THE EFFECT OF GROUP INVESTIGATION BY SIGIL AND LEARNING MOTIVATION TOWARD BIOLOGY LEARNING OUTCOMES

Budi Rahayu

Abstract:
The purpose of this study was to determine the effect of group investigation by sigil and learning motivation toward biology learning outcomes. This research is a quantitative research with an experimental method. The population of this study was all X grade students of IPA of SMA Negeri 61 Jakarta with a total of 140 students, the study sample was determined by a cluster sampling technique of 2 classes with a total sample of 70 students. The learning strategy in the experimental class used the group investigation by sigil with group discussion method while the control class used the lecture method. The research hypothesis test used two-way analysis of variance with a 2x2 factorial design and a significant level of 5%. The analysis prerequisite test that is carried out is the normality test using Kolmogorov Smirnov and homogeneity test using Barlett test. From the results of the analysis it can be concluded that (1) there was an influence of group investigation by sigil toward biology learning outcomes, (2) there was effect between the level of learning motivation in biology learning outcomes; 3) there was no interaction between group investigation by sigil and learning motivation toward biology learning outcomes.

Keywords: Group Investigation; Sigil; Learning Motivation; Biology Learning Outcomes.

1. Introduction

Pedagogically, a curriculum is an educational design that provides opportunities for students to develop their own potential in a pleasant learning environment and in accordance with their ability to have the qualities desired by society and nation (Kemendikbud, 2012). The findings of the problems faced in the world of education in the implementation of the 2013 curriculum include the weak learning process that is able to realize learning centered on student activities and the completeness of learning outcomes in achieving basic competencies. One of the things that needs to be evaluated to meet the demands of learning outcomes is to improve the learning strategies used by the teacher.

According to Arthur in Basri (2015), one of the principles of good learning to improve student' learning abilities can be done by applying cooperative learning models through group investigation learning strategies. Group investigation has 6 stages, namely identifying topics, planning assignments, carrying out investigations, preparing final reports, presenting reports and evaluating results (Slavin, 2009).

These stages of group investigation will be maximized when the teacher uses the group discussion method. Students actively seek information from various sources then synthesize information contributed by each group member. Students can increase their involvement in learning by becoming a learning resource for other friends, the teacher acts as a facilitator as the discussion progresses. These activities can also be supported by improving the standard of the learning process by increasing the use of technology.

One way to use technology to improve learning process' standard is that teachers try to use sigil software. Sigil is an open source software that will facilitate accessing subject matter to electronic components including computer, laptops and even mobile phones. Looking at the current conditions, most students already have handphone, so if the teacher can make material that can be accessed on a handphone, students are expected to be able to study anytime and anywhere. When students become more intense reading subject matter using mobile phones and creating a more interactive learning process between students by responding to content on the sigil, it is expected that learning outcomes will improve.

According to Wahab (2015) students' learning outcomes are influenced by internal and external factors. Learning motivation is an internal factor because it originates from the individual. Motivational theory according to Robbins (2012) "motivation is the processes that account for individual's intensity, direction, and persistence of effort toward attaining a goal." In the learning process learning motivation is seen when students try to complete the task given by the teacher to the maximum of their abilities so learning objectives are achieved.

Biology is a subject that must be helped by visualization, so that things become easier to understand. Software sigil can facilitate the visualization process because animation can be inputted. Based on the existing references, no research has been conducted on the effect group investigation by sigil and learning motivation toward biology learning outcomes, it is necessary to conduct research with the title of the effect of group investigation by sigil and learning motivation toward biology learning outcomes.

2. Materials and Methods

This research is a type of quantitative research with experimental research design. The independent variable in this study were the learning strategies and learning motivation, while the dependent variable is the biology learning outcomes. The research design used in this study was a 2x2 factorial design. The population in this study was students of class X IPA in SMA Negeri 61 Jakarta. Class sampling was done by using cluster sampling technique from class X IPA as many as 4 classes. There are 2 data collection techniques used in this study, namely (1) the formative test to determine the ability of the biology learning outcomes, and (2) the questionnaire about learning motivation.

The data analysis technique in this study used a two-way variance analysis. Prior to the analysis, a preliminary analysis of variance analysis was carried out, namely the normality test and

homogeneity test. The data of normality test aims to determine whether the data obtained from the research results are normally distributed or not. The normality test in this study used the Kolmogorov Smirnov test with a significance level of 5%. Homogeneity test is used to determine whether the variances of a number of populations are the same or not. The method used for homogeneity test is the Bartlett method with a significance of 5%.

3. Results and Discussions

The results of the comparison of the biology learning outcomes scores in the experimental and control class, are presented in table 1.

Table 1: Comparison of biology learning outcomes

Class	n	$\bar{x}$	Mo	Me	Min	Max	s	s^2
Experimental	70	78.97	75	78	60	95	8.28	68.65
Control	70	77.54	78	78	55	90	6.84	46.81

Based on table 1. it is known that the group investigation by sigil using group discussion obtained a total score of 78,97 and in the lecture method obtained a total score of 77,54, so it can be concluded that the group discussion was better than the lecture method.

Table 2: The results of the two-way variant analysis test

	dk	JK	RJK	Fcount		Ftabel	
						0.05	0.01
Corrected	3	3860.36	1286.79	32.76	**	3.98	7.01
Intern group	72	2828.00	39.28			3.98	7.01
Method	1	162.12	162.12	4.13	*	3.98	7.01
Motivation	1	3682.12	3682.12	93.75	***		
Method x Motivation	1	16.12	16.12	0.41			
Total	75	6150.53					

* = significance

** = very significance

Based on the results of Table 1, it can be stated that the average biology learning outcomes of students in the experimental class which was given treatment group investigation by sigil using group discussion method is higher than the average biology learning outcomes taught using the lecture method. This is allegedly because the group discussion method as the implementation of cooperative learning makes learning activities centered on student activities. Students have a wide opportunity to improve mastery of a biological concept, one way of interacting with fellow students both in groups and between groups.

Based on the results of table 2, for the source of the learning method variance, the calculated Fcount = 30.48 is greater than Ftable 3.98 (30.48 > 3.98) then H0 is rejected. This shows that there is a significant difference in the average of the learning method factors towards the biology learning outcomes.

This fact is in line with the theory presented by Slavin (2009) that the investigative learning strategy of group discussion methods will help create an atmosphere of positive interdependence, where one student and another student are interdependent to achieve group success. This is reinforced by cognitive learning theory according to Jean Piaget in Karwono (2017) who supports the method of group discussion and states that learning is an activity process that involves mental activities that occur in humans as a result of the process of active interaction with the environment to obtain a change in form knowledge, understanding, behavior, and attitude.

In the method of group discussion there is a learning process of knowing a science, imbibing the knowledge to others so that they come to understand, training themselves to convey words politely and understandable to others and the process of appreciating different opinions. These processes are actually also applications in implementing the four pillars of learning according to UNESCO in Sukmadinata (2005), namely learning to know, learning to do, learning to live together and learning to be.

The high level of biology learning outcomes of students after participating in group investigation is also thought to be influenced by sigil-based learning. Through sigil students learning materials become programmed meaning when students conduct facilitated student investigations through sigils that already exist on each students' handphone, which students can learn anytime and anywhere.

Based on the results of table 2, it shows that the Fcount value of 88.81 is greater than Ftable of 3.98 (88.81 > 3.98), then H0 is rejected. This shows that there is a significant difference in the average of learning motivation factors towards biology learning outcomes. It can be said that the average score of biology learning outcomes between groups of students who have strong learning motivation is higher than students who have weak learning motivation. In addition, because they want to be the best, they aim at their ability to provide the best for the group. This fact is in accordance with the motivation theory according to Robbins (2013), namely motivation will produce intensity, direction and perseverance to achieve goals. Through strong learning motivation, students direct themselves to positive activities, and become more diligent in solving a problem to achieve the targeted goals.

Another thing that can be attributed so that strong learning motivation has a higher score on biology learning outcomes because students with strong learning motivation seem more enthusiastic to take initiative, be active and have confidence in the learning process in their respective groups. In line with the theory presented by Thelen in Cahyo (2013) regarding the strategy of group investigation that the teacher has the role of giving clear instructions, providing guidance as needed, preparing the facilities needed, students will be encouraged to improve the learning process. Supported by the opinion of Mc.Donald in Sardiman (2014) that motivation does arise from within humans, but its emergence is driven by the presence of other elements, such as the delivery of instructions and the right learning goals.

The use of sigil-based strategies also turned out to be able to influence student motivation, because sigil can be flexibly used in mobile phones so the possibility of students with strong learning motivation has higher perseverance to read the material presented in the sigil compared to students who are weakly motivated. In line with the psychoanalytic theory that examines about motivation

according to Freud in Dimyati (2006) which suggests the characteristics of a person who is strongly motivated, including diligently facing the task, and likes to find and solve problems problems. Strengthened by motivation theory according to Robbins (2013) that motivation produces perseverance.

Based on the results of table 2, it is known that there is no interaction of group investigation learning strategies by sigil in group discussion and lecture methods and the level of learning motivation towards biology learning outcomes. This is allegedly because the desire to learn and compete in students is quite good, so there is no interaction between motivation and the strategy used. Other expectations students have tended to be more proficient in the adoption of digital technology for the learning process so that there is no interaction between the strategy and motivation to learn. This result is not in line with the results of research conducted by Purba (2017) who reported that there was a significant effect between motivation and biology learning outcomes in the learning process that utilizes technology

4. Conclusions and Recommendations

Based on the results of the data analysis and discussion it was concluded that there is an influence of group investigation by sigil toward biology learning outcomes. There is an influence on the level of learning motivation towards biology learning outcomes. There is no interaction between group investigation by sigil and learning motivation towards biology learning outcomes.

The recommendation of this study is the development of sigil use in learning strategies is still limited, so it needs to be followed up with research on the research and development of sigil in integration into e-learning based learning strategies to improve learning outcomes.

Acknowledgements

The researcher presents her sincere appreciation goes to Dr. Mieke Miarsyah, M.Si, Dr. Ratna Komala, M.Si, Prof. Dr. I Made Putrawan, Dr. Rusdi, M.Biomed, and Dr. Diana Vivanti, M.Si. for supervision, advice, guidance from the very early stage of this research as well as giving me extraordinary experiences throughout the past few years and correction until the completion of this thesis.

Finally, I would like to thank everybody who was important to the successful realization of this undergraduate thesis. This undergraduate thesis is far from perfect, but it is expected that it will be useful not only for the researcher, but also for the readers. For this reason, constructive thoughtfull suggestion and critics are welcomed.

5. Appendices

Appendix Learning Motivation Measurement Instrument
Dimension of learning motivation instruments according motivation theory by Robbins (2013)

Dimension	Indicator
Intensity	Having determination in carrying out the task
	Having a spirit of learning
Direction	Having a learning plan
	Having a learning goal orientation result
Persistence	Have responsibility for completing tasks
	Having seriousness in achieving learning goals

References

[1] Amal S. Al-BadI, Open Source Software (OSS) in Higher Education, Oman SQU Case Study, World Academy of Science, Engineering and Technology, International Journal of Educational and Pedagogical Sciences, Vol.8, No.8, 2014.

[2] Anas, Y. Hardeli. Anhar, A and Sumarmin, R, Application of type Cooperative Learning Models GI in Improving Competence Learning Biology Student School. International journal of Progressive sciences and technologies. Vol 6, 2018.

[3] Anne Jordan, Orison dan Annetta Stack, Approaches to Learning, New York: McGraw-Hill, Open /University Press, 2008.

[4] Coon and O.Mitter, Educational Psychology, New York: McGraw-Hill, Open University Press, 2012.

[5] Hung Lin, Ming, A study of the effects of digital learning on learning motivation and learning outcome, Tung-Fang Design Institute, EURASIA journal of mathematic science and technology education, Taiwan, 2016.

[6] Joyce Bruce, Et al. Models of Teaching, 6th Ed. Allyn & Bacon: London, 2000.

[7] Karwono and Heni, Teaching and Learning Models, Depok: Raja Grafindo Persada, 2017.

[8] Komara, Endang, Interactive Learning, Bandung: Refika Aditama, 2016.

[9] Putrawan, I.M., Hypothesis in the research, Bandung: Alfabeta, 2017.

[10] Slavin, Robert, Cooperative Learning, Bandung: Nusa Media, 2009.

[11] Sudjana, Statistical Methods, Bandung: Tarsito, 2005

[12] Trianto, Model-model pembelajaran, Jakarta: Bumi Aksara, 2009.

Penelitian ini juga sudah terpublikasi pada :

International Journal of Engineering Technologies and Management Research. Rahayu et. al., Vol.6 (Iss.7): July 2019. ISSN: 2454-1907 DOI: 10.5281/zenodo.3341486. http://www.ijetmr.com/

Jurnal Nasional. Pengaruh Strategi Investigasi Kelompok Berbasis Sigil dan Motivasi Belajar terhadap Hasil Belajar Biologi. Diterbitkan pada jurnal JPB Volume 11 No 1. Artikel tersebut akan tersedia pada situs s.id/JPB atau journal2.um.ac.id/index.php/jpb**.**