Seloka: Jurnal Pendidikan Bahasa dan Sastra Indonesia
8 (3) (2019) : 37 – 43

https://journal.unnes.ac.id/sju/index.php/seloka/article/view/35378

Learning to Write Scientific Articles with The Project Based Learning on The Levels of Students' Creative Thinking

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Article Info

History Articles
Received:
October 2019
Accepted:
November 2019
Published:
December 2019

Keywords:
creative thinking, project based learning, scientific articles

DOI
https://doi.org/10.15294/seloka.v8i3.35378

Abstract

The students' skills of writing scientific articles are necessarily acquired in order to put the students' ideas into writings, within appropriate methods and styles. The learning process of writing scientific articles is suitably acquired with the project based learning which assesses the levels of students' creative thinking. The research aims to explain aims to explain the effectiveness of learning process in writing scientific articles with the project based learning and the levels of students' creative thinking. The research applied quasi experiment. The data were collected using purposive sampling method. The data were analyzed using validity and reliability tests. The sample were analyzed using normality and homogeneity tests. Finally, the data were analyzed using paired t-test. All of them were analyzed using paired t-test. All the tests used SPSS 25 test program the results of the research were concluded by applying the project based learning and the levels of students' creative thinking on students' writing practices. The results found that learning to write scientific articles using the project based learning effectively affect students with a high level of creative thinking that those with medium and low levels. The benefits of this research were to enrich the thesaurus theory of learning to write scientific articles based on the level of students' creative thinking more effectively.

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p-ISSN 2301-6744
e-ISSN 2502-4493

INTRODUCTION

Writing skills are often done by everyone in their everyday life, for instance writing letters, notes, articles, news, scientific articles, and many others. Writing is regarded as an important skill of learning language (Hyland, 2002). Writing skill is one of language skills which is considered as the most difficult skill as writing involves complicated cognitive process (Sibarani, 2007). Besides, writing practices can increase the writers' intelligence, expand his intuition and encourage him to find information. One of writing products is scientific articles. Scientific article is a writing product which shows ideas, descriptions or problem solving systematically (Suparno dalam Zulaeha, 2016).

One of writing products is scientific articles. Scientific articles can be said to be essays that are factual and scientific (Haekal, 2019). In addition, scientific articles are the result of series of ideas from thoughts based on facts, events, and symptoms which can accurately be presented (Dalman, 2016; Pateda in Nasucha, et al, 2009; Dewanto, et al, 2007).

One of methods is project based learning. This method is considered as one of the way to improve students' skills, such as their skills in making decisions, thinking creatively and solving problems skills (Abidin, 2014). Besides that, the project based learning is an innovative learning method which is mainly involved contextual learning of complex problems (Trianto, 2014).

Krajcik, Halord, & Morten' research (2008), showed that the project based learning in scientific articles has several fundamental features in that the process has several steps of asking questions, appreciations, analyzing, correlating, and concluding. Curtis's research (2011), it showed that through the project based learning students can explore their creativity.

Besides the appropriate method of learning process, teachers need to pay attention to the levels of students' creative thinking in writing scientific articles. Creativity is the way solve problems in several ways (Zulaeha, 2008). Creativity is someone's ability to create something new or combine previous works into something new. This can be done by exploring problems and looking for alternatives to solve them (Ali and Asrori, 2009).

According to the description above, the effectiveness of learning process in writing scientific articles with the project based learning and the levels of students' creative thinking on the ninth grade students need to be assessed. So that, teachers can choose the appropriate method of writing articles. The current research aims to explain the effectiveness of learning process in writing scientific articles with the project based learning and the levels of students' creative thinking. The benefits of the research are to enrich the thesaurus theory of learning to write scientific articles based on the level of students' creative thinking, and especially for Indonesian language teachers.

METHODS

The method of the current research is quasi experiment. In the experiment, the sample was given treatments using the project based learning. This aims to find out the effectiveness of learning process in writing scientific articles with the project based learning and the levels of students' creative thinking. The population of the study is the writing skills of the ninth grade students in Jepara district.

The sample were collected using the purpose sampling method. There were several criteria used such as the sample were categorized as schools with accreditation A, homogeneity of students and teachers and skills who have got similar treatment in schools. The sample of the current research was the ninth grade students in the social program of Mathalibul Huda Mlonggo. The variables in the current research are the writing skills as the dependent variable, the project based learning as the independent variable, and the levels of students' creative thinking as the moderator.

The instruments in the current research uses two types of experimental tests and non-tests. The experimental tests are the students' skills of writing scientific articles, while the non-experimental tests consist of observation,

questionnaire, and photo documentation. In other words, the data were collected through the experimental tests and non-tests.

The data were analyzed using validity and rehabilitee tests. The sample were analyzed using normality and homogeneity tests. Finally, the data were analyzed using paired t-test. All of them were analyzed using paired t-test.

RESULTS AND DISCUSSION

The effectiveness of learning in writing scientific article with the project based learning and the levels of creative thinking can be evaluated from learning process by applying the features of learning method and the students' results. The project method is evaluated based on the application of its principal, syntagmatic, reaction system, supporting system, instruction and supporting effects of the method.

The learning process of writing scientific articles with the project based learning is supported with the levels of students' creative thinking. The students' creative thinking based on the project based learning is described in Table 1.

Table 1. The Levels of Creative Thinking on the Project Based Learning

Variables	Range	Criteria	Respondents' total	Percentage
Creative Thinking	X ≤ 147	Low	7	20
	147< X≤168	Medium	22	63
	168 < X	High	6	17

From table 1, the students on the project based learning consist of 35 students. There is 17% (6 students with a high level of creative thinking, 63% (22 students) with a medium level of creative thinking, 20% (7 students) with a low level of creative thinking. Therefore, there is a tendency of the medium students on the project based learning.

Table 2. The Results of the Pre-Test on the Project Based Learning

Categories	Ranges	Frequency	Percentage	Average
Excellent	85-100	0	0	64
Good	69-84	10	29	
Fair	53-68	25	71	
Poor	0-52	0	0	
Total		35	100	Fair

From table 2, there are 25 students who have got scores within 53-68 in well enough category and there are 10 students who have got scores within 68-84 in good category. The lowest score, which is 55, while the highest score is 73. The average score in the project based learning is 64 with the well enough category. Based on the average results, it can be concluded that students have not achieved the criteria of minimum score.

After the pre-test, students get four times treatments, then students are given the post-test to find out their skills on writing scientific articles. The post test results are presented in table 3.

Table 3. the Post Test Results on the Project Based Learning

Categories	Ranges	Frequency	Percentage	Average
Excellent	85-100	12	34	83
Good	69-84	23	66	
Fair	53-68	0	0	
Poor	0-52	0	0	
Total		35	100	Good

From table 3, there are 23 students who have got scores within 69-84 on the good category and there are 12 students who have got scores within 85-100 on the very good category. The students' lowest score is 77, while the highest score is 92. The average results of the project based learning is 83 on the good score category. Based on the average score on the project, it can

be concluded that the students' scores have achieves the criteria of minimum scores. Next, the normality test on the pre-test and the post-test is conducted. The test results can be seen in Table 4.

Table 4. the Normality Test on the Pre-Test and the Post-Test in the Project Based learning.

	Kolmogorov-smirnov[a]			Shapiro-wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest_PjBL	.134	35	.112	.937	35	.045
Postest_PjBL	.125	35	.187	.943	35	.068

a. Lilliefors Significance Correction

From table 4 *Kolmogorov-Smirnov*[a] the pre-test on the project based learning shows that the significant result is 0.200 > 0.05 and the significant result on the post test is 0.187 > 0.05. Looking at the results, it can be concluded that the sample is normally contributed. Next, there is the homogeneity test on the project based learning which can be seen in table 5.

Table 5. the Results of the Homogeneity Test on the Project Based Learning

		Levene Statistic	df_1	df_2	Sig.
PJBL_Class	Based on mean	.061	2	32	.941
	Based on median	.065	2	32	.938
	Based on median and with adjusted df	.065	2	31.406	.938
	Based on trimmed mean	.061	2	32	.941

From table 5, the homogeneity of project based learning at the early test has the value of sig., 0.941 > 0.05. After having the prerequisite test, the hypothesis test is conducted. Hypothesis testing is done by one way test. One way Anova test is to determine the effectiveness of learning to write scientific papers with a project based model based on the level of students' creative thinking. The test can be observed in table 6.

Table 6. Comparison Test of One Way Anova

PJBL_Class	Sum of squares	df	Mean square	F	Sig.
Between Groups	92.247	2	46.124	3.728	.035
Within Groups	395.924	32	12.373		
Total	488.171	34			

Based on table 6, the sig. column is 0.035. It has explicitely meantioned 0.035 < 0.05. So H_0 is rejected, which means that there are significant differences in average learning outcomes in project based learning between high, medium, and low levels of creative thinking. Those result demonstrate the significant average differences between different levels of creative thinking, then LSD can be further tested. The test can be seen in table 7.

Table 7. Advanced Test for LSD

(I) Creativity	(J) Creativity	Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
High	Medium	4.136*	1.526	.011	1.03	7.25
	Low	3.667	1.957	.070	-.32	7.65
Medium	High	-4.136*	1.526	.011	-7.25	-1.03
	Low	-.470	1.620	.774	-3.77	2.83
Low	High	-3.667	1.957	.070	-7.65	.32
	Medium	.470	1.620	.774	-2.83	3.77

*. The mean difference is significant at the 0.05 level.

From table 7 the comparison between high creative and medium creative shows sig. = 0.011 < 0.05, then the result reveals the significant differences in the average learning outcomes between treatments. Moreover, the comparison between high and low creative has a sig. = 0.070

< 0.05, then there are differences in average learning outcomes but not significant between treatments. Then for the comparison between medium creative with low creative has a sig value. = 0.774 < 0.05, then there are differences in average learning outcomes but not significant between treatments. The next step is descriptive test to conclude the best level of students' creative thinking. This test can be seen in table 8.

Table 8. Descriptive Test Results

	N	Mean	Std. deviation	Std. error	95% Confidence interval for mean		Minimum	Maximum
					Lower bound	Upper bound		
High	7	86.00	3.000	1.134	83.23	88.77	83	92
Medium	22	81.86	3.413	.728	80.35	83.38	77	89
Low	6	82.33	4.412	1.801	77.70	86.96	78	89
Total	35	82.77	3.789	.640	81.47	84.07	77	92

Based on the results of descriptive test above, the following conclusions can be revealed.

1. The level of both high and medium creative thinking have a significant difference based on description tables, high creative is better.
2. Either high or low creative thinking has a significant difference based on description tables, high creative is better.
3. Medium and low creative thinking have not big significant difference, although in the description table, low creative thinking is better than medium creative, but statistically medium or low creative is considered the same, because the average is not much different.

From these data, it can be concluded that learning to write scientific articles with project-based models is more effectively carried out at high level creative thinking students.

The results of this research are relevant to the research conducted by Luthvitasari et al (2013) *"Implementasi Pembelajaran Berbasis Proyek pada Keterampilan Berpikir dan Kemahiran Generik Sains".* The results of the research stated that the project-based learning model had an influence on increasing critical thinking skills and creative thinking skills of vocational students. Every aspect of critical thinking skills has a relationship with aspects of creative thinking skills. Project-based learning can improve the generic science skills of vocational students.

The results of this research are relevant to research conducted by Insyasiska, et al (2015) *"Pengaruh 'Project Based Learning' Terhadap Motivasi Belajar, Kreativitas, Kemampuan Berpikir Kritis, dan Kemampuan Kognitif Siswa pada Pembelajaran Biologi".* The results showed that based on LSD test further project-based learning models can influence student learning motivation 14% higher, student creativity increased 31.1%, critical thinking skills increased 34% and Through contextual learning projects, cognitive abilities of students also increased 28 , 9% of the learning provided without going through the project. In line with research by Ratih, Kusmaryatni, & Rediani (2017) *"Model Pembelajaran Berbasis Proyek, Kreativitas dan Hasil Belajar Mahasiswa"* which stated that the project-based learning model can increase the creativity and learning outcomes of students.

The results of this research are also reinforced by the research from Siwa & Muderawan (2013) which states that there is an increase in science process skills in students using project-based learning methods. Besides, these results of this study are also relevant to the research of Rahman and Zulaeha (2015) stating that learning to compose short story texts in writing with an effective project-based model is used. This can be seen from the positive changes in the attitudes and the average value of students after treatment. In project-based classes students are more active, disciplined and responsible in participating in learning. This is because in the project-based model students are required to quickly obtain information, communicative and complete assignments on time.

In addition, the results of research conducted by Elvina, Subyantoro, & Haryadi (2015) also supported this study that the results of treatment models on extroverted personality is

higher than introverted personality that is 19.22 > 16.24 in the writing poetry skill.

Other relevant research also conducted by Wijanarto, Supardi & Marwoto Marwoto (2018) research shows the following results: (1) there are differences in cognitive learning outcomes between groups of students who follow the guided PiBL model and groups of students who follow the PjBL learning model, obtained tcount = 2.32. This value is greater than the table of 1.67. (2) There is a difference in science process skills between groups of students who take the guided PBL learning model and those who follow the PBL learning model (tcount = 3.18> t table = 1.67). Improved learning outcomes and process skills using the guided PjBL model are better than the PjBL. So the PjBL model is effective for improving students' learning outcomes and process skills. Furthermore, for research conducted by Komalasari et al (2019) stated that the project-based learning model can be used as an alternative learning model in Indonesia in the implementation of the 2013 curriculum in elementary schools to increase students' creativity and understanding concepts.

CONCLUSION

There is an effectiveness in learning to write scientific papers using a project-based model based on the level of creative thinking of class XI students. This is based on differences in the average value of students before and after being treated with a project based model. Before being treated, the average value of the ability to write scientific papers at a low level of creative thinking was 61.37, whereas after being treated to 80.00, for students the level of creative thinking was at 66.31, while after being treated it was 82, 52, then for students the level of creative thinking is high, the average value is 71.87, while after being treated, it becomes 87.00. So, learning to write scientific papers using project-based models is effectively used for students with high levels of creative thinking.

Suggestions that can be given for further research are related to the use of research variable on creative thinking level and the use of other learning models in learning to write scientific papers.

Special thank is delivered to Dr. Wagiran, M. Hum who has deigned to devote his knowledge and experience.

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