1, R_2, R_3 do the planning activity in solving the problem that is by thinking/reading/writing what is known on the problem (P-1), by giving certain signs on the data of concentration of substance and reaction rate in the table, and set the goal rather than the problem (P-2)

that is by giving an underscore, the sign of the circle line or other signs in accordance with the mind expression on the questions about the problem and establish a problem solving strategy (P-3), According to Maulana (2013) learning with a metacognitive skill approach as a learning that instills awareness of how to design, monitor and control what they know; what it takes to do and how to do it [13].

In addition, this low ability group also conducts monitoring activities by using formula rules in problem solving (M-2), as well as monitoring something that is considered error: in the form of graffiti and correction (M-3). According to Flavell (1979) in metacognitive there are aspects of Monitoring, which monitor what they know and how to do it by questioning themselves and describing in their own words to understand simulations. But the low group does not do reflection activities in solving the problem. The low group only displays metacognitive planning and monitoring characteristic only [12].

Level of student's metacognitive based on high, medium, and low ability group. Based on the analysis of research results obtained.

Table 4 The Level of Student's Metacognitive in High Ability Group

Subject	Indicator of Metacognitive Level			Metacognitive Level
	Planning	Monitoring	Reflection	
T_1	EP-2	EM-2	FR-1	Reflective Use
	EP-3	FM-1		
	FP-1			
	FP-2			
T_2	EP-2	EM-2	FR-1	Reflective Use
	EP-3	FM-1		
	FP-1			
	FP-2			
T_3	EP-2	EM-2	FR-1	Reflective Use
	EP-3	FM-1		
	FP-1			
	FP-2			

High ability group with indicators of metacognitive characteristic (P-1, P-2, P-3, P-4, P-5, M-2, M-3, M-5, R-1, and R-3) conformity with metacognitive level indicators (EP-2, EP-3, FP-1, FP-2, EM-2, FM-1, and FR-1), with the explanation that students know how to solve problems (EP-2), students are able to explain the strategy used to solve the problem (EP-3), students understand the problem well because it can identify the important information in the problem (FP-1), the student can explain what is written on the answer sheet (FP-2), the student is able to apply the same strategy to another problem (EM-2), the student is aware of the mistake of the concept and can improve it (FM-1), and the student evaluates every step made and believes the result obtained (FR-1).

It can be concluded that high ability group occupy metacognitive level Reflective Use.

According to Swartz and Perkins (in Laurens, 2009) Reflective Use is the use of reflective thinking. Types of thinking relate to individual reflection in the thinking process before and after or even during the process taking into account the continuation and improvement of the results of his thinking. In this case, the student realizes and corrects the mistakes made in the troubleshooting steps [5].

Table 5 The Level of Student's Metacognitive in Medium Ability Group

Subject	Indicator of Metacognitive Level			Metacognitive Level
	Planning	Monitoring	Reflection	
S_1	BP-3	BM-2	BR-1	Semi strategic Use
	CP-1	CM-1		
S_2	BP-3	BM-2	AR-1	Semi strategic Use
	CP-1	CM-1		
S_3	BP-3	BM-2	BR-1	Semi strategic Use
	CP-1	CM-1		

Medium ability group with metacognitive characteristic indicators (P-1, P-2, P-3, P-4, M-2, M-3, and R-1) were in conformity with metacognitive level indicators (BP-3, CP-1, BM-2, CM-1, and BR-1), with the explanation that students understand the problem because it can reveal clearly (BP-3), students have doubts about the concepts (formula) and how to calculate to be used (CP-1), students are aware of the concept error (formula) and how to calculate but can not improve it (BM-2), the students need help to believe the correctness of the concept and the results obtained (CM-1), and the students evaluate but are unsure of the results obtained (BR-1).

It can be concluded that medium ability group occupy metacognitive level of Semi strategic Use. According to Fauziyah (2013) Semi strategic Use is a metacognitive level that lies between Aware use and Strategic Use, where this level has some metacognitive activity of Aware Use level and some is metacognitive Strategic Use activity. Semi strategic Use has thought related to the individual arrangement in the process of thinking consciously by using specific strategies to solve the problem. Students are aware of the problem, but can not correct the mistakes made in the troubleshooting steps [14].

Table 6 The Level of Student's Metacognitive in Low Ability Group

Subject	Indicator of Metacognitive Level			Metacognitive Level
	Planning	Monitoring	Reflection	
R_1	BP-2	BM-1	AR-1	Aware Use
	BP-3	BM-2		
R_2	BP-3	BM-1	AR-1	Aware Use
		BM-2		
R_3	BP-1	BM-1	AR-1	Aware Use
		BM-2		

Low ability group with metacognitive characteristic indicators (P-1, P-2, P-3, M-2, and M-3) were in conformity with metacognitive level

indicators (BP-2, BP-3, BM-1, BM-2, and AR-1), with the explanation that the student only explains part of what is written (BP-2), the student understands the problem because it can express clearly (BP-3), the students are confused because they can not continue what will be done (BM-1), students are aware of the concept error (formula) and how to calculate but can not correct it (BM-2), and the students do not evaluate or evaluate will look confused or unclear about the results obtained (AR-1).

It can be concluded that low ability group occupy metacognitive Aware Use level. According to Mahromah (2013) Students with metacognition level "Aware Use" have metacognition activities, such as students able to understand the problem because it can reveal clearly, able to realize concept mistakes (formula) and how to calculate but can not fix it, and not to evaluate the results of his thinking [15]. According to According Swartz and Perkins (in Laurens, 2009) Aware Use is the use of conscious thought. This type of thinking relates to students' awareness of what and why students do that thinking. In this case, the student realizes that she must use a problem-solving step by explaining why she chose to use the move [5].

From the description and analysis above, we get the relationship pattern of characteristic and metacognitive level in solving chemistry problems at reaction rate material, in the following table.

Table 7. The Pattern Characteristic and Level of Student's Metacognitive in High, Medium, and Low Ability Group

The Level of Student's Metacognitive	The Characteristic of Student's Metacognitive							
	Planning			Monitoring			Reflection	
	T	S	R	T	S	R	T	S
Tacit Use			P-1					
Aware Use			P-2 P-3			M-2 M-3		
Semi strategic Use	P-1 P-2 P-3 P-4				M-2 M-3			R-1
Strategic Use								
Semi reflective Use								
Reflective Use	P-1 P-2 P-3 P-4 P-5			M-2 M-3 M-5		R-1 R-3		

CLOSURE
Conclusion

Based on the results of research that has been tested its validity using triangulation method and discussion then in this study it can be concluded that the characteristic and level of student's metacognitive in solving chemistry problems rate class XI MIA-5 SMA Negeri 18 Surabaya has

differences that is: Characteristic of metacognitive students based on high group , medium, and low.

Characteristic of student's metacognitive in the high ability group, viewed from the activities of planning, monitoring, and reflection. Planning, including: thinking/reading/writing what is known in the problem (P-1), setting goals (P-2), establishing a problem solving strategy (P-3), determining the achievable results (P-4), and plotting a representation (drawing tables, drawings of circles and scribbles, as well as explanatory texts) to support understanding (P-5). Monitoring, including: using rules, such as: the reaction equation, the reaction rate equation (M-2), monitoring something that is considered error: in the form of graffiti and correction (M-3), as well as monitoring by arguing (M-5). Reflection, including: reflecting that the concepts or goals have been achieved (R-1), and analyze the data table on the problem (R-3).

Characteristic of student's metacognitive in the medium ability group, viewed from the activities planning, monitoring, and reflection. Planning, including: thinking/reading/writing what is known on the problem (P-1), setting goals (P-2), establishing a problem solving strategy (P-3), and establishing achievable results (P-4). Monitoring, including: using rules, such as: the reaction equation, the reaction rate equation (M-2), and monitoring something that is considered error: in the form of graffiti and correction (M-3). Reflection, reflecting that concepts or goals have been achieved (R-1).

Characteristic of student's metacognitive in the low ability group, viewed from the activities of planning, monitoring, and reflection. Planning, including: thinking/reading/writing what is known on the problem (P-1), setting goals (P-2), and establish a problem solving strategy (P-3). Monitoring, including: using rules, such as: the reaction equation, the reaction rate equation (M-2), and monitoring something that is considered error: in the form of graffiti and correction (M-3). There is no reflection activity to solve problem.

Level of student's metacognitive based on high, medium, and low ability group. Based on the analysis of research results can be concluded that:

High ability group students with indicators of metacognitive characteristic (P-1, P-2, P-3, P-4, P-5, M-2, M-3, M-5, R-1, and R-3) conformity with metacognitive level indicators (EP-2, EP-3, FP-1, FP-2, EM-2, FM-1, and FR-1), it can be concluded that high ability group students occupy metacognitive levels Reflective Use.

Medium ability group students with metacognitive characteristic indicators (P-1, P-2, P-3, P-4, M-2, M-3, and R-1) were in conformity with metacognitive level indicators (BP-3, CP-1, BM-2, CM-1, and BR-1), it can be concluded that group students occupy metacognitive level of Semi strategic Use.

Low ability group students with metacognitive characteristics indicators (P-1, P-2, P-3, M-2, and M-3) were in conformity with metacognitive level indicators (BP-2, BP-3, BM-1, BM-2, and AR-1), it can be concluded that low ability group students occupy Aware Use metacognitive level.

Suggestion

Suggestions that researcher can provide for further research are as follows:

1. It is hoped to connect this metacognitive research to the cognitive dimension (C4, C5, C6/ bloom's taxonomic) because metacognitive ability is one of High Order Thingking (HOT), as it becomes an exciting new research.

2. It is expected to make the detail indicators, so that the metacognitive ability of student can be identified maximally.

3. It is advisable to investigate further about the gap between the written and interview results that occurred in some students related to this metacognitive research.

4. Each teacher should know how important this metacognitive research is, because with this the teacher is able to know, reach, limit, even control every student he holds. Of course there are many interesting things that can be extracted from this metacognitive research.

REFERENCES

1. Surata, Nengah. 2013. *Pengetahuan Metakognitif dan Kurikulum 2013*. [online], http://www.academia.edu/9326852/Pengetahuan Metakognitif dan Kurikulum 2013. Diakses pada tanggal 19 Juni 2015 pukul 12.00 WIB.

2. Desmita. 2010. *Psikologi Perkembangan Peserta Didik*. Bandung: Remaja Rosdakarya.

3. Weinert and Kluwe. 1987. *Metacognition, Motivation and Understanding*. New Jersey : Lawrence Erlbaum Associates, Inc.

4. Woolfolk. 2013. *Educational Psychology*, *20 th ed*. New Jersey : Pearson Education.

5. Laurens, Theresia. 2009. *Penjenjangan Metakognisi Siswa*, Disertasi, tidak dipublikasikan. Surabaya : Universitas Negeri Surabaya.

6. Sophianingtyas, Fitaria dan Bambang Sugiarto. 2013. *Identifikasi Level Metakognitif Siswa dalam Memecahkan Masalah Materi Perhitungan Kimia*. UNESA journal of Chemical Education, vol.2 n0.1, 21-27 Universitas Negeri Surabaya.

7. Hidayah, Rusly and Fitria Dwi Lestari. 2014. *Implementation of Guided-Inquiry to Promote Students' metacognitive Self Regulation in XI Grade*. At the Proceeding of International Conference On Research, Implementation And Education Of Mathematics And Sciences 2014, Yogyakarta State University, 18-20 May 2014. [online], http://eprints.uny.ac.id/11450/1/CE12-Rusly%20Hidayah.pdf diakses tanggal 2 Juni 2018 pukul 05.23 WIB.

8. Sholih, Blesty Novela. 2014. *Identifikasi Karakteristik dan Level Metakognitif Siswa dalam Memecahkan Masalah pada Materi Asam Basa Kelas XI-IPA*. Skripsi. Tidak dipublikasikan. Surabaya: Universitas Surabaya.

9. McMillan, James H., & Sally Schumacher. 2006. *Research in Education*. New Jersey : Pearson.

10. Moleong, Lexy J. 2011. *Metodologi Penelitian Kualitatif*. Bandung : Remaja Rosdakarya.

11. Rahardjo, Mudjia. 2010. *Triangulasi dalam Penelitian Kualitatif*. [online], http://uin-malang.ac.id diakses tanggal 01 Maret 2018 pukul 13.09 WIB.

12. Flavell, John. 1979. *Metacognition and Cognitive Monitoring*. [online], http://scribd.tu8.hu67.com diakses tanggal 29 Maret 2014 pukul 15.08 WIB.

13. Maulana. 2013. *Pendekatan Metakognitif Sebagai Alternatif Pembelajaran Matematika Untuk Meningkatkan Kemampuan Berpikir*. [online], http://journal.Upi./pendekatan_metakognitif./34-54.webb diakses tanggal 4 April 2014 pukul 11.25 WIB.

14. Fauziyah, Nafizatul. 2011. *Identifikasi Metakognitif Siswa dalam Memecahkan Masalah Matematika*. Skripsi tidak dipublikasikan. Surabaya : Universitas Negeri Surabaya.

15. Mahromah, Laily agustina. 2013. *Identifikasi Tingkat Metakognisi Siswa dalam Memecahkan Masalah Matematika Berdasarkan Perbedaan Skor Matematika*. [online], http://jurnalmahasiswa.unesa.ac.id/index.php/mathedunesa/article/.../1208 diakses tanggal 19 Juni 2015 pukul 11.30 WIB.