The Effect of Applying Problem Based Learning on the Sixth Grade Students' Critical and Communicative Thinking Skillsat SDN Tegal Besar 03 Jember

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ABSTRACT

This research was based on the problem that arose related to the lack of students' skill in solving the problems they face. This condition results in the low ability of students to think critically and students do not have the opportunity to develop their communicative skills. The objectives of this study were to: (1) determine whether or not there is an effect of the applying Problem Based Learning on students 'critical thinking skills, (2) to find out whether or not there is an effect of applying Problem Based Learning on students' communicative skills. This research used the Quasi Experimental method with research design "Non equivalent control group design". The research subjects were students of class VI SDN TegalBesar 03 Jember which were divided into a control group and an experimental group. The main data collection method used was the learning outcome test. After the data had been collected, the data were analyzed by using 2 types of data analysis techniques, namely t-test, and relative effectiveness analysis. The results indicated that: (1) there is a significant effect of applying Problem Based Learning on the sixth grade students' critical thinking skills at SDN 03 TegalBesar. The relative effectiveness was 62.1% with the high category, (2) there is a significant effect of applying Problem Based Learning on the students' communicative skills. The relative effectiveness was 62.73% with the high category.

Keywords: *Problem Based Learning, critical thinking skills, and communicative skills*

INTRODUCTION

A personal thinking ability can determine the success of his life, especially in solving life's problems he faces. Critical thinking itself is an organized process that allows students to evaluate evidence, assumptions, logic and language that underlie other people's statements (Johnson, 2007: 185). A good learning system will produce good quality of learning that can be seen from the results of the assessment. Therefore, teachers must plan learning, strategies, and question-based constructs that facilitate students to think at higher levels, think creatively, and think critically.

The realm of communication is very necessary because people require to communicate their ideas, feelings, and needs to others. In other words, communication is useful in solving problems. Communication is very important for students to communicate what they know and what they do. In the learning process especially

in the classroom, communication is very much needed by students because it greatly determines how students express their opinions, thoughts, and behaviors in socializing with peers, even understanding in classroom learning is very much determined by the communicative skills developed by students.

Problem Based Learning is one of the efforts that teachers can make in facilitating students to develop critical and communicative thinking skills. Akinoglu & Tandogan (2007) revealed the advantages of Problem Based Learning, namely developing self-control attitudes, developing problem-solving skills, developing social skills and communicating through groups, as well as developing higher-order thinking skills or critical thinking and scientific thinking. Based on the above background, the research entitled "The Effect of Applying Problem Based Learning on the Sixth Grade Students' Critical and Communicative Thinking Skills" needs to be carried out."

Based on the description above, the research problems can be formulated as follows: (1) how is the effect of applying Problem Based Learning on the sixth grade students' critical thinking skills at SDN TegalBesar 03 Jember?, and (2) how does the application of Problem Based Learning affect the sixth grade students' communicative skills at SDN TegalBesar 03 Jember?

The objectives of this study were: (1) to determine whether or not there was an effect of applying Problem Based Learning on the sixth grade students critical thinking skills at SDN TegalBesar 03 Jember, and (2) to determine whether or not there was an effect of applying Problem Based Learning on the sixth grade students' communicative skills at SDN TegalBesar 03 Jember.

The benefits expected from this study are: (1) for teachers, the results of this study can provide input to teachers that Problem Based Learning can be applied in other learning activities, where through this model, the teacher can improve students' critical thinking and communication skills, (2)) for the principal, the results of this study can be used as input and consideration in implementing Problem Based Learning, especially in improving the critical thinking and communication skills of elementary school students, (3) for school supervisors, the results of this study are expected to be a source of information for school supervisors regarding variations of learning models which can improve students' skills and the quality of learning process, (4) for researchers, the results of this study can provide new insights about the problem-based learning process in improving students' skills, and (5) for other researchers, the results can be used as a reference and comparison in doing a further research related to the object of this research.

RESEARCH METHOD

The research design applied in this study was a Quasi Experimental research design with the pattern of "Non equivalent control group design." The research design can be described as diagram 1 as follows:

Diagram1. *Diagram of Non Equivalent Control Group Design*

E :	O1	X	O2
C :	O1		O2

DESCRIPTION

E =Experimental Group

C=Control Group

O1=Observation/pre test given to experimental and control groups before giving the treatement. The test for both groups used the same instrument.

X =The treatement given to experimental group

O2=Observation/post test given after having treatement. The test for both groups used the same instrument. (Masyhud (2016:155-156)

The research subjects were Grade VI students of SDN TegalBesar 03.There were 27 students in class 6A as the experimental class and 29 students in 6B as the control class. Sampling was done by using purposive sampling technique.

The instruments used were interview, questionnaire, observation, and learning outcomes test. The collected data were then analyzed by using t-test data analysis technique and analysis of relative effectiveness test.

RESULT AND DISCUSSION

Before conducting data collection, the research instrument was first validated through field trial, and the result showed that all questions were valid at a significant level of 0.05. After all the questions were declared valid, then the reliability test was carried out by using the split-half technique. The reliability test result showed that the r11 was 0.9419 and this number was included in the high reliability classification. While the result of the Instrument Distinguishing Power Index test obtained a figure of 0.38, and it was included in the category of sufficient distinguishing power. Then, the result of the index test of difficulty level test on the items obtained an average of 56% which was included in the medium category.

The Analysis Results of Critical Thinking Skills

Initial data analysis was carried out to determine the initial condition of students on the critical thinking skills of the experimental group and the control group that were tested by using the t-test. Here is the calculation to find out t count.

The following is a comparison of the pretest scores in the control class and the experimental class.

Table1. *Comparison of Pretest Scores in Control Class and Class*

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test (Kontrol)	29	51	70	59,69	5,022
Pre-test (Eksperimen)	27	51	69	60,48	4,839
Valid N (listwise)	27				

The descriptive analysis result of each group obtained an average scores of the control group of 59.69 with a standard deviation of 5.022 and a minimum score of 51. The mean score minus the standard deviation of 54.668 (59.69 - 5.022) is still greater than the minimum score (51) which indicates the data in the control group had a homogeneous variance.

The average score of the experimental group is 60.48 with a standard deviation of 4.839 and a minimum score of 51. The average value minus a standard deviation of 55.643 (60.48 - 4.839) is still greater than the minimum value (51) which shows the data the experimental group had a homogeneous variance. In addition, the normality test was also carried out:

Table2. *Hasil Ujinormalitasnilaipretest kelaskontroldankelaseksperimen*

One-Sample Kolmogorov-Smirnov Test

			Pre-test (Kontrol)	Pre-test (Eksperimen)
N			29	27
Normal Parameters [a,b]	Mean		59,69	60,48
	Std. Deviation		5,022	4,839
Most Extreme Differences	Absolute		,116	,172
	Positive		,116	,087
	Negative		-,092	-,172
Kolmogorov-Smirnov Z			,624	,895
Asymp. Sig. (2-tailed)			,831	,399

a. Test distribution is Normal.
b. Calculated from data.

The result of the Kolmogorov-Smirnov normality test on the pre-test score of the Control and Experimental groups obtained Z value of 0.624 (Control) and 0.895 (Experiment), respectively, with a significance value of 0.831 (Control) and 0.399 (Experiment), respectively. The two significance values of each group are greater than α (0.05). This means that the two data in each group (Control and Experiment) were spread according to the normal distribution, and the next test could use the parametric test (t test).

Table3. *Comparison of pretest scores in the control class and the experimental class by using the independent t-test sample*

Independent Samples Test

		Levene's Test for Equality of Var		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pretest	Equal variances assumed	,032	,860	-,600	54	,551	-,792	1,320	-3,483	1,854
	Equal variances not assumed			-,601	53,932	,550	-,792	1,318	-3,434	1,850

Based on the above analysis, Sig. 0.860 (p> 0.05) = Significant, this means that the pretest scores of the control and the experimental classes have the same variant (homogeneous).

The value of [t (46) = 0.551 p> 0.05] = insignificant, this means that there is no average difference between the control and the experimental classes (apple-apple to compare both of them), so that the two classes can be compared with different treatments.

The statistical data of the pretest comparison in the control class and the experimental class are as follows.

Table4. *Comparison of posttest scores in the control class and the experimental class*

Group Statistics

Nilai Posttest	Kelompok	N	Mean	Std. Deviation	Std. Error Mean
	Kontrol	29	75,59	6,350	1,179
	Eksperimen	27	83,63	6,789	1,307

The descriptive analysis result of each group obtained an average value of the control group of 75.59 with a standard deviation of 6.350. It indicates that the data in the control group had homogeneous variance.

The average score of the experimental group is 83.63 with a standard deviation of 6.789 which indicates that the data in the experimental group had a homogeneous variance. In addition, a normality test was also carried out which can be seen in the following table:

Table5. *The normality test result of the post-test scores of the control class and the experimental class*

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		56
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	6,50500615
Most Extreme Differences	Absolute	,098
	Positive	,070
	Negative	-,098
Test Statistic		,098
Asymp. Sig. (2-tailed)		,200[c,d]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Based on the data above, it shows Asymp. Sig. (2-tailed) 0.200> 0.05.itindicates a significant result, and it also indicates that the posttest scores of the control and experimental classes are normally distributed. Then it proceeds using the independent t-test sample showing the following results:

Table6. *Comparison of posttest scores in the control class and the experimental class by using the independent t-test sample.*

Independent Samples Test										
		Levene's Test for Equality of Var		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Posttest	Equal variances assumed	,110	,741	-4,581	54	,000	-8,043	1,756	-11,563	-4,523
	Equal variances not assumed			-4,570	52,972	,000	-8,043	1,760	-11,573	-4,513

Based on the statistical analysis data above, Sig. 0.741 (p> 0.05). It indicates a significant result. This means that the posttest scores of the control class and the experimental class had the same variant (homogeneous). The value of [t (46) = 0.000 p <0.05] indicates significant results. This means that

there is a difference in the mean posttest score between the control class and the experimental class after given different learning treatments.

Analysis Result of Communicative Skills

The following is a comparison of the difference in the value of the communicative skills homogeneity test in the control class and the experimental class.

Table7. *Comparison of Communicative Skills Homogeneity Test*

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Selisih Nilai	Based on Mean	,192	1	54	,663
	Based on Median	,291	1	54	,592
	Based on Median and with adjusted df	,291	1	48,375	,592
	Based on trimmed mean	,280	1	54	,599

HasilpengujianhomogenitasselisihnilaikemampuankomunikatifkelaskontroldaneksperimendiperolehnilaiLevene Statistic (F) sebesar 0,192 dengannilaisignifikansisebesar 0,663. Nilaisignifikansilebihbesardarinilai α (0,05). Hal iniberarti data selisihnilaike mampuan komunikatif keduakelas (kontroldaneksperimen) mempunyaivarians yang homogen, sehinggauji selanjutnyada patdilaksanakan. Kemudian jugadilakukanuji normalitas.

The homogeneity test result of the difference in the communicative skills value of the control and experimental classes obtained a Levene Statistic (F) value of 0.192 with a significance value of 0.663. The significance value is greater than the α value (0.05). This means that the data on the difference in the communicative skills values of the two classes (control and experiment) had a homogeneous variance, so that the next test could be carried out. Then the normality test was carried out.

Table8. *Comparison of Communicative Skills Normality Test in the Control Class and Experiment Classes*

One-Sample Kolmogorov-Smirnov Test

		Kontrol	Eksperimen
N		29	27
Normal Parameters [a,b]	Mean	10,34	20,00
	Std. Deviation	5,334	6,934
Most Extreme Differences	Absolute	,215	,278
	Positive	,215	,278
	Negative	-,198	-,278
Kolmogorov-Smirnov Z		1,160	1,186
Asymp. Sig. (2-tailed)		,135	,063

a. Test distribution is Normal.
b. Calculated from data.

The result of the Kolmogorov-Smirnov normality test on the score difference of the communicative skills of the control class and the experimental class obtained Z values of 1.160 (Control Class) and 1.186 (Experimental Class), respectively with a significance value of 0.135 (Control Class) and 0.063 (Class Experiment). The two significance values of each test are greater than α (0.05). This means that the two data on the Communicative Skills of the Control Class and Experiment Class were spread according to the normal distribution and the next test could use the parametric test (t test).

In this study, reserachers conducted a posttest to determine the final ability of students in the control class and experimental class. The statistical data of the pretest comparison in the control class and the experimental class are as follows.

Table 9. *Test on Difference in Communicative Skills between the Control and Experimental Classes*

Group Statistics

	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Selisih Nilai	Kontrol	29	10,34	5,334	,990
	Eksperimen	27	20,00	6,934	1,334

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
									Lower	Upper
Selisih Nilai	Equal variances assumed	,192	,663	-5,865	54	,000	-9,655	1,646	-12,956	-6,354
	Equal variances not assumed			-5,810	48,789	,000	-9,655	1,662	-12,995	-6,315

The results of the t-test on the independent data of the difference in the value of communicative abilities between the control class and the experimental class obtained a t-count value of -5.865 with a significance value of 0.000. The significance value is smaller than the α value (0.05). This means that there is a difference in the average difference in the value of Communicative Skills between the control class and the experimental class. The negative sign on the t-value shows the average difference in the value of the experimental class communicative skills is higher than the control class.

Furthermore, researcher analyzed the level of relative effectiveness in order to find out how much the relative effectiveness of the critical thinking skills of the group taught by the Problem Based Learning learning model compared to those taught using the ordinary learning model, it is necessary to calculate the relative effectiveness level by using the following formula:

$$ER = \frac{MX2 - MX1}{(\frac{MX1 + MX2}{2})} \times 100\%$$

$$ER = \frac{24,32 - 12,79}{(\frac{24,32 + 12,79}{2})} \times 100\% = 62,1\%$$

where:

ER   :relative effectiveness of a product compared to another

MX_1 : average scores of experimental class

MX_2 : average scores of control class

After the calculation was done, it was interpreted based on the relative effectiveness test criteria. Then the value of 62.1% is found in the range of 60% - 80%, which means that its effectiveness is high compared to without the application of the Problem Based Learning learning method.

Meanwhile, to find out how much the relative effectiveness of the group's communicative skills taught by the Problem Based Learning learning model compared to those taught using the ordinary learning model, it is necessary to

calculate the relative effectiveness level using the following formula:

$$ER = \frac{MX2 - MX1}{(\frac{MX1 + MX2}{2})} \times 100\%$$

$$ER = \frac{21,11 - 12,41}{(\frac{21,11 + 12,41}{2})} \times 100\% = 62,73\%$$

After the calculation was done, it was interpreted based on the relative effectiveness test criteria. Then the value of 62.73% is obtained in the range of 60% - 80%, which means that its effectiveness is high compared to without the application of the Problem Based Learning learning method.

CONCLUSION AND SUGGESTION

Based on the results of the research and discussion as described in the previous section, several conclusions can be made as follows: (1) There is a significant effect of applying Problem Based Learning on the sixth grade students' critical thinking skills at TegalBesar 03 Elementary School, Jember Regency. The relative effectiveness level shown by the class that used Problem Based Learning in achieving critical thinking skills was 62.1% compared to the class that did not use Problem Based Learning. This picture shows a high level of effectiveness category. (2) There is an effect of the application of Problem Based Learning on the communicative abilities of Grade VI students at the TegalBesar 03 Elementary School, Jember Regency. The relative effectiveness level shown by the class that used Problem Based Learning in achieving communicative skills was 62.3% compared to the class that did not use Problem Based Learning. This figure shows a high level of effectiveness category.

Based on the conclusions described above, several points of suggestion can be stated as follows: (1) For teachers, teachers should try to apply innovative learning models to create various learning activities, one of which is by applying the Problem Based Learning model. This model provides opportunities for students

to be actively involved in every learning activity, so that the teacher is only a facilitator, and learning becomes more meaningful. (2). For school principal, based on the results of this study, the principal can provide motivation and guidance to teachers to always innovate in implementing a more various learning development including Problem Based Learning learning model to improve students' critical thinking skills, and (3) For other researchers, the results of this study can be as input and comparison material in designing further research activities related to learning by applying the Problem Based Learning model.

REFERENCES

[1] Akinoglu, O. & R. O. Tandogan, (2007). The Effects Of Problem-Based Active Learning In Science Education On *Students' Academic Achievement, Attitude And Concept Learning. Eurasia Journal of Mathematics, Science & Technology Education* 3(1): 71-81.

[2] Angelo, T. A, dan Cross, P. K. (1993*) Classroom Assessment Techniques, A Handbook for College Teachers*. [online]. Tersedia di: http://honolulu.hawaii.edu/intranet/ committees/ FacDevCom/ guidebk/ teachtip /assess-1.htm[April, 2020].

[3] Arikunto, S. (2012). *Prosedur Penelitian Suatu Pendekatan Praktek* (EdisiRevisi). Jakarta: RinekaCipta.

[4] Bundu, Patta. (2006). *Penilaian Keterampilan Proses danSikapIlmiahdalam Pembelajaran Sains di SD*. Jakarta : Depdiknas.

[5] Masyhud, M. Sulthon. (2009). *Manajemen Pengajaran Mikro.*Yogyakarta: LaksBang PRESSindo.

[6] Masyhud, M. Sulthon. (2015). *Analisis Data Statistik Untuk Penelitian Pendidikan*. Jember: Lembaga Pengembangan Manajemendan Profesi Kependidikan

[7] Masyhud, M. Sulthon. (2016). *Metode Penelitian Pendidikan*. Jember: Lembaga Pengembangan Manajemendan Profesi Kependidikan.

[8] Masyhud, M. Sulthon, (2016). *Manajemen Profesi Kependidikan.* Yogyakarta: Kurnia KalamSemesta.

[9] Partnership for 21st Century Skills. (2002). *Learning for 21st Century: A report and Mile Guide for 21stCentury Skills.*(Online).http://www.p21.org. (Diaksespada 28 Maret 2020).

[10] Sapriya.(2009). *Pendidikan IPS Konsepdan Pembelajarannya*. Bandung: PT.Remaja Rosdakarya

[11] Sardiman, A. M. (1996). *Interaksidan Motivasi Belajar Mengajar*. Penerbit Rajawali Pers, Jakarta.

[12] Wijaya,Cece. (2010). *Pendidikan Remidial: Sarana Pengembangan*