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Creative Thinking for PJBL Approach Non-Parametric Analysis

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ABSTRACT

Based on the 2018 PISA results, Indonesia ranked creative thinking at 74th place out of 79 countries. This data shows how important it is that creative thinking needs to be fostered, taught and developed in students. There is a very important approach to developing this capability, namely the PjBL approach by utilizing digital libraries. Such as Google Scholar and Crossref, systematic literature reviews, especially on PGMI UIN Antasari Banjarmasin students. The research results show that with PjBL creative thinking, PGMI UIN Antasari Banjarmasin students are not significantly different from conventional methods in training students' creative thinking if the learning sources are the same, namely Google Scholar and Crossref for discussing science subjects, but the pre-test and post-test results show differences. in student thinking, after using the PjBL approach.

Keywords: Creative thinking skills, Project Based Learning, science

INTRODUCTION

The development of technological progress shows the progress of the life of a nation or a country in various ways. The common characteristic is the development of communication and information in all aspects of life (Baroya, 2018). In this development, all forms of endeavor are taught to students at every level and level of education. Teaching these needs is a variety of skills. Some skills are useful for all aspects of life, which can be used for all needs, whether in educational contexts or work demands (Syamina, et al, 2021).

In the educational context, the learning model with the demands of technological developments must be focused, so that the process developed gives rise to activities: (1) searching for a lot of information that is currently being developed for the required needs, (2) changing memorization patterns into practical activities, (3), how to individual learning to group or collaborative learning as an inevitable activity that must be present in the learning process in the classroom (Maula, M. M., Prihatin, et al, 2014).

It is very appropriate for a country that is aware of this interest to design a new curriculum that is in line with the progress of the times, such as by changing the National Curriculum to implement several very important demanding initiatives. It is not surprising that the design of the 2013 curriculum, the Merdeka curriculum, is a requirement to adapt to the developments and progress of the demands of the 21st century. However, education is still being developed in accordance with RI Regulation no. 20 of 2003, which states that education contributes to the development of dignified and civilized character in national life (Rosma, 2015). This means that whatever the process of technological development and the demands of progress, we still focus on dignified and civilized character, not value-free. Therefore, in this progress we are directed to new insights or information that can be used to overcome problems that may arise and do not justify various methods (Mursidik, E. M., et al, 2015).

In filtering and developing various findings and utilizing learning resources that develop with technological developments, creative students are needed. Students who think creatively can view the world from many perspectives and come up with fresh ideas to solve problems in real life. Students who think creatively still do not reach the expected criteria because the

teaching and learning process is often one-way and activities are boring for students, such as lectures, discussions and also practice which is still guided by teachers or lecturers (Teacher Centered Learning).

The creative thinking process in the context of this research uses the PjBL learning model. The Project Based Learning (PjBL) model is an effort to achieve goals in learning. The PjBL learning model prioritizes modeling a project that produces a product as its output. Sharing of things that have been experienced to one thing that is completed so that the final product of the project is an activity based on the results of educational activities that can provide learning (Ardianti, S. D, et al, 2017). The benefit of PjBL is that it provides inspiration and information to students to create unique answers to the problems they face. It is hoped that by following this pattern, students will be able to become facilitators and collaborate with other students to develop more meaningful thought patterns and activities. This will enable students to assess learning based on their learning experiences and develop knowledge and social skills.

Learning with the PjBL model will make it easier for students to find ideas. From Ravitz, 2021, Brigili claims students will be more active in problem solving by utilizing practical innovation with the use of learning with projects. It is hoped that this experience will develop into knowledge that will encourage students to learn more creatively. The PjBL learning model, adopted from (Thomas, 2000), is used in education for the following purposes: 1) planning projects, launching projects, and guiding research and creating products (guided research and product creation). Additionally, the conclusion of the project comes in the form of a conclusion. Students are able to carry out research collaborations with the PjBL education model. Students can solve real-world problems and create challenging projects by interacting with the environment. From teaching, conducting experiments to planning stages, exchanging ideas, finding solutions and determining results through critical thinking, communication, collaboration, creativity and innovation are some of the skills that the nation's next generation in the 21st century should have. Appropriate learning models, methods and strategies are very necessary to improve these skills. The PjBL model was used as one of them, and a systematic review was carried out to see whether it could stimulate students to improve their creative thinking skills.

Not many researchers have conducted research on how the PjBL model can help students learn science more creatively, especially when they later teach in elementary schools. Environmental pollution is the focus of most research on the application of the PjBL learning model or supporting examples in learning, so that the material is easy to understand in the learning process. (Ariyani, E., et al, 2019) The PjBL learning model has been proven to be effective in improving thinking skills, in previous research (Kusadi, N. M. R., Sriartha, I. P., & Kertih, 2020).

According to researchers, there is an interest in conducting a systematic study of research on PjBL learning models, educational theses, and journals. Systematic reviews are used to synthesize relevant research findings, improve existing research evidence, and represent data on a variety of research issues. This activity was carried out in order to see the extent to which science education is focused on the impact of the PjBL learning model for critical thinking skills. Because it contains material related to systematic methods of learning about nature, science subjects are very important. It is hoped that the findings of this systematic review will produce results that are useful, practical and easy to apply in real life.

METHOD

The research subjects in this study were 25 PGMI UIN Antasari Banjarmasin students who were involved in testing conventional methods and Creative Thinking Methods with the PjBL approach, using 2 learning resources from Google Scholar and 1 from Crossref.

Meanwhile, the Pres Test involved 22 PGMI UIN Antasari Banjarmasin students, before using the PjBL approach and the Post Test involved 22 PGMI UIN Antasari Banjarmasin students, after using PjBL.

The discussion material in the literature review was obtained from Google Scholar and Crossref, two digital libraries. The keyword " was used in the research literature search. Science, project-based learning, and creative thinking Between September and October 2023, a literature search was conducted. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) research method was used in this research (Snyder, 2019) (Page, M. J., & Moher, 2017). After conducting a review, the following discussion material was obtained, see table 1

Table 1: The discussion material in the literature review

Author	Topic	Source
Indri Widayanti. 191240091.	Powtoon Animation Video Media Development STEM-Based Temperature and Heat Material to Improve Skills Critical Thinking in Class V Elementary School Students.	Google Scholar
Ari Gunardi dan Avi Valentri	Application of Animation Media Through a Problem-Based Contextual Approach in Science Learning for Class IV Students at Al-Azhar Islamic Elementary School 10, Serang City	Google Scholar
Rif'at Shafwatul Anam	Effectiveness and Influence of the Inquiry Learning Model on Elementary School Science Learning	Crossref

DISCUSSION OF RESEARCH RESULT

The result of the normality test with SPSS using the Lilliefors and Shapiro Wilk method. The Sig value (p value) for both tests is <0.05, which means the data is not normally distributed. This is true because if the data is normally distributed, you should prefer to use the Independent T Test rather than the Mann Whitney U Test. See table 2:

Table 2: The result of the normality test

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Metode	Statistic	Df	Sig.	Statistic	Df	Sig.
Nilai	Metode Konvesional	.304	13	.002	.736	13	.001
	Berpikir Kreatif – PjBL	.185	12	.200*	.899	12	.002

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The results of the homogeneity test using the Levene's test method. Levene's test is recommended because this test can be used to test homogeneity of variance in data that is not normally distributed. Meanwhile, other tests, namely the Fisher F test, are preferred if the data is normally distributed. The Levene's Test test value is shown in the Based On Mean Value row, namely with Sig (p value) 0.114 > 0.05, which means the variance of the two groups is the same or is called homogeneous. So the second assumption, namely homogeneity, has been fulfilled. Next, we will test the hypothesis, namely the Mann Whitney U Test.See table:

Table 3**:** The result of the homogeneity test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Nilai	Based on Mean	2.693	1	23	.114
	Based on Median	.618	1	23	.440
	Based on Median and with adjusted df	.618	1	16.577	.443
	Based on trimmed mean	2.321	1	23	.141

The Mean Rank or average ranking of each group. Namely, in the first group the average ranking is 13.27, lower than the average ranking in the second, namely 13.73. Is the difference in the mean rankings of the two groups above statistically significant or what is called significant? See table 4:

Table 4**:** The Mean Rank or average ranking of each group

Rank of each group

	Metode	N	Mean Rank	Sum of Ranks
Nilai	Metode Konvesional	13	13.27	172.50
	Berpikir Kreatif- PjBL	12	13.73	178.50
	Total	25		

The U value of 81 and a W value of 172. If converted to a Z value, the value is -158. The Sig value or P value is 0.876 > 0.05. If the p value is > the critical limit of 0.05 then there is no significant difference between the two groups or which means H0 is accepted. See table:

Table 5**:** The U value of 81 and a W value of 172

Test Statistics[a]

	Nilai
Mann-Whitney U	81.500
Wilcoxon W	172.500
Z	-.156
Asymp. Sig. (2-tailed)	.876
Exact Sig. [2*(1-tailed Sig.)]	.880[b]

a. Grouping Variable: Metode

b. Not corrected for ties.

Because the shape and distribution are the same, the test results above can also be used to conclude that there is no significant difference in Median between the 2 groups. If the shape and distribution of the two groups are the same, then the Mann Whitney test can only be used to conclude that there is no difference in the mean between the 2 groups. The meaning of conventional methods and learning methods by developing PjBL is not significantly different in the context of research using learning resources from Google Scholar and Crossref. Conventional learning can train creative thinking if the learning resources used are used in the same way.

To determine whether your data is normally distributed using Shapiro Wilk, in SPSS you just need to look at the Sig value. in the Shapiro-Wilk column. The sig value means significance or may be called the p value or probability value. In the example above, the value is 0.189, more than 0.05, so it can be said that the data is Normally distributed or which means accepting H0. See Table 6

Table 6: The result of the normality test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pre Test	.148	22	.200*	.939	22	.189
Post Test	.114	22	.200*	.948	22	.290

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Almost the same as Shapiro Wilk above, the way to interpret it is to look at the Sig value. on the Kolmogorov-Smirnova column. In the example above, the value is 0.290 more than 0.05, so the data is Normally distributed, or which means it accepts H0, See table:

Table 7: The Descriptive Statistics

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Pre Test	22	68.23	6.102	56	77
Post Test	22	85.55	3.764	80	92

The descriptive statistics table above shows the mean, standard deviation, minimum and maximum values for each group of data (pretest and posttest). It appears that the mean or average posttest score is 85.55, which is greater than the pretest score, namely 68.23. Is the size of this difference statistically significant? That's what the Wilcoxon Signed Rank Test will answer. See table:

Table 8: The Wilcoxon Signed rank Test formula

Ranks

		N	Mean Rank	Sum of Ranks
Post Test - Pre Test	Negative Ranks	0[a]	.00	.00
	Positive Ranks	22[b]	11.50	253.00
	Ties	0[c]		
	Total	22		

a. Post Test < Pre Test
b. Post Test > Pre Test
c. Post Test = Pre Test

Based on the calculation method carried out in the Wilcoxon Signed rank Test formula, the values obtained are: the mean rank and sum of ranks from the negative ranks, positive ranks and ties groups. Negative ranks mean that the sample with the second group (posttest) value is lower than the first group (pretest) value. Positive ranks are samples with the second group (posttest) value higher than the first group (pretest) value. Meanwhile, ties are the values of the second group (posttest) which are the same as the values of the first group (pretest). The symbol N shows the number, Mean Rank is the average rank and sum of ranks is the sum of the ranks. The next Z value, see table:

Table 9: The Z value

Test Statistic[a]	Pres Test – Post Test
Z	-4.109[b]
Asymp. Sig. (2-Tailed)	.000

a.Wilcoxon signed Ranks Test
b.Based on negative ranks

Based on the results of the Wilcoxon Signed Rank Test calculation, the Z value obtained is -4.109 with a p value (Asymp. Sig 2 tailed) of 0.000 which is less than the research critical limit of 0.05 so that the hypothesis decision is to accept H1 or which means there is a difference significant between the pretest and posttest groups.

Based on the normality and homogeneity tests conducted, the data showed interesting characteristics. The normality test using both Lilliefors and Shapiro Wilk methods revealed that the data was not normally distributed, with Sig values (p-value) <0.05. However, the homogeneity test using Levene's test method showed that the variance between the two groups was homogeneous, with a Sig value of 0.114 (>0.05). This combination of characteristics led to the selection of the Mann Whitney U Test for hypothesis testing rather than the Independent T Test.

The Mann Whitney U Test results revealed no significant difference between the conventional method and the creative thinking PjBL method when using learning resources from Google Scholar and Crossref. The mean ranks were relatively similar, with the conventional method group showing 13.27 and the creative thinking-PjBL group showing 13.73. The test produced a U value of 81 and a W value of 172, with a p-value of 0.876 (>0.05), indicating that there was no statistically significant difference between the two groups. This suggests that conventional learning methods can be equally effective in training creative thinking when using the same learning resources.

Further analysis using the Wilcoxon Signed Rank Test demonstrated significant improvements between pretest and posttest scores across all participants. The mean posttest score (85.55) was notably higher than the pretest score (68.23), and this difference was

statistically significant with a Z value of -4.109 and a p-value of 0.000 (<0.05). All 22 participants showed positive ranks, meaning every student's posttest score was higher than their pretest score. This indicates that both teaching methods were effective in improving student performance, regardless of whether the conventional or creative thinking-PjBL approach was used.

CONCLUSION

The results of research using the Conventional Method approach and the Creative Thinking Method with the PjBL Model do not show significant differences if the sources used are the same, namely sourced from discussion material from Google Scholar and Crossref to support science learning in training creative thinking. However, there are differences in learning before and after using the PjBL approach. That PjBL has trained PGMI UIN Antasari Banjarmasin students in training and developing students' creative thinking when compared to learning that only uses conventional methods.

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