

## Creative Thinking Analysis, Motivation and Concept Mastery on Learning of Cooperative Discovery Model in Elementary School

Asrul<sup>✉</sup>, Saiful Ridlo & Susilo

Universitas Negeri Semarang, Indonesia

### Article Info

#### History Articles

Received:  
February 2018  
Accepted:  
March 2018  
Published:  
April 2018

#### Keywords:

*cooperative discovery,  
creative thinking ability,  
learning motivation,  
mastery of concepts*

### Abstract

The reason to do this research is because the creative thinking ability, motivation and mastery concept still less than optimal. The purpose of this research is to analyze the improvement of creative thinking ability, motivation and mastery of students' concepts through cooperative discovery learning model. This research is quantitative research and design experimental with nonequivalent control group. The population in this research is the fifth grade students' of Rejosari 02 and Rejosari 03 elementary schools. The sample of this research is chosen by using purposive sampling technique. The are 5a obtained 51 students as a control class and class 5b, 50 students as an experimental class. The research instrument is in the form of tests of creative thinking ability, questionnaire of learning motivation and concept of mastery test. The hypothesis test using the N-gain test and independent sample t-test. The result showed as follows: (1) the improvement of students' creative thinking ability taught by using cooperative discovery learning of, is in category and those who average are in medium category. (2) the improvement of students' learning motivation that taught by using cooperative discovery learning is of 82.12 and that of conventional learning is of 76.69. (3) There is a difference in the mastery of students' concepts that taught by using cooperative discovery learning and the conventional learning. So it can be concluded that by using cooperative discovery learning are the students' creative thinking, motivation and concept mastery higher than that of conventional learning. This research gives the implication that cooperative discovery learning is suitable to use in the fifth grade of elementary school to increase the students' creative thinking, motivation and as.

© 2018 Universitas Negeri Semarang

<sup>✉</sup> Address correspondence:  
Campus UNNES Kelud Utara III, Semarang, 50237  
E-mail: [asrulidrus18@gmail.com](mailto:asrulidrus18@gmail.com)

## INTRODUCTION

The new paradigm of education focuses on the students' to activity in seeking and developing the knowledge, while the teacher should be the facilitator who guides the students towards a whole personal formation. The lessons are interesting and successful when linked to the surrounding environment of the students where they can seek, try, think and find solutions to the problems at hand. There are still many students who consider science lesson as a boring material because it is difficult to understand. The students often see the science lesson as a compulsory rather than necessity (Wisudawati, 2013).

Based on the observation in Semarang, it shows the following results. Researchers find that in Rejosari 02 and Rejosari 03 elementary schools, the final test data of the semester especially in the science lesson of the competents only reached 40% of the students. In addition, it seems that the student thinking ability is lower in the learning process indicated by the answers given by students that limited only to the existing answers in the book. Students' mastery of science materials is temporary (short-term), it can be seen from lack of interest in the science subjects and lack of confidence in learning.

The indication of creative thinking in the definition that creative thinking is the ability of a person necessary to produce an alternative problem solving, the teacher is in charge of developing the ability of critical and creative thinking in the students (Suyanto et al, 2012). This understanding shows that one's creative thinking ability is higher if he is able to show many possible answers to a problem (Purnomo, 2011). The importance of the presence of a creative person in the environment, this is confirmed by Yuniarta et al (2012) that the working environment and society need creative people to find new innovations for human life. The emergence of one's creative ideas is supported by the curiosity or motivation from within to understand something. The existence of the motivation to learn on each individual can create a conducive learning atmosphere (Rahma et al 2016). Students' motivation can have a

positive effect if it provides the right learning environment. Thus, the students can fully learn, which ultimately impacts the learning outcome (Putri et al 2017). Therefore, high motivation to learn can stimulate the students to be active in the learning process in order to understand the concept. The observed aspects of students' motivation are attention, relevance/compatibility, confidence, and satisfaction.

Some of the above descriptions can affect the low level of science learning in the students of grade 5 of Rejosari 02 and Rejosari 03 elementary schools. Hence, it takes a more serious effort from the teachers to apply more innovative learning. Learning model of cooperative discovery is the learning that can improve the ability of creative thinking, motivation and concept mastery of the student. Learning refers to the teaching methods where students work together in small groups indicating that cooperative learning can encourage students to interact actively (Nuswowati, 2015) and the students can be more active because they are directly involved in learning through the discovery process (Martini, 2016). This model is selected because it can develop students' thinking ability; help the students in finding on their own, investigate by themselves and make students be more motivated in engaging lesson.

Based on the above problems, the purpose of this research is to analyze the improvement of creative thinking ability, motivation, and mastery concept of the students learned using cooperative discovery model compared with conventional learning. This study provides implications of the advantages of cooperative discovery model that is suitable to be used as one of the learning models to enable students to be more active, to motivate ther in learning, and to gain a variety of learning experience as well as to improve the students' learning outcomes. Especially in improving the ability of creative thinking, learning motivation, and mastery concept.

## METHODS

This research is a quantitative experimental quasi-type with nonequivalent

control group design. There are two groups: the first group is called experimental class taught using cooperative discovery model and the second class is called control class taught using conventional learning. The research is conducted in Rejosari 02 and Rejosari 03 elementary schools with the population of all students of class 5 that is 101 students. The sample in this research is the students of 5A Rejosari 02 class number of 26 students, 5B class number of 26 students and 5A Rejosari 03 class number of 25 students, 5B class number of 24 students. The sampling technique uses purposive sampling which is taking the samples with a certain consideration.

The data of this research are the test of creative thinking ability and questionnaire of learning motivation. The instrument of data collected through pretest and posttest of creative thinking ability with 8 items of essay; motivation study and study questionnaire consisting of 30 items of the statement and conceptual understanding while multiple choice item which consisting of 27 item. The improvement analysis used the gain test and the difference analysis using independent t-test samples.

## RESULTS AND DISCUSSION

This research is different from previous research since it combines discovery learning model with cooperative learning model to measure some dependent variables such as creative thinking ability, learning motivation and concept comprehension in grade 5 of elementary school. The Combination models are generated after analyzing and synthesizing the opinions of

the syah (2014), wisudawati (2015) and ilahi (2012) on discovery learning and group learning by Rusman (2011). According to Syah (2011) among the six steps about discovery learning there were three steps of syah conducted in this research namely stimulation, data collection and verification. where are, observe and classify were stated by wisudawati (2015). Ilahi (2012) was support the two previous argument about discovery learning which conducted two step of discovery learning namely statement and generalization. besides, group learning was assumed by Rusman that there were two step of six was mentioned: motivation and rewards.

### The Ability to Think Creatively

The data of students' creative thinking ability is obtained from the pretest and posttest of a science lesson. The result of improving students' creative thinking ability in the experimental class and control class is obtained after six meetings. The pretest is given in the first meeting, in the second to fifth meeting the learning with cooperative discovery model is given in the experimental class and conventional learning is given in the control class, posttest is given in the sixth meeting. The results show that students who are taught using cooperative discovery learning and conventional learning experience significant improvement. However, cooperative discovery learning has better average scores than conventional learning. The ability to think creatively namely fluency, elaboration, flexibility, and originality. The result of creative thinking ability test of experiment class and control class is more clearly presented in Table 1.

**Table 1.** The Average Result of Improving The Ability to Think Creatively Every Aspect of The Experimental Class and The Control Class.

Aspect	Experiment				Control			
	Pretest	Posttest	g	Category	Pretest	Posttest	g	Category
Fluency	51.15	90.96	0.82	High	59.42	80.30	0.51	Medium
Elaboration	15.18	67.52	0.62	Medium	14.83	33.95	0.22	Low
Fleksibility	15.12	74.45	0.70	High	16.18	68.53	0.62	Medium
Originality	14.06	77.56	0.74	High	14.12	54.12	0.47	Medium

g : normalized gain values

Based on the table, it can be seen the improvement of every aspect of creative thinking

in the experimental class is better than the control class. The experimental classes obtains values

with high category respectively on the aspect of fluency, flexibility, and originality while for the medium category is in elaboration aspect. The control classes are rated in the medium category on the fluency, flexibility and originality aspects while the lower category is elaboration. Judging from the results of students' creative thinking

skills tests, cooperative discovery classes have better scores than conventional learning classes. Analysis of differences in students' creative thinking skills is learned through cooperative discovery learning with conventional learning using independent sample t-test by using SPSS. Different test results are presented in Table 2.

**Table 2.** Different Test of Creative Thinking Ability of Experimental Class and Control Class

		t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
							Lower	Upper
Creative Thinking	Equal variances assumed	-3.550	99	.001	-7.273	2.048	-11.337	-3.208
	Equal variances not assumed	-3.557	96.434	.001	-7.273	2.045	-11.331	-3.214

Based on the independent sample t-test on column equal variances assumed through SPSS with 5% real level, it is found that the data of students' creative thinking ability in cooperative discovery class and conventional learning have a significance level of  $0.001 < 0.05$  it means that  $H_0$  is rejected. This shows that the data of students' creative thinking ability learned through cooperative discovery learning compare with conventional learning has a significant difference.

The results of classical mastery calculations show the proportion of students who achieve mastery exceeding the criteria. This occurs as a result of cooperative discovery learning which puts forward the discovery process through learning group. This is in line with Mahbub's (2016) opinion that cooperative learning can help students to work in small groups to learn from each other, thus generating the creative ideas they possess.

This is supported by Rudyanto (2014) research results that indicate the discovery learning requires students to discover new things, and the process of finding new things requires creativity. Therefore, discovery learning is a learning that can improve and develop students' thinking ability. The result of the improvement of creative thinking ability is also shown by Dwiprabowo (2017) research that the improvement of creative thinking ability based on the grade of pretest and posttest of discovery learning class with the scientific approach of 0.57

to be considered as a medium category. The expository class obtains a gain value of 0.29 in the low category. So it can be concluded that the ability of creative thinking that is learned through discovery learning achieve better improvement compared with conventional learning (Widhiyantoro et al, 2012). Students carry out lecture and discussion learning method in the class with conventional learning, where the material is presented by students' and recorded. Thus, students are required to memorize the material learned. Students are less able to develop their creativity because the lesson leads the students to experience their own problems.

### Learning Motivation

The result of learning motivation of Students of 5 grade of Rejosari 02 dan Rejosari 03 is obtained from the motivation questionnaire score which is taught using cooperative discovery model and conventional learning. Questionnaire data on learning motivation are distributed to students before and after the learning is completed. This from the average score questionnaire motivation of learning experimental class and control class on four indicators namely attention, relevance/suitability, confidence, and satisfaction. The data of average learning motivation questionnaire score can be seen in Table 3.

**Table 3.** The Average Score of Each Learning Motivation Indicator

Aspect	Rejosari 02		Rejosari 03	
	Experiment	Control	Experiment	Control
Attention	80.25	73.48	82.35	80.34
Relevance/compatibility	80.26	75.25	83.56	78.26
Confidence	78.12	72.30	87.02	78.77
Satisfaction	85.06	78.06	80.35	77.05

Based on Table 3, it is known that the students' learning motivation consisting of four indicators have different scores between the experimental class and control class. The average score of the experimental class indicator is 82.12 while the control class is 76.69. Increased motivation for learning in experiment class is higher due to the use of effective model namely the cooperative discovery model. The use of this cooperative discovery-based model tends to make students be more active and more enthusiastic in dealing with issues. This is in line with the findings of Probowening et al (2014) that learning

which encourages the students to have high motivation will make them to not easily discourage in solving the problems they face.

Analysis of differences in student learning motivation learned through cooperative discovery learning by lecture and discussion learning method uses independent sample t-test using SPSS. The test results of independent sample t-test with SPSS data questionnaire student learning motivation through cooperative discovery learning compared with conventional learning are presented in Table 4.

**Table 4.** Different Test of Students' Learning Motivation of Experimental Class and Control Class

		t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
							Lower	Upper
Learning motivation	Equal variances assumed	-4.972	99	.000	-4.995	1.005	-6.988	-3.001
	Equal variances not assumed	-4.981	96.526	.000	-4.995	1.003	-6.985	-3.004

Based on the Independent sample t-test on column equal variances assumed using SPSS with 5% real level, the student's motivation data in cooperative discovery class and conventional learning obtained significance level of 0.000 < 0.05 which means that  $H_0$  is rejected. This shows that the data of students' learning motivation learned through cooperative discovery learning and conventional learning have a significant difference.

N-gain test analysis and t-test are both indicated that the students' learning motivation data which is learned by cooperative discovery is higher than conventional learning. Students have a higher enthusiasm for learning if the learning leads students to discovery (Sumiadi, 2016). Cooperative discovery learning involves students actively in learning; improving cooperation among students; enabling students to understand the concept on certain materials; and reviewing previous material so as to improve the cognitive

learning outcomes and motivation (Yuliani et al, 2017).

The efforts to improve students' learning motivation through cooperative discovery learning with interesting instructional media give positive results. Which means that the cooperative discovery learning can improve students' learning motivation (Lutfi, 2013). This is in accordance with the results of previous studies. Research conducted by Patandung, et al (2017) show the result that there is an increase in students' learning motivation which is learned through the model of discovery learning and direct learning. However, the discovery learning gets better improvement compared to the direct learning class. The research conducted by Dewi, et al (2016) shows the use of discovery model on science learning can improve students' learning motivation because by trying new things students are more active in learning and have high confidence in expressing opinions. The research

of Maduretno, et al (2016) shows that learning through scientific approach with discovery learning model can improve students' learning motivation and influence their learning achievement. Cooperative discovery learning used to measure student's learning motivation because in the learning discovery students can explore the material and find their own concept, while in the control class the students receive information from the teacher and the learning tends to be monotone.

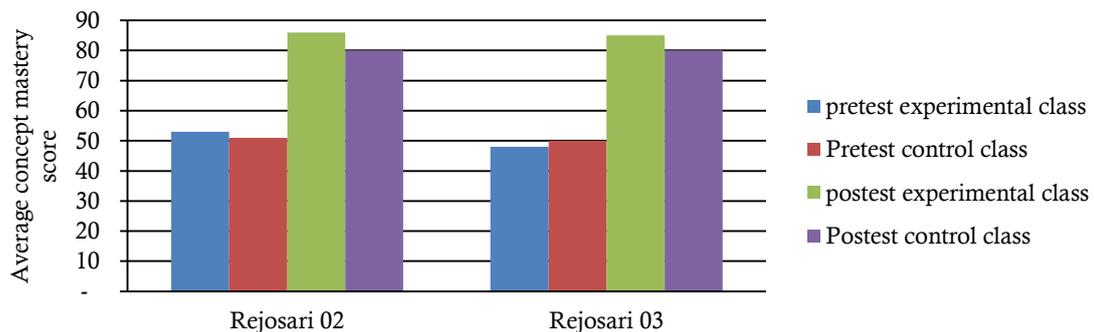
Thus, cooperative discovery learning model that emphasizes on instructional procedures puts forward the invention-based learning group, object manipulation, experiment before reaching generalization. Creating cooperative discovery learning model is more benefit compared to conventional learning where its instructional strategy emphasizes the process of verbal material delivery from a teacher to the students with the intention that the student can master the subject matter optimally.

**Concept Mastery**

The test result of concept mastery improvement of the student on cooperative discovery study based on pretest and posttest score on the experimental class of Rejosari 02 and Rejosari 03 shows the average value on the gain test result in experimental class with each value of 0.70. It means that interpretation of the

improvement of concept mastery is in the high category. This suggests that students who are taught using cooperative discovery learning experienced a significant improvement. In the control class, the average value of the test results of each class gain score of 0.58 and 0.60 which means the interpretation of the increase in mastery of the concepts that occur are included in the medium category. This shows that the students who are taught by using cooperative discovery learning has experienced the improvement significantly.

Based on the figure above, the test results of concept master of the students' cooperative discovery on grade 5B of Rejosari 02 and Rejosari 03 are 26 and 24 students get the average of pretest concept master score are 53 and 48. Posttest obtains an average concept mastery of 86 and 85. The class of conventional learning of Rejosari 02 and Rejosari 03 which are 26 and 25 students get the average score of pretest for concept mastery of 51 and 50. Posttest of concept mastery get an average score of 80 and 77. Based on the average pretest and posttest test results of students' concept mastery on cooperative discovery learning and conventional learning, it is obtained a significant improvement. The results of the recapitulation of the improvement of students' concept mastery is presented in Table 5.



**Figure 2.** Pretest and Posttest Results of Concept Mastery of Students in The Experimental and Control Class

Based on Table 5, it can be seen that the category of students' concept mastery on the experimental class are 56% with the medium

category. While conventional learning reach 71% with the medium category. This suggests that cooperative discovery and lecture and discussion

learning method have a classical improvement, but the cooperative discovery has better improvement than conventional learning.

**Table 5.** Recapitulation of The Improvement of Student's Concept Mastery

Category of improvement	Experimental class		Control class	
	The number of student	%	The number of student	%
High	22	44	14	27
Medium	28	56	36	71
Low	0	0	1	2

Analysis of the differences in students' mastery concept learned through cooperative discovery learning by lecture and discussion learning method uses independent sample t-test

using SPSS. The test result of independent sample t-test with SPSS test data on the students' concept mastery through cooperative discovery learning and conventional learning presented in Table 6.

Based on the sample independent test t-test on column equal variances assumed through SPSS with 5% real level, it is obtained that the test data of students' concept mastery in cooperative discovery class and conventional learning have a significance level of  $0.000 < 0.05$  which means  $H_0$  is rejected. This shows that the test data of students' concept mastery learned through cooperative discovery learning and conventional learning has a significant difference.

**Table 6.** Different Test of Mastery of Student Concept of Experiment Class and Control Class

		t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
							Lower	Upper
Mastery of concept	Equal variances assumed	-3.646	99	.000	-5.635	1.546	-8.702	-2.568
	Equal variances not assumed	-3.644	98.566	.000	-5.635	1.546	-8.704	-2.567

Discovery-based activities increase student involvement in learning activities. This will make the students be more skillful in discovering and expressing the concepts they gain from the experience (Suryawati, 2013). This is reinforced by Yusuf (2016) which states that learning by using discovery model has increased with the highest value of 100 and the lowest score of 73.3 with an average value of 85.7. A number of students have completed the scores above the category of competents. In line with that, the research conducted by Istiana et al (2016) revealed a similar thing that cooperative learning can improve the students' concept mastery. This suggests that cooperative discovery learning model is very effective in improving the students' concept mastery. The research results conducted by Asyhuri et al (2017) show that the improvement of mastering the concept of each experiment group 1 and experiment 2 on the guided discovery learning model is higher than the control class. A significant increase in conceptual mastery occurs in the high-capability group. This is because the discovery learning model is able to invite students to solve problems

so that students can find their own concept of the problem. Similarly, the research conducted by Purwanto et al (2012) show that students are able to be more active in learning through the learning discovery (Ardianto, 2016) and the outcome of cognitive, affective and psychomotor are better comparing to the class that uses lecture method.

Thus, cooperative discovery learning model and conventional learning can improve students' concept mastery. However, the learning discovery that is integrated with group learning is more fun and interesting than the conventional learning. The reason is that in learning discovery model the students can experience by themselves or interact directly with the studied object. Thus, they can find their own concept without getting more guidance from the teacher.

## CONCLUSION

The conclusion of the analysis and discussion are (1) the ability of creative thinking using cooperative discovery model is better than using lecture and discussion learning method. (2) the improvement of student learning

motivation learned using cooperative discovery learning is better equal to 82.12 than lecture and discussion learning method with the average of 76.69. (3) Cooperative discovery learning model is better in improving the students' concept mastery compared with conventional learning model.

## REFERENCES

- Ardianto, D. & Rubini, B. 2016. Comparison of Students' Scientific Literacy in Integrated Science Learning Through Model of Guided Discovery and Problem Based Learning. *Jurnal Pendidikan IPA Indonesia* 5(1): 31-37.
- Asyhuri, A, B., Marida, & Slamet, S. 2017. Pengaruh Penerapan Model *Guided Discovery Learning* Metode *Concept Maps* dan *Mind Maps* terhadap Penguasaan Konsep Biologi Siswa SMA. *Proceeding Biology Education Conference* 14(1): 301-304.
- Dewi, A, A, S, K., DB. Kt. Ngr. S, P., & Ketut, A. 2016. Penerapan Pendekatan Saintifik Berbasis Model *Discovery Learning* untuk Meningkatkan Motivasi dan Hasil Belajar Pengetahuan IPA pada Siswa Kelas IV SDN 8 Sumerta Tahun Ajaran 2015/2016. *e-Journal PGSD Universitas Pendidikan Ganesha Jurusan PGSD* 4(1): 1-10.
- Dwiprabowo, R. 2017. Analisis Kemampuan Berpikir Kreatif dan Sikap Percaya Diri Siswa SD pada Model Pembelajaran *Discovery Learning* Berpendekatan Saintifik. *Tesis*. Semarang: Program Pascasarjana Universitas Negeri Semarang.
- Istiana, N., Sarwi, & Masturi. 2016. Penerapan Model Pembelajaran Kooperatif STAD untuk Meningkatkan Penguasaan Konsep dan Keterampilan Proses Belajar Fisika Siswa SMP Kelas VIII. *Unnes Physics Education Journal* 5(1): 1-7.
- Lutfi, A. 2013. Memotivasi Siswa Belajar Sains dengan Menerapkan Media Pembelajaran Komik Bilingual. *Jurnal Pendidikan dan Pembelajaran* 20(2): 152-159.
- Maduretno, T, W., Sarwanto, & Widha, S. 2016. Pembelajaran IPA dengan Pendekatan Saintifik Menggunakan Model *Learning Cycle* dan *Discovery Learning* Ditinjau dari Aktifitas dan Motivasi Belajar Siswa terhadap Prestasi Belajar. *JPEK* 2(1): 1-11.  
<http://ejournal.ikipgrimadiun.ac.id/index.php/JPEK>
- Mahbub, M., Z., Kirana, T. & Poedjiastuti, S. 2016. Development of Stad Cooperative with Animation Media to Enhance Student's Learning Outcome in MTS. *Jurnal Pendidikan IPA Indonesia* 5(2): 247-255.
- Martini, I., Ely, R. & Saiful, R. 2016. Pengaruh Model *Discovery Learning* Gaya Belajar VAK (Visual, Auditori, Kinestetik) terhadap Pembelajaran Invertebrata di SMA. *Unnes Journal of Biology Education* 5(1): 55-64.
- Nuswawati, M. & Taufik, M. 2017. Developing Creative Thinking Skills and Creative Attitud Through Problem Based Green Vision Chemistry Environment Learning. *Jurnal Pendidikan IPA Indonesia* 4(2): 170-176.
- Patandung, Y. 2017. Pengaruh Model *Discovery Learning* terhadap Peningkatan Motivasi Belajar IPA Siswa. *Journal of Education Science and Technology* 3(1): 9-17.
- Probowening, P. R., Sopyan, A & Handayani. L. 2014. Pengembangan Strategi Pembelajaran Fisika Berdasarkan Teori Kecerdasan Majemuk untuk Meningkatkan Motivasi dan Hasil Belajar Siswa SMP. *Unnes Physics Education Journal* 3(1): 66-71.
- Purnomo, 2017. Keefektifan Model Penemuan Terbimbing dan *Cooperative Learning* pada Pembelajaran Matematika. *Jurnal Kependidikan* 41(1): 37-54.
- Purwanto, C. E., Sunyoto, E. N., & Wiyanto. 2012. Penerapan Model Pembelajaran *Guided Discovery* pada Materi Pemantulan Cahaya untuk Meningkatkan Berpikir Kritis. *Unnes Physics Education Journal* 1(1): 26-32.
- Putri, R. H., Albertus, D, L., & Pramudya, D, A. 2017. Pengaruh Model *Discovery Learning* terhadap Motivasi Belajar dan Hasil Belajar Fisika Siswa MAN Bondowoso. *Jurnal Pembelajaran Fisika* 6(2): 173-180.
- Rahma, A. D., Sulhadi, & Sri, S. S. 2016. Implementasi Pembelajaran Sains dengan Media Fotonovela untuk Meningkatkan Motivasi Belajar Siswa SD/M SD/MI. *Journal of Primary Education* 5(1): 1-9.
- Rudyanto, H. E. 2014. Model *Discovery Learning* dengan Pendekatan Saintifik Bermuatan Karakter untuk Meningkatkan Kemampuan Berpikir Kreatif. *Jurnal Premiere Educandum* 4(1): 41-48.
- Rusman. 2012. *Seri Manajemen Sekolah Bermutu: Model-model Pembelajaran Mengembangkan Profesionalisme Guru*. Edisi Kedua. Bandung: Raja Grafindo Persada.

- Sumiadi, R., Dwi, S, D, D., & Jamaluddin. 2016. Pengembangan Perangkat Pembelajaran Berbasis Pendekatan Saintifik Model *Guided Discovery* dan Efektivitasnya terhadap Penguasaan Konsep Biologi Siswa SMA Negeri 1 Bayan. *Jurnal Penelitian Pendidikan IPA* 2(2): 1-9.
- Suryawati, E. 2013. Implementasi Pembelajaran Kontekstual RANGKA untuk Meningkatkan Keterampilan Proses Sains, Pemecahan Masalah, dan Penguasaan Konsep IPA. *Jurnal Pendidikan dan Pembelajaran*. 20(2): 180-189.
- Suyanto, Y, P., Hadi, S. & Suharto, L. 2012. Keefektifan Penggunaan Strategi Predict, Observe and Explain untuk Meningkatkan Kemampuan Berpikir Kritis dan Kreatif Siswa. *Unnes Physics Education Journal* 1(1): 15-25.
- Syah, M. 2014. *Psikologi Pendidikan dengan Pendekatan Baru*. Bandung: Remaja Rosdakarya.
- Widhiyantoro, T., Meti, I., & Riezky, M, P. 2011. The Effectiveness of Guided Discovery Method Application Toward Creative Thinking Skill at the Tenth Grade Students of SMA Negeri 1 Teras Boyolali in the Academic Year 2011/2012. *Jurnal Pendidikan Biologi* 4(3): 89-99.
- Wisudawati, A. K., & Eka, S. 2015. *Metodologi Pembelajaran IPA*. Jakarta: Bumi Aksara
- Yuliani, M., Natalia, R, K., Santoso, S., & Dewi, K. 2017. The Discovery Learning Model and Bowling Campus Strategy for Improving the Cognitive Learning Result and Science Learning Motivation. *Jurnal BIOEDUKASI* 10(1): 23-32.
- Yunianta, T. N. H., Ani, R., & Rochmad. 2012. Kemampuan Berpikir Kreatif Siswa pada Implementasi Project Based Learning dengan Peer and Assessment. *Unnes Journal of Mathematics Education Research* 1(2): 81-86.
- Yusuf, M. & Ana, R, W. 2016. Penerapan Model *Discovery Learning Tipe Share dan Webbed* untuk Meningkatkan Penguasaan Konsep dan KPS Siswa. *EDUSAINS* 8(1): 48-56.  
<http://journal.uinjkt.ac.id/index.php/edusains>