www.bircu-journal.com/index.php/birci
Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
Budapest Institute

The Effect of Project Based Learning Model on Student Mathematics Learning Outcomes in the Covid-19 Pandemic Era

Yusrizal[1], Syahrina Anisa Pulungan[2]
[1,2]*Sekolah Tinggi Keguruan dan Ilmu Pendidikan Amal Bakti, Indonesia*
yusrizaldns@gmail.com

Abstract

This research is motivated by the absence of an appropriate method to improve student learning outcomes during learning in the era of the covid-19 pandemic. The specific purpose of this research is to find out the differences in student learning outcomes in mathematics taught with project-based learning models compared to conventional learning models in learning in the era of the covid-19 pandemic. This research was conducted at SD Negeri 060931, Medan Amplas District. The population in the study were all students of SD Negeri 060931 with a total of 48 students consisting of 24 students in class V/a and 24 students in class V/b. The research instrument used a mathematics learning outcome test. The data analysis technique used an independent sample t test with a significant level of of 0.05. The results showed that the mathematics learning outcomes of students who were taught using the project based learning model were higher than those of students who were taught using the conventional learning model (Sig. 0.023 < 0.05; Mean Difference of 5.583).

Keywords
learning in the era of the covid-19 pandemic; mathematics learning outcomes; project based learning

I. Introduction

As of January 30, 2020, WHO has declared an outbreak of Corona Virus Disease (Covid-19) with a pandemic status (Sohrabi et al., 2020). Since then, the whole order of life in the various affected countries has changed drastically. UNESCO noted that there were 63 million teachers affected by Covid-19, as well as 1.3 billion students worldwide (Joshi et al., 2020; Yusrizal & Fatmawati, 2020). The outbreak of this virus has an impact of a nation and Globally (Ningrum *et al*, 2020). The presence of Covid-19 as a pandemic certainly has an economic, social and psychological impact on society (Saleh and Mujahiddin, 2020). Covid 19 pandemic caused all efforts not to be as maximal as expected (Sihombing and Nasib, 2020). Indonesia as one of the affected countries issued several urgent policies to maintain economic stability, health and education. Some local governments have closed schools and changed learning patterns to distance or online learning (Powers et al., 2020). The same thing is in line with the opinion of Pertiwi & Sutama (2020) who say that one of the right solutions to replace learning during the Covid-19 pandemic is to replace learning that is usually done in schools into online learning. Online learning is something new that makes it a challenge for most parents, teachers and students. Therefore, the success of education during a pandemic is the result of the collaboration of these three elements (Handayani, 2020).

Online learning still leaves a number of problems among the community. Not all schools are ready to run it, many problems are found in the field including: (1) technological disparities between students; (2) internet network disparities between regions, (3) technological literacy skills of teachers and parents; and (3) the ability of parents to provide online learning facilities for students. This certainly causes differences

in the level of learning motivation among students (Yusrizal et al., 2020). Students who have sophisticated smartphones coupled with a smooth internet connection are definitely more excited, on the other hand students who live in areas that have limited internet connections certainly have obstacles in participating in online learning. Therefore, many schools in the regions prefer offline learning by applying the visit home method or continuing to carry out learning at school while still carrying out health protocols.

The Minister of Education and Culture gave 7 tips for learning from home through a video uploaded from the Youtube channel of the Ministry of Education and Culture of the Republic of Indonesia on May 20, 2020 which among other things mentioned that teachers should divide the class into smaller groups and try to apply a project based learning model because this model is able to train students to collaborate, work together cooperation and empathy. In the project based learning model, students are required to have the ability to solve problems and put them into the form of projects, so that students get real experience about making projects (Surya et al., 2018). The application of the project based learning model is expected to be able to train students' independence, collaboration and experimentation. Based on these problems, this study aims to see the effect of using the project based learning model on students' mathematics learning outcomes in the era of the covid-19 pandemic.

II. Review of Literature

2.1 Project Based Learning Model

The project-based learning model is a constructive learning model that seeks to empower students' higher-order thinking skills. In the project based learning model, the teacher acts as a facilitator who guides students to be active in finding solutions to a problem (Wiek et al., 2014). The steps of the PjBL model can be explained as follows: (1) Question: The learning process begins by asking challenging questions or questions that lead students to project learning; (2) Plan: the teacher guides the students in planning the project to be worked on; (3) Schedule: in this step the teacher makes a schedule of activities carried out based on the plans that have been made previously. The aim is for students to understand that in making a large project requires a good work schedule so that the project being carried out can run as desired; (4) Monitoring: in the implementation the students are supervised by the teacher. Supervision is carried out by providing full facilities for students to carry out all activities properly; (5) Appraisal: assessment is carried out to see and measure the level of student achievement in working on a given project. Assessment is carried out after or when the project is run; and (6) Evaluate: the activity process ends with an evaluation of the project that has been made (Wajdi, 2017).

Based on this explanation, it can be concluded that there are 3 important things that teachers need to review when implementing a project-based learning model during a pandemic, including: (1) the teacher mentions the purpose of the activity to be carried out and mentions the role of parents in the learning; 2) the teacher explains the benefits of implementing the project-based learning model at home; and 3) the teacher explains to parents about ways to motivate students to be more enthusiastic in learning from home. Thus, it is hoped that the application of the project-based learning model in the Covid-19 pandemic era can improve student learning outcomes.

2.2 Student Mathematics Learning Outcomes

Learning outcomes are a change from within after the learning process (Dwita et al., 2018). Winkle said there are three important things in learning outcomes, namely

cognition, affective, psychomotor. The factors that influence learning outcomes include external and internal factors. External factors include: teaching materials used, curriculum, teachers who teach, curriculum, environment, and learning facilities. While internal factors are influenced by cognitive abilities, motivation, interests, talents, to intelligence.

Students' mathematics learning outcomes during the pandemic tend to deteriorate, this is due to the lack of readiness, parents, teachers and students in implementing distance learning. Therefore, the government continues to strive to improve the quality of education during the pandemic. Since the beginning, the Ministry of Education and Culture has echoed student learning achievements, including focusing on literacy, numeracy, and character education. But today, a new problem that is urgent and must be of concern to all of us is mastery of technology. Because with the distance learning method, it will be impossible to achieve if the education implementers are still blind to technology.

III. Research Methods

This type of research is a quasi-experimental research. This research was conducted at SD Negeri 060931 which is located at Medan Amplas District, Medan City. The population in this study were all students of SD Negeri 060931 Medan Amplas District. The sample in this study was class V students, totaling 54 students, each of which amounted to 24 students in class V-a and 24 students in class V-b. The data collection technique in this study was using a mathematics learning outcome test. The research hypothesis was tested by independent sample t test with a significant level of 0.05. The normality of the data was tested using the Kolmogorof Smirnov test, while the homogeneity of the data was tested using the Levene's test.

IV. Results and Discussion

4.1 Results

a. Data Description

1. Mathematics Learning Outcomes of Students Taught with Project Based Learning Models

Based on statistical calculations, the students' lowest score was 63 and the highest score was 97. The average value was 81.81, the mode was 83, the median was 83, the standard deviation was 9.11 and the variance was 83.07. The histogram of the frequency distribution of mathematics learning outcomes for group A students can be seen in the following figure:

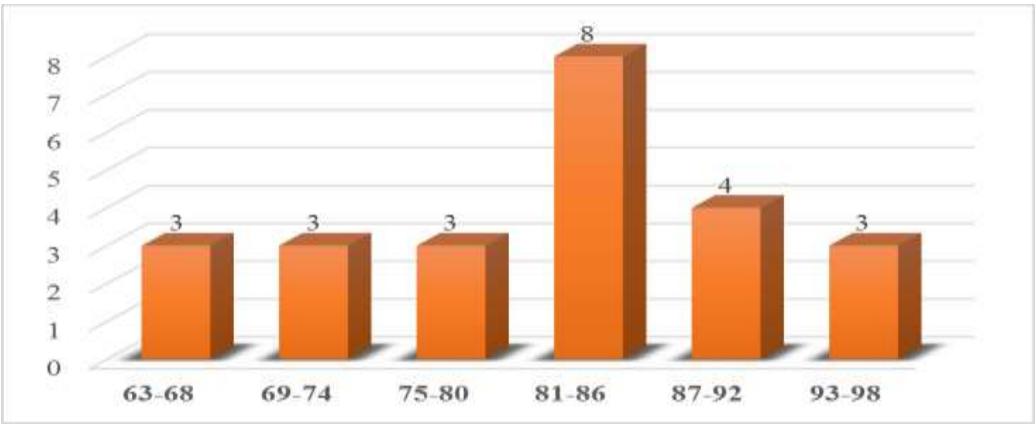

Figure 1. *Histogram of Student Learning Outcomes with Project Based Learning Model*

2. Mathematics Learning Outcomes of Students Taught with Conventional Learning Models

Based on statistical calculations, the students' lowest score was 63 and the highest score was 93. The average value was 76.25, the mode was 73, the median was 73, the standard deviation was 7.24 and the variance was 52.48. The histogram of the frequency distribution of mathematics learning outcomes for group B students can be seen in the following figure:

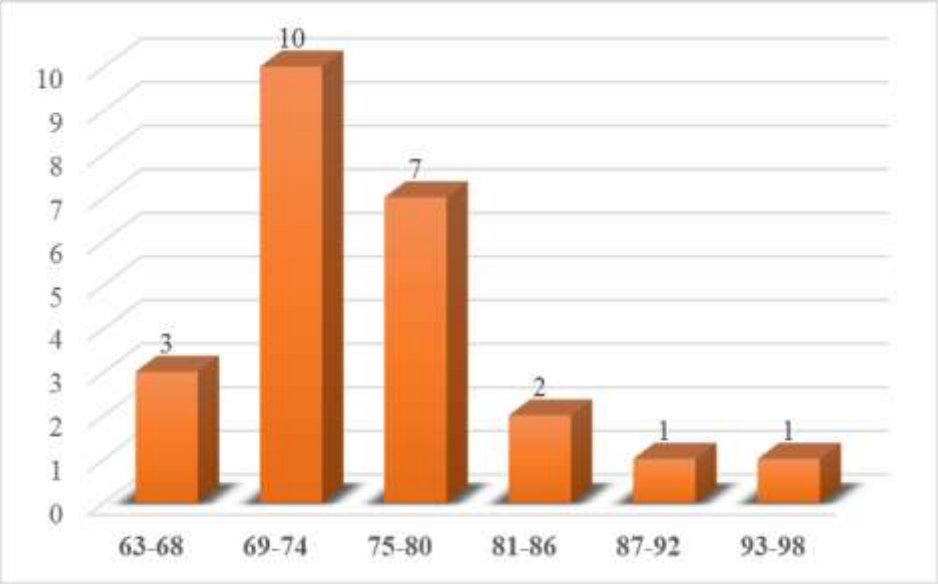

Figure 2. *Histogram of Student Learning Outcomes with Conventional Learning Model*

b. Prerequisite Test

1. Normality Test

Table 1. Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Math Learning Results	PjBL Learning Model	.181	24	.040	.942	24	.181
	Conventional Learning Model	.209	24	.008	.939	24	.152

a. Lilliefors Significance Correction

Based on the table, it is known that the significant value in the PjBl learning model is 0.181 > 0.05, and the significant value in the conventional learning model is 0.152 > 0.05. Thus it can be concluded that the research data is normally distributed.

2. Homogeneity Test

Table 2. Test of Homogeneity of Variances

Math Learning Results

Levene Statistic	df1	df2	Sig.
.391	1	46	.535

Based on the table, it is known that the significance is 0.535 > 0.05, thus it can be concluded that the research data group is relatively the same or homogeneous.

c. Hypothesis Test

Testing the hypothesis of this study using the independent samples t test. Hypothesis testing data can be seen in the following table:

Table 3. SPSS Output Hypothesis Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Math Learning Results	Equal variances assumed	.391	.535	2.349	46	.023	5.583	2.377	.798	10.369
	Equal variances not assumed			2.349	43.635	.023	5.583	2.377	.791	10.376

Table 4. Comparison of Student Learning Outcomes

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Math Learning Results	PjBL Learning Model	24	81.71	9.144	1.866
	Conventional Learning Model	24	76.13	7.213	1.472

Based on the SPSS output in table 1, it can be seen that the significant (2-tailed) value is 0.023 < 0.05 so that the hypothesis testing rejects Ho and accepts Ha. Thus, it can be concluded that there is a significant difference between the average mathematics learning outcomes of students who are taught using the project-based learning model compared to conventional learning models. Based on table 2, it is known that the mathematics learning outcomes of students who are taught using the project based learning model are higher than those of direct learning.

4.2 Discussion

Project based learning learning model is a student-centered teaching model. The use of this model is considered very suitable for use during distance learning. In line with that, the Minister of Education and Culture gave 7 tips for learning from home through a video uploaded from the Youtube channel of the Ministry of Education and Culture of the Republic of Indonesia on May 20, 2020 which among other things mentioned that teachers should divide the class into smaller groups and try to apply the project based learning model because this model is able to train students collaboration, mutual cooperation and empathy. In the project based learning model, students are required to have the ability to solve problems and put them into the form of projects, so that students get real experience about making projects (Surya et al., 2018).

This is evidenced from the results of this study which shows that the mathematics learning outcomes of students who are taught using the project based learning learning model are higher than the mathematics learning outcomes of students who are taught using the conventional learning model with a difference of 5,583 levels. The same results were

also obtained in the research of Zahidah & Zainil (2020) which revealed that the application of the project based learning model was able to improve student learning outcomes in the mathematics learning process in elementary schools. In a study conducted by Sultan & Javaid (2018), it was stated that the project-based learning model was able to increase students' creativity and competitiveness. In addition, the project based learning model can enable teachers to apply teaching methods better. Project based learning has great potential to create interesting and meaningful learning experiences for students, especially when they have to deal with real jobs in the industry (Gunawan et al., 2017). Therefore, the use of project-based learning methods is considered very suitable for use in learning in the era of the covid-19 pandemic.

V. Conclusion

Based on the results of research and discussion, it can be concluded that the mathematics learning outcomes of students who are taught using the project based learning learning model are higher than those of students who are taught using the conventional learning model (Significant 0,023 < 0,05; Mean Difference of 5,583).

Acknowledgement

The authors express their infinite gratitude to the Direktorat Riset dan Pengabdian kepada Masyarakat Kementerian Riset dan Teknologi/Badan Riset dan Inovasi Nasional (Kemenristek BRIN) who has fully provided research grants for novice lecturers based on letter number B/112/E3/RA.00/ 2021. The author also expresses his gratitude to LPPM STKIP Amal Bakti which has helped a lot in carrying out this research.

References

Dwita, D. K., Anggraeni, A. I., & Haryadi. (2018). Pengaruh Home Visit dan Motivasi Belajar Terhadap Hasil Belajar Siswa di SDIT Harapan Bunda Purwokerto. *Jurnal Ekonomi, Bisnis, Dan Akuntansi*, *20*(01), 1–15.

Gunawan, Sahidu, H., Harjono, A., & Suranti, N. M. Y. (2017). The effect of project based learning with virtual media assistance on student's creativity in physics. *Cakrawala Pendidikan*, *2*, 167–179.

Handayani, L. (2020). Peningkatan Motivasi Belajar IPA Melalui Model Pembelajaran Project Based Learning pada Masa Pandemi Covid-19 bagi Siswa SMP Negeri 4 Gunungsari. *Jurnal Paedagogy: Jurnal Penelitian Dan Pengembangan Pendidikan*, *7*(3), 168–174.

Joshi, A., Vinay, M., & Bhaskar, P. (2020). Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments. *Interactive Technology and Smart Education*.

Ningrum, P. A., et al. (2020). The Potential of Poverty in the City of Palangka Raya: Study SMIs Affected Pandemic Covid 19. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)* Volume 3, No 3, Page: 1626-1634

Pertiwi, R., & Sutama, S. (2020). Membudayakan Kelas Digital Untuk Membimbing Siswa dalam Pembelajaran di Tengah Pandemi Covid-19. *JKTP: Jurnal Kajian Teknologi Pendidikan*, *3*(4), 350–365.

Powers, J. M., Brown, M., & Wyatt, L. G. (2020). SPARK-ing innovation: a model for elementary classrooms as COVID-19 unfolds. *Journal of Professional Capital and Community*.

Saleh, A., Mujahiddin. (2020). Challenges and Opportunities for Community Empowerment Practices in Indonesia during the Covid-19 Pandemic through Strengthening the Role of Higher Education. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*. Volume 3, No 2, Page: 1105-1113.

Sihombing, E. H., Nasib. (2020). The Decision of Choosing Course in the Era of Covid 19 through the Telemarketing Program, Personal Selling and College Image. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)* Volume 3, No. 4, Page: 2843-2850.

Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., Iosifidis, C., & Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International Journal of Surgery*, *76*(February), 71–76.

Sultan, S., & Javaid, S. T. (2018). Pakistani undergraduate students' perceptions of project-based learning in the English composition course. *Journal of Applied Research in Higher Education*, *10*(3), 217–229.

Surya, A. P., Relmasira, S. C., & Hardini, A. T. A. (2018). Penerapan Model Pembelajaran Project Based Learning (PjBL) untuk Meningkatkan Hasil Belajar dan Kreatifitas Siswa Kelas III SD Negeri Sidorejo Lor 01 Salatiga. *Jurnal Pesona Dasar*, *6*(1), 41–54.

Wajdi, F. (2017). Implementasi Project Based Learning (Pbl) Dan Penilaian Autentik Dalam Pembelajaran Drama Indonesia. *Jurnal Pendidikan Bahasa Dan Sastra*, *17*(1), 81–97.

Wiek, A., Xiong, A., Brundiers, K., & Leeuw, S. van der. (2014). Integrating problem- and project-based learning into sustainability programs A case study on the School of Sustainability at Arizona State University. *International Journal of Sustainability in Higher Education*, *15*(4), 431–449.

Yusrizal, Y., & Fatmawati, F. (2020). Analysis of Teacher Abilities in Implementing Online Learning in Elementary Schools of the North Sumatra PAB Foundation. *Jurnal Ilmiah Teunuleh*, *1*(2), 129–137.

Yusrizal, Y., Lubis, B. S., Fatmawati, F., & Muzdalifah, D. (2020). Pengaruh Metode Visit Home dan Pola Bimbingan Orang Tua terhadap Motivasi Belajar Siswa Sekolah Dasar di Era Pandemi Covid-19. *Jurnal Tematik*, *10*(3), 129–135.

Zahidah, W., & Zainil, M. (2020). Penerapan Model Project Based Learning Terhadap Hasil Belajar Siswa Dalam Pembelajaran Matematika Di Sekolah Dasar (Studi Literatur). *Journal of Basic Education Studies*, *3*(2), 599–618.