

IMPROVE THE MATHEMATICAL LITERACY ABILITY OF JUNIOR HIGH SCHOOL STUDENTS THROUGH A CONTEXTUAL APPROACH

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Abstract

The aim of this study was to examine the achievement and improvement of MLA of junior high school students who obtained a CA and obtained CL. The method used is quasi-experiment design with a nonequivalent control group. This research was conducted in SMPN in West Bandung Regency with a sample of grade 8th students as many as 33 experiment class students and 27 control class students. The instrument used was the MLA 3rd level test as many as 2 items and 4th level as many as 3 items. The data analysis used was the Mann-Whitney U test. The results of the study found that 1) MLA's initial in both classes was the same; 2) the average posttest that gets contextual learning and those who get regular learning is quite different; 3) Mann Whitney U test scores on the posttest and normalized gain obtained Sig. = 0,000 < 0,05, then Ho is rejected. This means that the achievement of MLA of students who get CA is better than those who get CL. The same gain also in the normalized gain, Sig. < 0.05, meaning that the increase in MLA of students who get CA is better than those who get CL.

Keywords: Mathematical literacy ability, Contextual approach

Abstrak

Tujuan dari penelitian ini adalah untuk mengetahui pencapaian dan peningkatan MLA siswa SMP yang memperoleh CA dan memperoleh CL. Metode yang digunakan adalah kuasi eksperimen dengan kelompok kontrol nonequivalent. Penelitian ini dilakukan di SMPN Kabupaten Bandung Barat dengan sampel siswa kelas 8 sebanyak 33 siswa kelas eksperimen dan 27 siswa kelas kontrol. Instrumen yang digunakan adalah tes level 3 MLA sebanyak 2 item dan level 4 sebanyak 3 item. Analisis data yang digunakan adalah uji Mann-Whitney U. Hasil penelitian menemukan bahwa 1) kemampuan awal MLA di kedua kelas adalah sama; 2) rata-rata post tes yang mendapatkan pembelajaran kontekstual dan mereka yang mendapatkan pembelajaran biasa sangat berbeda; 3) skor tes Mann Whitney U pada posttest dan gain normal diperoleh Sig. = 0,000 < 0,05, maka Ho ditolak. Ini berarti bahwa pencapaian MLA siswa yang mendapatkan CA lebih baik daripada mereka yang mendapatkan CL. Gain yang sama juga dalam gain yang dinormalisasi, Sig. < 0,05, artinya peningkatan MLA siswa yang mendapat CA lebih baik daripada mereka yang mendapat CL.

Kata Kunci: Kemampuan literasi matematis, Pendekatan kontekstual

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INTRODUCTION

Mathematical literacy ability (MLA) is an integrated basic essential cognitive ability that needs to be developed and owned by students. In accordance with the objective of cognitive mathematics learning in Permendiknas number 22 of 2006 (Mulhamah & Putrawangsa, 2016) namely: (a) understanding mathematical concepts, explaining the interrelationships between concepts and applying concepts or algorithms flexibly, accurately, efficiently and precisely in

problem solving; (b) use reasoning on patterns and traits, make mathematical manipulations in generalizing, compiling evidence, or explaining mathematical ideas and statements; (c) solving problems that include: the ability to understand problems, design mathematical models, complete models and interpret solutions obtained; (d) communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem.

At present, Indonesia as a participant in the international evaluation of PISA (Program for International Students Assessment), especially in the field of mathematics is very alarming. Where the results of the latest Indonesian students' mathematical literacy conducted in 2015 were ranked 66 out of 72 with a mean score of 386, while the average PISA score was 500 (3rd level) (Nuurjannah, Hendriana, & Fitrianna, 2018). Other researchers found that there were still many students who were unfamiliar with solving mathematical problems in complex, procedural and critical daily life that required logical reasoning and solutions (Nuurjannah, Amaliyah, & Fitrianna, 2018).

That way, there needs to be a renewal of learning that is seen to be able to improve MLA students, namely a contextual approach. The contextual approach (CA) is learning that focuses on the process of involving students as a whole to find a concept/material learned and link it with everyday life.

Based on the explanation, the research question was proposed as follows: 1) Is the achievement of MLA students who obtain CA better than those who get conventional learning (CL)? 2) Is the increase in MLA students who get CA better than those who have CL? With the aim of the study to examine the achievement and improvement of MLA students who obtained CA and those who obtained CL.

METHOD

In this study using quasi-experiment design with a nonequivalent control group as follows:

$$\begin{array}{ccc} 0 & X & 0 \\ \hline 0 & & 0 \end{array}$$

with information, X = contextual approach, 0 = pre-test and post-test of MLA. The research sample was grade 8th students in one of the SMPN in West Bandung as many as 33 experiment class students and 27 control class students. The instruments used were 3rd level mathematical literacy tests as many as 2 items and 4th level as many as 3 items.

The following are some examples of items of mathematical literacy tests.

1) Example: Item about level 3 mathematical literacy

A K-Pop music concert is held in a rectangular field measuring 25×10 meters. The circular music stage with a diameter of 14 meters is in the middle of the field. Based on this information, illustrate the shape of the field and the stage of the music concert and determine the area that can be occupied by the audience!

2) Example: Item about level 4 mathematical literacy

A coin printing company will print a circle of coins with an ideal that must meet the following requirements:

- The diameter of the coins is not less than 15 mm and not more than 45 mm.
- If the diameter of a coin has been determined, then the diameter of the next coin must be at least a quarter longer.

- The printing press can only produce coins with millimeters of integer diameter (for example 19 mm is allowed, 19.5 mm is not allowed).

Which of the following diameter designs of coin sets meets these conditions? For each design, circle "Yes" or "No" in the available table and give your reason for each answer!

No	Printing design	Meet printing requirements	Reason
1	15 ; 18,75 ; 22,5 ; 26,25 ; 30 ; 33,75 ; 37,5 ; 41,25 ; 45	Yes or No	
2	15 ; 30 ; 45	Yes or No	
3	15 ; 30 ; 45 ; 60	Yes or No	

Based on the results of the trial, the mathematical literacy test has good characteristics of content validity and face validity, including: a) content validity and face validity have been consulted with junior high school supervisors and teachers; b) test reliability r_{11} of 0.83; c) the validity of the test items ranges from $0.40 < r_{xy} < 0.75$; d) different power coefficients range from $0.20 < DP < 0.50$; and e) difficulty index around $0.25 < ID < 0.90$.

RESULTS AND DISCUSSION

The descriptions of the students MLA are presented in table 1.

Table 1. Pre-test and Post-test, and the N-Gain MLA

Variable	Statistic	Contextual Approach (CA)			Conventional Learning (CL)		
		Pre-test	Post-test	N-Gain	Pre-test	Post-test	N-Gain
MLA	N	33	33	33	27	27	27
	$\bar{x}$	14,52	27,27	0,67	13,15	20,48	0,35
	%	42,71	80,21		38,68	60,24	
	SD	4,32	6,77		3,32	6,09	

Note: % out of Ideal score; and Ideal score of MLA is 34

From table 1, it can be seen that the mean pre-test of the MLA of the experiment class and the control class is not much different, which indicates that the MLA of the two classes is the same. Mathematical literacy is very low at 14.52% and 13.15% from the ideal score. This achievement can be understood because students have not yet learned the relevant mathematical content. Then the post-test average of the two classes is quite different, it can be said that the MLA of the experiment class students is better than the control class. Furthermore, the average N-gain MLA is slightly different in the experiment class, slightly better than the control class. After learning found achievement and gain mathematical literacy of students who get contextual approach is 27.27% of ideal scores and normalized gain of 0.67 is better than achievement and gain of mathematical literacy which is conventional learning is 20.48% of ideal scores and normalized gain is 0.35. The contextual approach can help in achieving students' mathematical literacy abilities. This is indicated by the acquisition of the experimental class posttest higher than the control class.

Analysis of the normality test for pre-test, post-test, and the N-gain of students MLA is presented in table 2.

Table 2. Normality Test Pre-test, Post-test, and the N-Gain MLA

Tests of Normality				
Class		Kolmogorov-Smirnov		
		Statistic	df	Sig.
Pre-test	experiment	.123	33	.200*
	Control	.177	27	.030
Post-test	experiment	.179	33	.009
	Control	.191	27	.012
N-gain	experiment	.156	33	.040
	control	.188	27	.015

From table 2 the acquisition of Sig. in the experiment class pre-test of $0.200 > 0.05$ and the control class of $0.030 < 0.05$, because there is one class that is less than 0.05 then H_0 is rejected which means the data is not normally distributed. Then the acquisition of Sig. the post-test experiment class is $0.009 < 0.05$ and the control class is $0.012 < 0.05$, then H_0 is rejected, which means the data is not normally distributed. The gain analysis is normalized, both classes obtained Sig. < 0.05 namely the experimental class of 0.040 and the control class of 0.015, then H_0 is rejected. This means that both classes, both experimental and control classes, are not normally distributed. That way, followed by the Mann Whitney U test.

Analysis of the average differences in the pre-test, post-test, and N-gain of the students MLA is presented in table 3.

Table 3. Mann Whitney U Test Pre-test, Post-test, and the N-Gain of MLA

Test Statistics					
		Pre-test Value	Post-test Value	N-Gain Value	
Mann-Whitney U		357.500	194.500	190.000	
Wilcoxon W		735.500	572.500	568.000	
Z		-1.313	-3.746	-3.803	
Asymp. Sig. (2-tailed)		.189	.000	.000	
Sig.		.193	.000	.000	
Monte Carlo Sig. (2-tailed)	95% Confidence Interval	Lower Bound	.185	.000	.000
		Upper Bound	.201	.000	.000
	Sig.		.100	.000	.000
Monte Carlo Sig. (1-tailed)	95% Confidence Interval	Lower Bound	.094	.000	.000
		Upper Bound	.016	.000	.000
		Bound			

In the pre-test, the test conducted was a two-part test, with the acquisition of Sig. at $0.193 > 0.05$, then H_0 is accepted which means that there is no difference in the initial ability of mathematical literacy of junior high school students who use learning with contextual approaches and who use conventional learning.

In the post-test, the test conducted is a one-part test, with the acquisition of Sig. equal to $0,000 < 0,05$, then H_0 is rejected which means the achievement of the ability of mathematical literacy of junior high school students who use learning with a contextual approach is better than those that use conventional learning. In addition, based on statistical tests, it was obtained the fact that the achievement of students' mathematical literacy skills in learning using a contextual approach was better than those using conventional learning. In line with the research that students who get learning using a contextual approach get a good achievement, while classes with conventional learning are still very lacking (Sariningsih, 2014). In addition, the improvement of mathematical understanding and communication skills of students who received MMP learning with a contextual approach was better than students who only received learning with a contextual approach (Yuniarti, 2014).

On normalized gain, the test performed is a one-part test with the acquisition of Sig. equal to $0,000 < 0,05$, then H_0 is rejected, which means an increase in the ability of mathematical literacy of junior high school students who use learning with a contextual approach is better than those using conventional learning. The contextual approach can improve students' mathematical literacy skills. This is indicated by the acquisition of N-gain scores of students who get learning using a contextual approach higher than students who get regular learning with moderate gain criteria. In addition, based on the statistical test, it was obtained the fact that the increase in students' mathematical literacy skills in learning using a contextual approach was better than those using conventional learning. In line with relevant research that the application of contextual learning approaches can improve students' problem-solving skills in mathematics (Mulhamah & Putrawangsa, 2016). In addition, contextual learning can improve the ability of mathematical representation of junior high school students and the learning outcomes of students who get contextual learning representation ability is better than student learning outcomes using conventional learning (Hutagaol, 2013).

CONCLUSION

Based on the research findings, data analysis, and discussion obtained some conclusions as follows. Students' initial mathematical literacy ability in both classes are the same. the achievement and improvement of mathematics literacy ability of students who get a contextual approach are quite good and better than those who get conventional learning.

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