THE CONTRIBUTION OF METACOGNITIVE SKILLS AND MOTIVATION ON THE RETENTION OF SENIOR HIGH SCHOOL STUDENTS IN MALANG, INDONESIA

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ABSTRACT

This research aims at revealing the correlation between metacognitive skills and motivation toward retention, as well as the amount of the contribution of metacognitive skills and motivation toward students' retention in biology learning implementing of cooperative script strategy. The design used in this research was a descriptive-correlational research. This research involved 19 students of class X Natural Science of Muhammadiyah 1 Senior High school Malang. The data collected in this research were the data of the pretest and posttest of metacognitive skills and motivation as well as the retention data (three weeks after the posttest). The data were analyzed using multiple linear regression analysis. The results of the analysis showed that there was a correlation between metacognitive skills and motivation toward students' retention in cooperative script strategy with the regression line equation $Y = -3.510 + 0,757X_1 + 0,061X_2$, and the contribution value of 79.6%; the effective contribution of metacognitive skills toward retention was 79.54%, and the effective contribution of motivation toward retention was 0.06%. The contribution of the other factors, was as much as 20,4%.

Keywords: cooperative script, metacognitive skills, motivation, retention

1. INTRODUCTION

Metacognitive skills are a form of cognition or high order thinking process that involve the control over the cognitive activity [1]. Metacognitive skills have an important role in determining the students' learning success because it encourage the students to become independent learners. Self-independent learning leads to the students' ability to understand and control the learning environment [2]. It has been said too added that metacognitive skills also played an important

role in cognitive activity, such as comprehension, communication, attention, retention (memory) and problem solving [3]. Thus, metacognitive skills can be regarded as a person's thinking awareness about his/her own cognitive processes on what he/she knows and what he should be done.

The empowerment of metacognitive skill is closely related to retention (memory). In this connection it has been ability to monitor their thinking process will greatly help their retention because it can store meaningful information, that is, by linking the new knowledge with their prior knowledge [4]. Retention is the information stored and can be retrieved or recalled in the future.

Several researches investigating the correlation between metacognitive skills and retention are such as conducted through PBMP learning strategy [5] as well as through the Reciprocal Teaching learning strategy [6]. It is proven in other research conducted before that there was a correlation between students' metacognitive skills and retention through the implementation of TPS learning strategy, where the correlation coefficient related was 0.679 and the regression line equation was $Y = 0,834X + 11.078$ [7].

Motivation is the driving force within the students which leads to learning activities, ensures the continuity of learning activities, and gives direction to the learning activities in order to achieve the learning objectives [4]. Motivation serves as an encouragement for achievements. A person makes an effort because he has a motivation. A good motivation in a learning process will produce good results [8].

A learning process will leave traces in a person and will be temporarily stored in memory. Memory plays an important role in the learning process, not only in the aspect of memorization, but also in the aspect of critical thinking, connecting ideas, remembering and using all the knowledge and abilities that have been obtained [9]. Thus, retention is an important factor in the learning process. At the time of recalling, the role of motivation is very important, in order that the memory is retained. It can be concluded that motivation has a correlation with students retention.

The research investigating the correlation between motivation and retention conducted before proved that there was a correlation between learning motivation and German vocabulary mastery, especially relating to students' memory [10]. It can be seen from the correlation coefficient (R) of 0.37 even though the correlation coefficient is included in the low category. Motivation has a contribution as much as 13.69%. This is supported by other research, stating that "Nine of 11 motivation factors were found to be positively correlated to retention" [11].

In relation to the correlation between metacognitive skills and motivation with retention, there has not been any research that can provide information on how metacognitive skills and motivation can explain retention as well as the contribution of these two variables on retention. It becomes essential to conduct a research investigating the correlation between metacognitive skills and motivation toward retention, and it will be better if the research is conducted through the implementation of specific learning strategy.

One of the learning strategies that can be used to empower metacognitive skills, motivation and retention is cooperative script. It has been revealed that the cooperative script could empower students' metacognitive skills because it could make the students monitor their understanding and correct the mistakes or errors in the summary of his or her partner [12], and it motivates the students to express their thoughts [13]. The summarizing activity at the cooperative script is an activity in which students write what they hear and read. This activity is proven to improve students' retention (memory) of the learning material [14].

Some previous researches have proved that the implementation of cooperative script strategy can empower students' metacognitive skills [15] and students' retention [16]. In addition having potential to empower students' metacognitive skills and motivation, cooperative script is also proven having potential to empower students' retention [17;18].

This research aimes at revealing the correlation between metacognitive skills and motivation with retention as well as the contribution of metacognitive skills and motivation towards the retention of the students who learned by using cooperative script strategy. The results of this research are expected to provide benefits for students, teachers and schools: 1) as an alternative to empower students' metacognitive skills, motivation and retention, 2) to increase students' motivation to learn, 3) to motivate teachers to improve their teaching quality to empower students' metacognitive skills, motivation and retention.

2. METHOD

The design of this study was descriptive-correlational research, in which the metacognitive skills and motivation become the predictors and retention become the criterion. The subjects of this research were the class X students of Muhammadiyah 1 Senior High School Malang in the second semester of 2015/2016 academic year consisting of 19 students. This research was conducted ± 4 months. The data were collected by using pretest, posttest and retention test (three weeks after the posttest). The instruments used in this research consisted of a syllabus, lesson plans, Student Worksheet (LKS), metacognitive skills rubric [19], motivation questionnaire which covered attention, relevance, confidence, satisfaction (ARCS) [20] and cognitive learning result rubric.

The data of this research were initially analyzed using the Kolmogorov-Smirnov Test, to know if the research data were normally distributed. After that, the hypothesis was tested by using multiple regression analysis with the assistance of SPSS Software for Windows 23.00 with a significance level of 5%, to know the correlation and the contribution of metacognitive skills and motivation towards retention.

3. RESEARCH RESULTS

The results of the normality test shows that metacognitive skills, motivation and retention had significance value of 0.200, 0.200 and 0.200 respectively. Thus, it can be stated that the data of metacognitive skills and motivation and retention are normally distributed. The summary of the results of hypothesis testing normality test can be seen in Table 1. The results of ANOVA above show that the F value was 31.217 with a significance value of 0.000, less than 0.05 (p <0.05). This shows that there is a correlation between metacognitive skills and motivation with retention.

Table 1. Summary of ANOVA of the Results of the Correlation Analysis between metacognitive Skills and Motivation with Retention

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1866,856	2	933,428	31,217	,000b
	Residual	478,417	16	29,901		
	Total	2345,273	18			

a. Dependent Variable: Retention

b. Predictors: (Constant), Motivation, Metacognition

Regression analysis is used to determine how the correlation between metacognitive skills and motivation with retention is. In addition, the regression analysis shows the contributions of metacognitive skills and motivation towards retention, and it shows the regression equation coefficients. Summary of the regression analysis is shown in Table 2 to Table 4.

Table 2. Regression Analysis Summary of metacognitive Skills and Motivation with Retention

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,892a	,796	,771	5,46819

a. Predictors: (Constant), Motivation, Metacognition

b. Dependent Variable: Retention

Based on the results of the regression test in Table 2, it can be seen the multiple correlation coefficient value (R) is 0.892 with the determination value (R2) of 0.796. It shows a strong

correlation between metacognitive skills and motivation with retention. Based on the results of the analysis, both metacognitive skills and motivation have a contribution of 79.6% in explaining students' retention. This means that 20.4% of the students' retention is explained by the other factors than metacognitive skills and motivation.

Table 3 shows that the relative contribution of metacognitive skills toward students' retention is 99.92%, and the relative contribution of motivation toward students' retention is 0.08%. On the other hand the effective contribution of metacognitive skills and motivation towards students' retention are 79.54% and 0.06% respectively. Thus the effective contribution is 79.6%, and the remaining 20.4% is the contribution of other factors, in addition to metacognitive skills and motivation. It can be clearly seen that the metacognitive skills variable have a higher relative contribution and effective contribution than motivation.

Table 3. Relative and effective Contribution of metacognitive Skills and Motivation with Students' Retention

Variable	RC(%)	EC(%)
X1 (Metacognitive Skills)	99,92	79,54
X2 (Motivation)	0,08	0,06
Total	100	79,6

Table 4. Regression Equation Coefficient of the Correlation between metacognitive Skills and Motivation with Retention

	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3,510	9,251		-,379	,709
	Metacognition	,757	,114	,864	6,643	,000
	Motivation	,061	,145	,055	,420	,680

Table 4 shows that the regression line equation of the correlation between metacognitive skills and motivation with students' retention is Y= -3,510 + 0,757X1 + 0,061X2. In general, it can be seen that if there is an increase in the metacognitive skills and motivation, it will be followed by an increase in the students' retention, whereas a decrease in metacognitive skills and motivation will also be followed by a decrease in students' retention

4. DISCUSSION

Based on the results of multiple regression analysis, the regression equation is Y = -3.510 + 0,757X_1 + 0, 061X_2 with a contribution value of 79.6%. It indicates that metacognitive skills and

motivation have a contribution of 79.6% in explaining students' retention. This means that the other 20.4% of students' retention is explained by other factors in addition to metacognitive skills and motivation. The correlation coefficient value (R) in this research is 0.892. It shows that the correlation between metacognitive skills and motivation with students' retention is "very strong".

Based on the description above, metacognitive skills have an effective contribution 1324.67 times higher than that of motivation. The correlation between metacognitive skills and retention is stronger than that of between motivation and retention. This is in line with the research by conducted before [7] which found a positive correlation between metacognitive skills and retention through Think Pair Share strategy. The contribution of metacognitive skills on students' retention was 46.1%.

It has been revealed that the empowerment of metacognitive skills would increase students' comprehension and retention [21]. Metacognitive skills include the students' understanding and belief about their cognitive processes and the learning materials that will be studied, as well as their conscious efforts to be involved in the process of behaving and thinking that will enhance their learning process and retention [14 ; 22]. Thus, the students who have high metacognitive skills will be more aware and think about how to find the solution of the problems they face.

However, this phenomenon is different from the correlation between motivation and retention. As previously explained, motivation gives lower contribution than metacognitive skills do. This phenomenon is presumably caused by the factor of the students' interest. Students are dynamic and unstable, so that there may be other components in the teaching-learning process that may make the students less interested in learning. In addition to students' interest, the factors of school environment and the dynamic elements of teaching and learning process can also have an effect [23]. One of the dynamic elements is "life experience".

Students have feelings, concerns, wishes, memories, and thoughts that may experience a change due to life experience. The experience with peers or environment will have an effect on learning motivation and behavior [23]. In this connection it has been revealed that human personality and activity were not solely determined by the influences and processes that take place at present, but also by the influence and the process in the past [24].

The process in the past is related to memory (retention), which is a biological process [25]. Memory process is the activity in the brain caused by environmental experience, and when the process stops, the traces and effects remain in the brain [26]. The experience usually involves the meaningful events for the students. If the experience is not meaningful, it will make the students' retention low, as a result, the students have low encouragement or motivation to remember and

to take objective actions. This explanation is related to the lower the contribution of motivation towards retention compared to that of metacognitive skills.

Another factor that makes the contribution of motivation toward retention low is the lack of "attention or concern". Providing attention means directing not only appropriate sensory receptors (eyes, ears, tips of fingers, and so on), but also any thoughts that need to be learned and remembered [14]. The students' attention easily changes from one thing to another, and it is easily directed to an object and events that are not related to the task at hand. As a result, the students cannot completely concentrate on the task, which makes them have low retention.

Based on the above explanation, it can be said that the motivation can enhance retention through students' interests and life experience. Thus, motivation is closely related to retention theoritically.

This positive correlation between metacognitive skills and motivation with retention in this research cannot be separated from the implementation of cooperative script learning strategy. One of the activities in the cooperative script is summarizing activity. Summarizing activity is an activity that can help retention and the students' understanding of the material [27].

It has been said that cooperative script could increase retention [18]. Cooperative script learning provides the opportunity for students to learn by peer tutoring. Therefore, students sometimes find it easier to learn with peers. Peers more or less have a quite similar age, so that they can communicate more easily [28]. This makes the learning memorable and meaningful, so that it can build a strong learning retention because they do not feel reluctance to express the difficulties they face.

5. CONCLUSION AND SUGGESTION

5.1 Conclusions

Based on the results of this research, it could be concluded that there is a correlation between metacognitive skills and motivation with retention of senior high school students in Malang. The relative contribution of metacognitive skills was 99.92%, and the relative contribution of motivation 0.08%. The effective contribution of metacognitive skills toward retention was 79.54%, and the effective contribution of motivation toward retention was 0.06%. Thus, the total effective contribution of both metacognitive skills and motivation was 79.6%, while the remaining 20.4% was the contribution of the other factors in addition to metacognitive skills and motivation. The regression equation of the correlation between metacognitive skills and motivation with retention is $Y = -3.510 + 0,757X_1 + 0, 061X_2$.

5.2 Suggestions

Metacognitive skills and motivation have been proved to have a correlation with students' retention, so that it is expected that educators not only focus on the learning objectives in the cognitive aspects, but also focus more emphases on empowering process skills, creativity, interests, social attitudes, and other factors. If they are well empowered, the students' retention will also increase

REFERENCES

[1]   Wellman, H. *The Origins of Metacognition. In D.L.Forrest-Pressley, G.E.MacKinnon, and T.G. Waller (eds.), Metacognition, Cognition, and Human Performance*, volume 1– Theoretical Perspectives, chapter 1, 1985. Academic Press, Inc.

[2]   Schraw G.. Crippen K.J., Hartley K. *Promoting Self-Regulation in Science Education: Metacognition as Part of a Broader Perspective on Learning*, 2006. doi: 10.1007/s11165-005-3917-8.

[3]   Howard J.B. *Metacognitive Inquiry. School of Education Elon University*, 2004. http://org.elon.edu/t2project/pdf_docs/sp_metacognitive. pdf, Accessed 1 December 2015.

[4]   Winkel W.S. *Teaching Psychology*, 2004. Jakarta, PT. Grasindo.

[5]   Ardila C. *The Correlation between metacognitive Skills towards Biology Learning Results and Retention of Class X Students in the Implementation of Thinking Empowerment by Questioning (TEQ) at State Senior High School 9 Malang.* Unpublished thesis, 2013. State University of Malang.

[6]   Arifin M.S. *The Correlation between metacognitive Skills towards Biology Learning Results and Retention of Class X Students in the Implementation of Reciprocal Teaching Strategy in State Senior High School 1 Lawang.* Unpublished thesis, 2013. State University of Malang.

[7]   Fauziyah D.R. *The Correlation between metacognitive Skills on Biology Learning Results and Retention of Class X Students in the Implementation of Think Pair Share Learning Strategy in State Senior High School 6 Malang.* Unpublished thesis, 2013. State University of Malang.

[8]   Sardiman. Interaction and Learning Motivation. Jakarta: PT Raja Grafindo, 2003.

[9]   Banikowski A.K. *Strategies to Enhance Memory Based On Brain Research. Focus on Exceptional Children*, 1999.   http://scboces.org/english/IMC/Focus/Memorystrategies2.pdf. Accessed 15   October 2016.

[10]   Lestari A., Khoeruddin E., Herliawan, L. *The Correlation between Motivation of Learning and Vocabulary Mastery of German Language.* Bandung: Universitas Pendidikan Indonesia, 2013. http://jerman.upi.edu/germania/2013.02.0809053.Astri.pdf. Accessed 28 October 2016.

[11]   Zhang Y., Wallace M. *The Relationship between Motivation Factors and Retention of Key Management and professional Technical Staff in Government-Run Construction Enterprises In China. Professional doctorate research in Australia : commentary and case studies from business, education and indigenous studies*, Southern Cross University Press, Lismore, NSW. ISBN: 1875855704, 2009. http://epubs.scu.edu.au/gcm_pubs/334/. Accessed 28 October 2016.

[12]   Bonk C.J. *Cooperative learning dan Teaching Script Best Of Bonk Handouts*, 1998. http://www.indiana.edu/~bobweb/Handout?script.html, Accessed 24 April 2015.

[13]   Huda M. *Teaching and Learning Models: methodical and paradigmatic Issues 3rd Edn*. Yogyakarta: Pustaka Belajar, 2013.

[14]   Ormrod J. E. *Educational Psychology: Helping Students Grow and develop, 3rd edn*, Translation by Wahyu Indianti. Jakarta: Penerbit Erlangga, 2008.

[15]   Fauzi A. *The Effect of academic Ability on metacognitive Skills, Biology Learning Results, and Retention of Class X Students in the Implementation of Cooperative Script Learning Strategy in Malang*. Unpublished thesis, 2013. State University of Malang.

[16]   Shofiana R.S. *The Implementation of Cooperative Script Learning Model to improve Motivation and Learning Results of X-1 Students of Senior High School 8 Malang*. Unpublished thesis, 2008. State University of Malang.

[17]   Warouw Z.W.M. *The Effect of metacognitive Learning in Cooperative Script Learning and Reciprocal Teaching on metacognitive Skill, critical Thinking Skills, Biology Learning Results and Retention of different academic Ability Students at State Junior High School, Manado*. Unpublished thesis, 2009. State University of Malang.

[18]   Kolow A. *The Effect of STAD and Cooperative Script Learning on cognitive Learning Results of Biology Science, social Attitudes, and Retention of Junior High School Students in Samarinda*. Unpublished thesis, 2012. State University of Malang.

[19]   Corebima A.D. *Metacognitive Skills Measurement Integrated in Achievement Test*. Paper presented on the Third Internatinonal Conference on Science and Mathematics Education (Cosmed). Malaysia. 10-12 November, 2009.

http://www.recsam.edu.my/cosmed/cosmed09/AbstractsFullPapers2009/Abstract/Science%20Pa rallel%20PDF/Full%20Paper/01.pdf. Accessed 1 December 2015.

[20]   Keller, J.M. *IMMS: Instructional Materials Motivation Survey*. Florida: Florida State University, 1987.

[21]   Curwen M.S., Roxanne G.M., Kimberly A.W.S., Robert C.C. Increasing Teachers' Metacognition Develops Students' Higher Learning during Content Area Literacy Instruction: Finding from the Read-Write Cycle project. *Issues in Teacher Education*, vol. 19, no. 2, pp. 157-151, 2010.   http://www1.chapman.edu/ITE/public_html/ITEFall10/ 16curwenetal.pdf, Accessed 16 October 2016.

[22]   Zaromb F.M., Jeffrey D.K., Henry L.R. III. Comprehension as a Basis for Metacognitive Judgments:Effects of Effort After Meaning on Recall and Metacognition. *Journal of Experimental Psychology: American Psychological Association Learning, Memory, and Cognition*, vol. 36, no. 2, pp. 552-557, 2010. http://psych.wustl.edu/memory/Roddy%20article%20PDF%27s/Zaromb%20et%20al%20(2010)_JEPLMC.pdf. Accessed 16 October 2016.

[23]   Dimyati, Mujiono. *Teaching and Learning*. Jakarta: Rineka Cipta, 2002.

[24]   Suryabrata S. *Educational Psychology*. Jakarta: C.V. Rajawali, 2004.

[25]   Hill W.F. *Theories of Learning: Conception, Comparison and Significance, Translation by Khozim, M*. Bandung: Nusa Media, 2011.

[26]   Hergenhahn B.R., Olson M.H. *Theories of Learning, Translation by Tri Wibowo*. Jakarta: Kencana, 2008.

[27]   Jacobs, G.M., Lee G.S., Ball J. *Learning Cooperative Learning Via Cooperative Learning: A Sourcebook of Lesson Plans for Teachier Education on Cooperative Learning, Singapore*, SEAMEO Regional Language Centre, 1996.

[28]   Santrock J.W. *Educational Psychology, Translation by Diana Angelica*. Jakarta: Salemba Humanika, 2008.