Understanding the Concept of Geometry through the Connected Mathematics Project Learning by Using Online Media and Local Culture

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ABSTRACT

Mathematics learning is very important but it is felt very difficult for the students. Geometry is a part of mathematics learning. The connected mathematics project-based learning (CMP) is mathematics learning that raised everyday problems in life to explore mathematical ideas so that to foster the student-centered learning environment to solve their problems by an investigation. Mathematics learning that connected both concepts and what was seen in real life would make it easier for the students to understand the concept and develop it in the form of creation at the time of Covid-19 pandemic which was carried out in online and local culture. This research used 2 x 2 factorial that was mean 2 methods, namely the control class and the experimental class and then 2 learning materials (online and ethnomathematics). The population was the students of elementary school in Bengkulu City, namely the students in grade 5. The Samples were taken by using a group technique based on school accreditation. A sample of 120 students, namely grade 5 students of SDN 1, SDN 65, SDN 81, and SDN 103 Bengkulu City. The CMP learning used online media based on local culture as an experimental class and conventional learning as a control class. The research instrument used was an online test of the capacity to comprehend the geometric concepts. This instrument was analyzed by utilizing the ANCOVA statistical test. Based on the analysis results by using the Kolmogorov-Smirnov test, the data in this research was normal and homogeneous. Thus, it could be concluded that there was the effect of CMP in online learning with a local cultural approach on the capacity to comprehend the geometric concept of the normal score and also the understanding the concept of geomantic for understudies who educated utilizing the CMP learning that was higher than understudies taught by using the conventional learning. In addition, the average score of students' ability in understanding the concept of geometry among understudies who were given material based on local culture was higher than students who were given material that was not based on local culture with t count 2.169 and t table 2.042. It means that t count > t table.

Keywords: *Mathematics, Geometry, Connected mathematics Project, Online media, Local culture.*

1. INTRODUCTION

Online learning carried out by the students during the new normal adaptation due to the pandemic of Covid-19 that occurred throughout the world included Indonesia [1], with face-to-face learning temporarily suspended it was hoped that it could break the chain of Coronavirus [2] This situation made teachers design the learning process that could be done by all the students in their class, included mathematics learning. Mathematics was the main subject in elementary school [3] and mathematics was a subject that was feared at the elementary school level [4]. Especially during the pandemic of Covid-19, teachers must be able to make learning more meaningful. The period of pandemic Covid-19 required the teachers to teach online so that they prepared materials and learning tools online with the result that the students do not get bored to the learning process and mathematics is no longer feared [4]. Mathematics learning that was associated with the students' daily lives would increase learning more meaningful [5]. Mathematics learning used online and linking learning with everyday life has not been carried out well. Mathematics learning during the period of

pandemic Covid-19, which required the students to be close to the world of the internet so that teachers were expected to be able to direct the students to use props or media that related to the available material at home with the result that this learning would be fun and could be used in everyday life [6].

Mathematics learning with the CMP methodology and dependent on the local culture was exceptionally essential learning and more reasonable. Mathematics learning which dependent on ethnomathematics, to be specific the understudies' mathematical relational abilities were educated with a higher practical learning approach than those with the traditional or conventional learning methods [7]. Ethnomathematics presented an excellent role as an approach to mathematics learning. This learning based on project learning which can make the learning process is more interesting because it related to the daily lives of the students [8]. Therefore, the researcher tried to apply online learning based on ethno-mathematics with the CMP approach in understanding the concept of geometric material.

Understanding the concept of geometry through online learning is something new in learning so it requires the CMP approach in the application of learning dependent on the local culture for the understudies in Bengkulu city. Teachers need to develop empirical mathematics in learning [9] mathematics that connects units and strands, as well as connecting harmoniously at the unit and also level of a grade. All of the things become more coherent. It is known as the Connected Mathematics Project (CMP) [10]. The study of mathematics would be more important if it connected to the students' real world in the form of local culture [11].

There were many obstacles in comprehension to the understudies about the significance of local culture in learning. However, by understanding a geometry concept through online learning using the connected mathematical approach by applying local culture in Bengkulu, the students have no difficulty to understand the concept of geometry and would even like the mathematics learning. This research showed how the understudies' capacity to comprehend the idea of geometry in online study environment by applying the CMP based on ethnomathematics.

2. RESEARCH METHODS

A quasi-experimental research was used as the method of this study. This research was conducted at four primary schools in the city of Bengkulu, namely SDN 1, SDN 65, SDN 81, and SDN 103 Bengkulu city. The period of this research was 6 months, started from the planning to the reporting process, from June 2020 to November 2020. The research population was the students from four schools in Bengkulu City. A sample of 120 students consisted of grade 5 students SDN 1, SDN 65, SDN 81, and SDN 103 Kota Bengkulu. The samples were chosen by the technique of whole group.

The design of this study was the 2 x 2 factorial. The online CMP learning approach with ethnomathematics teaching materials in SD Kota Bengkulu was carried out in Group-1. The conventional online learning approach with ethnomathematics teaching materials was applied in Group-2. The online CMP learning approach with non-ethnomathematics teaching materials was carried out in Group-3. And the last one, the conventional learning approach with non-ethnomathematics teaching materials was carried out in Group-4. Each group consists of 30 students.

The instrument this research was a test about understanding a concept of geometry, which was to determine and measure the degree of understudies' capacity to comprehend mathematical ideas pre and post the learning process. Five indicators were the focus of this research in knowing the geometry idea (1) restating the geometry concept orally and also verbally, (2) identifying and also giving illustrations, (3) classifying objects or models according to certain properties, (4) expressing concepts to form a mathematical representation, and (5) classifying concepts in problem-solving.

The information examination in this study was the test results of the understudies on understanding the geometry concept. In the recent research, the information that has been depicted that should be tried before the prerequisite analysis was carried out. The essential tests utilized in this study were the ordinariness, homogeneity, and also linearity tests. Information was dissected by using the Analysis of Covariance (ANCOVA). The analysis aimed to lessen blunder difference by disposing the impact of non-absolute factors obtained by the analysis results and the ANCOVA was also useful for increasing the accuracy of the trial since it controlled the impact of uncontrolled free factors. In this case, the researcher used the ANCOVA's concept and regression analysis.

3. RESULTS AND DISCUSSION

Researchers designed learning that contained in the learning device plan (RPP) and online CMP learning syllabus used a local cultural approach for the experimental class and conventional learning for the control class. The data of study that has been collected then presented in the form of a description and then analyzed and would get the data that has the highest value, lowest value, mean, median, mode and standard deviation of each class for each variable. Table 1 below showed the class's data.

Table 1. Between-Subjects Factors

		Value Label	N
A	1.00	CM	30
	2.00	Conventional	30
B	1.00	Local Culture	30
	2.00	Non Local Culture	30

The data in table 1 showed the conditions of the existing and homogeneous class groups so that students could be treated.
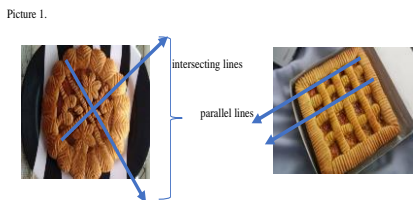
Picture 1.

Picture 1. Bay Tat Cakes (https://www.google.com)

Teaching materials and ethnomathematics media were shown by the teacher during learning, as were shown in Picture 1. The students were given an understanding of the geometric shapes of intersecting lines and parallel lines. In Picture 2, we can see the students' work after learning and making examples that have been learned.
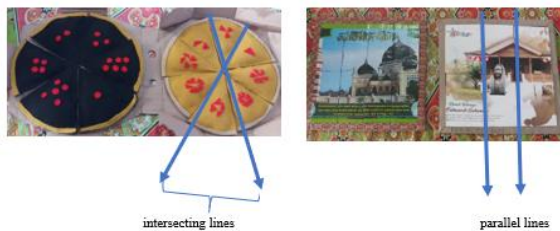
Picture 2 The result of the student's work.

The picture 2 was an example that has been made by the students regarding the results of online CMP learning based on ethnomathematics in Bengkulu city in the form of an example of a bay tat cake and a picture of the hero monument of Fatmawati.

To analyze the normality test, the researcher used SPSS version 26 software. It was the data obtained to test the normality of conventional class data by used ethnomathematics and without used ethnomathematics. Based the Kolmogorov-Smirnov Z, normality test of 0.764 and Asymp. Sig 2 of 0.604 was greater than 0.05, so the data was normally distributed as in table 2.

Table 2. Normality Test for Control class

		Unstandardized Residual
N		30
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	15.61581323
Kolmogorov-Smirnov Z		.764
Asymp. Sig. (2-tailed)		.604

The normality test in the experimental class on the ability to understand the geometry used the Kolmogorov Smirnov Z as shown in table 3 below:

Table 3. Normality Test for Experimental class

		Unstandardized Residual
N		30
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	19.21691259
Kolmogorov-Smirnov Z		1.443
Asymp. Sig. (2-tailed)		.031

Based on Table 3, the sample normality test for the experimental group in understanding the concept of geometry in experimental learning group CMP with a local culture approach that obtained a value of p (sig) Kolmogorov-Smirnov = 1.443 and Asymp. Sig = 0.031. This stated that the value of p (sig)> 0.05 then Ho was acknowledged, so it very well may be presumed that the information was taken from a typically conveyed populace.

To see the homogeneity test in determining whether the two classes were homogeneous based on the level of distribution of students' abilities in the class being tested the same. The information was utilized still the same, namely the data on the results of students' ability tests. This homogeneity test with the Levene's test is shown in the table 4.

Table 7. Parameter Estimates

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	12.327	3.522	3.500	.001	5.351	19.302
[B=1,00]	25.249	2.602	9.705	.000	20.096	30.401
[B=2,00]	0ᵃ	.	.	.	.	
X	1.019	.092	11.036	.000	.836	1.201

Table 4. Levene's Test of Equality of Error Variances^a

F	df1	df2	Sig.
1.316	3	116	.273

Based on table 4, the homogeneity test in classes that applied CMP based on local culture and non-local culture shows a significance of 0.273. Since the value was 0.273> 0.05, F = 1.316 with df (3.116). This means that Ho was approved, it could be inferred that the data looked homogeneous.

Another prerequisite test was the linearity test. Namely, to find out whether a variable that has been a linear or insignificant relationship. The result of the linearity test for the ability to comprehend mathematical ideas is shown in Table 5.

Table 5. Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	62312.928ᵃ	4	15578.232	92.858	.000	.764
Intercept	7180.461	1	7180.461	42.801	.000	.271
X	15404.862	1	15404.862	91.824	.000	.444
B	16092.979	1	16092.979	95.926	.000	.455
A * B	349.705	2	174.852	1.042	.356	.018
Error	19292.938	115	167.765			
Total	590688.000	120				
Corrected Total	81605.867	119				

a. R Squared = .764 (Adjusted R Squared = .755)

As shown in Table 5, it could be described the regression harmony between the two treatment groups. Table 4 showed that F = 1.042 with df (2.115) and p-value = 0.356> 0.05, which implies that Ho was approved. It very well may be inferred that the relapse coefficient of the two gatherings was homogeneous. It very well may be said that the two relapse conditions were equal. In view of the essential test, the scoring capacity of the idea of understanding geometry was homogeneous information, and the regression equation of the two sample groups was equal. Subsequently, information examination to decide the distinction in the impact between the two methodologies, further testing was completed as appeared in tables 6 and 7.

Table 6. Parameter Estimates

Parameter	B	Std. Error	T	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	10.255	4.727	2.169	.032	.893	19.617
[A=1,00]	-.189	3.348	-.056	.955	-6.820	6.442
[A=2,00]	0ᵃ	.	.	.	.	
X	1.393	.119	11.733	.000	1.158	1.629

In table 6 the t test with t = 2.169 and p-value = 0.03 <0.05, which implies that Ho was denied and Thickness 7 t test = 3,500 and p-value = 0.001> 005. Thus, the average score of the capacity to comprehend ideas of geometry for learners educated with a high CMP learning was higher than learners educated with traditional learning methods.

The results of this research provided a very good description of the students' ability to understand geometry that was being taught online with the CMP approach based on local culture. The results of this research supported previous research, namely the effective approach of CMP learning to improve mathematics understanding [12]. This was a realistic mathematics approach by making used of local contextual and social issues as a beginning stage. The capacity to comprehend the idea of geometry for understudies who were educated with a realistic mathematics learning approach was higher than those educated with direct guidance when two gatherings of understudies were given material that was oriented to local culture (ethnomathematics) [13]. So, we believed that CMP learning approaches that were oriented to local culture (ethnomathematics) positively affects in improving comprehension of mathematics, particularly geometry [14] especially in online learning which was needed during the pandemic Covid-19.

4. CONCLUSION

The results of this research concluded that there was a covariate linear influence (initial capacity) on the capacity of understudies to comprehend the idea of learning in CMP learning with online media and local cultural approaches. Second, there was the impact of CMP learning with a local cultural approach to deal with the capacity to comprehend mathematical ideas. The average capacity to comprehend geometric ideas in understudies who were educated by CMP learning was higher than conventional learning. The capacity to comprehend the idea of geometry for understudies who were given learning material based on local culture was higher than students who were given material not based on local culture. Finally, we suggested that mathematics education specialists advance a local culture-based

mathematics online learning approach at CMP. This learning approach positively affects the math skills.

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