

The Effect of the Missouri Mathematics Project Learning Model on Student Numeral Literacy Ability

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Abstract

It is hoped that this research can prove the influence of the learning model on students' numeracy literacy skills in cube and block building material in class VIII SMP Jaya Bekasi, even semester of the 2022/2023 academic year. With, using quantitative methods, this research is experimental. Researchers also used data collection techniques in the form of posttests and documentation related to student learning outcomes. The results of this research it can be concluded that there is an influence of the Missouri Mathematics Project (MMP) learning model on students' numeracy literacy abilities. Therefore, the MMP learning model can help improve students' numeracy literacy skills, especially in cube and block geometric material.

Keywords: Learning model, Missouri mathematics project, Numeracy literacy skills.

1 INTRODUCTION

Mathematics is one of the subjects studied by students from elementary school to high school education. In fact, even from early childhood education, students are already recognized by various forms of numbers and basic arithmetic. This shows that mathematics has an important position in the subject area. Mathematics is one of the difficult and boring subjects for students, because students feel intimidated when studying mathematics. According to Faizal et al. (2020:) mathematics grows and develops as a service to develop other sciences, so the concept of mathematical material must be in the first position.

Based on the results of the Program for International Student Assessment (PISA) data test in 2018, Indonesia was ranked 74th out of 79 countries participating in this program. The results of the 2018 PISA study released by the Organization for Economic Co-operation and Development (OECD) show that Indonesian students scored 371 out of an average of 487 in reading and 379 out of an average of 489 in mathematics. This makes Indonesia has a responsibility in dealing with problems in the field of education. According to Elok Rintarti and Meyta (2021), basically students are required to master three skills, including quality of character, competence and literacy. One of the literacy that is closely related to the ability to think and reason is numeracy literacy. The importance of numeracy literacy activities in schools will also increase interest in learning to increase knowledge, especially in the field of mathematics. According to Aulia, the government provides support for the aim of cultivating literacy activities in the education process by creating a program, namely the School Literacy Movement (GLS). According to Mahmud and Pratiwi, numeracy literacy is useful for analyzing information to reach a conclusion.

The geometric material is very suitable to be studied and is related to students' numeracy literacy skills. Lots of examples that can be taken in real life with three-dimensional shapes. Therefore, building space can train students' numeracy literacy skills with the many problems in daily life from discussing this material.

With the MMP learning model, students will be more communicative, think creatively and innovatively which can improve students' numeracy literacy skills. The learning objective of the MMP is to improve communication, reasoning, and decision-making skills to solve various mathematical problems. According to Convey in Sri Purwanti (2015) the general steps of the MMP learning model are introduction or review, development, controlled practice, independent work or seat work, and homework. There are still many Grade VIII students at SMP Jaya Bekasi who have difficulty learning mathematics because of their low numeracy literacy skills. With the MMP learning model, it can have an effect on improving students' numeracy literacy skills in cube and block geometric material.

2 RESEARCH METHODS

This research uses quantitative methods with experimental methods and research design in the form of posttests. The population used in the research were class VIII students at SMP Jaya Bekasi, whose ability to understand mathematics learning material, especially cubes and blocks, did not match the numeracy literacy indicators. The sampling technique uses cluster random sampling which is a random sampling technique from data sources that represent all class VIII at SMP Jaya Bekasi. Researchers took samples from class VIII-A as the experimental class (MMP learning model) and VIII-B as the control class (conventional learning model).

The research instrument used was a test instrument containing 7 questions in the form of essay questions as a tool used to measure students' numeracy literacy abilities. Through the test instruments given to students, researchers calculated validity, reliability, level of difficulty and differentiating power to find out which questions were valid and could be used in experimental and control classes. The data collection techniques used in this research are tests in the form of posttests, observation and documentation. Before carrying out the research, researchers carried out validation on class VIII which was not included in the experimental or control group as the sample for this research. Next, the researcher made observations and followed the learning process carried out by the teacher in the experimental and control classes. After learning has been completed, the test instrument is given via a sheet of paper which is filled in by students individually.

Data analysis in the MMP learning model goes through several stages of testing. After carrying out the instrument test, several questions were obtained that could be used in the experimental and control classes. These questions will be tested for normality, homogeneity and hypotheses to determine the results of the research that has been completed.

3 RESULT AND DISCUSSION

Numeracy literacy is closely related to mathematics and its components. So, numeracy literacy cannot be separated from mathematics. According to Maskanur Rezky et al. (2022) numeracy literacy skills can develop logical and systematic thinking for students in understanding and solving problems with their mathematical knowledge. According to Ekowati et al. (2019) numeracy literacy is a student's reasoning ability, where the reasoning in question is that the student is able to understand and analyze a statement. By using the numeracy literacy indicators from Han et al. (2017), in Table 1.

Tabel 1. Numerical Literacy Indicators according to Han et al. (2017)

No	Indicators
1	Using various basic mathematical languages to solve everyday life problems
2	Analyze information in various forms both from graphs, tables, charts, and the like
3	Memahami hasil dari analisis suatu informasi untuk mengambil kesimpulan

From the indicators in table 1 with the use of the MMP learning model, it shows that this learning model has an effect on increasing the numeracy literacy skills of class VIII students. The significant differences between the two groups, namely the experimental class and the control class, can be seen in Table 2.

Tabel 2. Frequency Distribution			
Interval Limit	Frequency	Midpoint	Real Boundary
Experimental Class			
60 – 65	2	62,5	59,5 – 65,5
66 – 71	6	68,5	65,5 – 71,5
72 – 77	3	74,5	71,5 – 77,5
78 – 83	8	80,5	77,5 – 83,5
84 – 89	3	86,5	83,5 – 89,5
90 – 95	1	92,5	89,5 – 95,5
Control Class			
54 – 58	5	56	53,5 -58,5
59 – 63	7	61	58,5 – 63,5
64 – 68	5	66	63,5 – 68,5
69 – 73	2	71	68,5 – 73,5
74 – 78	3	76	73,5 – 78,5

Based on Table 2, it shows that the numeracy literacy skills of the experimental class which uses the MMP learning model are superior to those of the control class which uses the conventional learning model. From the data, the posttest scores in Table 2 are represented in Figure 1 and Figure 2.

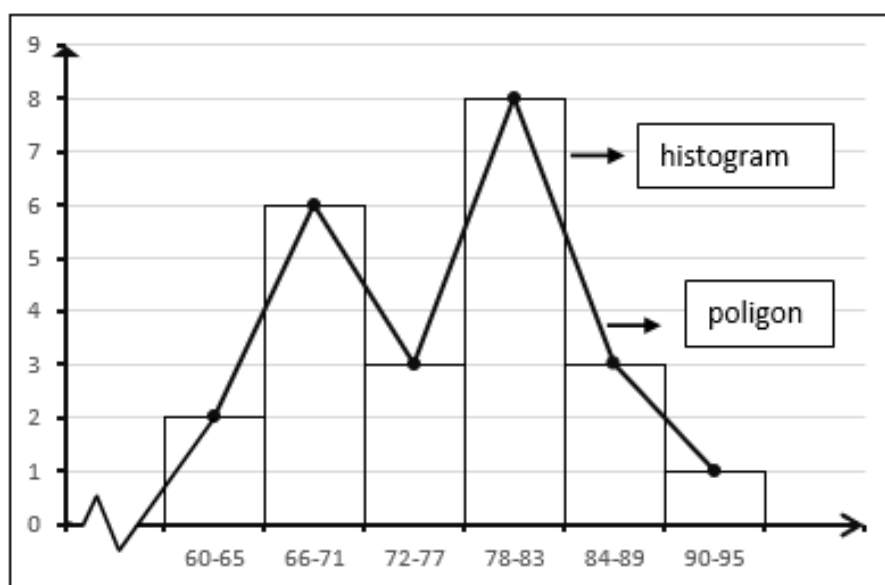


Figure 1. Graph of Experimental Value Data

Based on Figure 1, it shows that the experimental class with the MMP learning model has a range of values with a fairly balanced frequency. Following below are graphs from the control class.

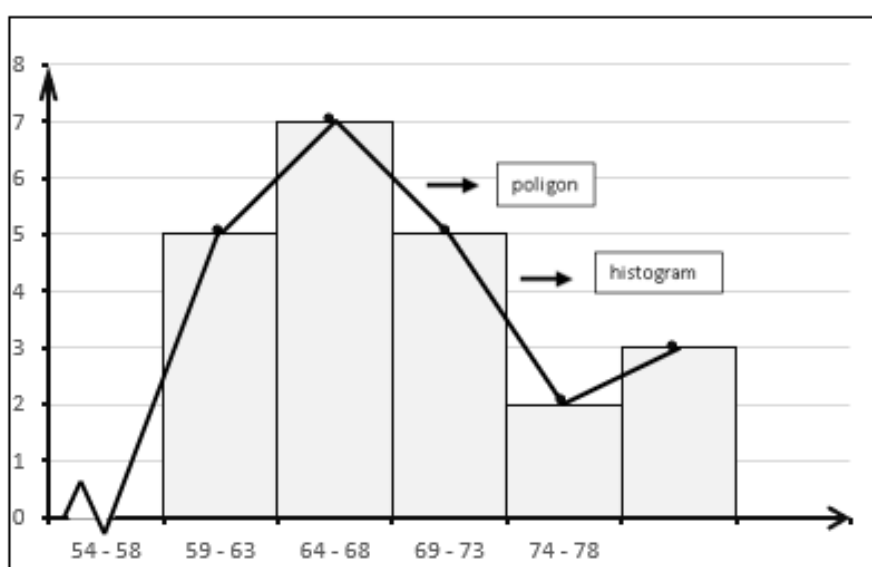


Figure 2. Graph of Control Value Data

Based on the data above, it shows that the control class with the conventional learning model has a range of values with a fairly balanced frequency, but the experimental class value data has a higher average value than the control class. From the available data, it will then be analyzed using the Liliefors test to determine whether the sample is normally distributed. The test results are presented in Table 4.

Tabel 4. Normality Test

Class	N	α	L_0	L_{table}	Conclusion
Experiment	23	0.05	0.150	0.185	Normal
Control	22	0.05	0.179	0.189	Normal

This means that the results of the posttest score on the numeracy literacy skills of students in the experimental class and control class come from a normally distributed population. The experimental class has $L_0=0.150$ and $L_{table}=0.185$, while the control class has $L_0=0.179$ and an $L_{table}=0.189$. Because the value of $L_0 < L_{table}$, then H_0 is accepted. Next, Fisher's test will be carried out to find out if the population has a homogeneous variance. The test results will be presented in Table 5.

Tabel 5. Homogeneity Test

Learning group	df	Varians	F_0	F_{table}	Conclusion
Experiment	22	64.47	1.244	2.073	Homogen
Control	21	58.81			

In Table 5, it can be seen that the value of $F_0 < F_{table}$, then H_0 is accepted. With an experimental class variance of 64.47 and a control class variance of 58.81, the F_0 results are 1.244 and smaller than $F_{table}=2.073$. It can be concluded that the results of the posttest value data for the numeracy literacy abilities of students in the experimental class and control class have a homogeneous variance. Henceforth, a t -test will be carried out which is presented in Table 6.

Tabel 6. t -test Result Summary

Learning group	Mean	Mean Different	t_0	t_{table}	Conclusion
Experiment	76.33				
Control	63.95	12.38	5.435	2.017	The influence is significant.

Based on Table 6, $t_0=5.435$ while the $t_{table}=2.017$ with a significant level of 0.05 where $dk=n_1+n_2-2=43$. Because $t_0>t_{table}$, it can be concluded that the MMP learning model has more influence on students' numeracy literacy skills in the experimental class than the conventional learning model in the control class.

3 CONCLUSION

Based on the results of research hypothesis testing, the average score for the experimental class using the MMP learning model was 76.33, while the average score for the control class using the conventional learning model was 63.95. Based on the average scores of the two classes and the data that has been tested, it can be concluded that there is an influence of the application of the MMP model on numeracy literacy skills. Therefore, the MMP learning model can help improve the numeracy literacy skills of class VIII students at SMP Jaya Bekasi in the material of cubes and blocks.

4 REFERENCES

- Arby, A. R., Hadi, H., & Agustini, F. (2019). Keefektifan Budaya Literasi terhadap Motivasi Belajar. *Mimbar PGSD Undiksha*, 7(3), 181-188. <https://doi.org/10.23887/jjpgsd.v7i3.19388>
- Aziz, A. F., Kusumaningsih, W., & Rahmawati, N. D. (2020). Pengaruh Model Pembelajaran Missouri Mathematics Project (MMP) dengan Strategi Think Talk Write (TTW) Terhadap Kemampuan Pemecahan Masalah Matematika Siswa SMP. *Imajiner: Jurnal Matematika Dan Pendidikan Matematika*, 2(2), 127-132. <https://doi.org/10.26877/imajiner.v2i2.5774>
- Ekowati, D. W., Astuti, Y. P., Utami, I. W. P., Mukhlisina, I., & Suwandayani, B. I. (2019). Literasi numerasi di SD Muhammadiyah. *ELSE (Elementary School Education Journal): Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar*, 3(1), 93-103. <https://doi.org/10.30651/else.v3i1.2541>
- Han, W., Susanto, D., Dewayani, S., Pandora, P., Hanifah, N., Miftahussururi, M., ... & Akbari, Q. S. (2017). Materi pendukung literasi numerasi. Kementerian Pendidikan dan Kebudayaan.
- Hendrawati, N. E., Mutaqqin, N., & Susanti, E. (2020, February). Etnomatematika: literasi numerasi berdasarkan bahasa pada suku Kowai Kabupaten Kaimana. In *Prosiding SI MaNI's (Seminar Nasional Integrasi Matematika dan Nilai-Nilai Islami)* (Vol. 3, No. 1, pp. 239-243).
- Mahmud, M. R., & Pratiwi, I. M. (2019). Literasi numerasi siswa dalam pemecahan masalah tidak terstruktur. *Kalamatika: Jurnal Pendidikan Matematika*, 4(1), 69-88. <https://doi.org/10.22236/KALAMATIKA.vol4no1.2019pp69-88>
- Purwanti, S. (2017). Meningkatkan kemampuan komunikasi dan berpikir kritis matematis siswa sekolah dasar dengan model Missouri Mathematics Project (MMP). *TERAMPIL: Jurnal Pendidikan Dan Pembelajaran Dasar*, 2(2), 253-266.
- Rezky, M., Hidayanto, E., & Parta, I. N. (2022). Kemampuan Literasi Numerasi Siswa Dalam Menyelesaikan Soal Konteks Sosial Budaya Pada Topik Geometri Jenjang Smp. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 11(2), 1548-1562. <http://dx.doi.org/10.24127/ajpm.v11i2.4879>
- Salvia, N. Z., Sabrina, F. P., & Maula, I. (2022, January). Analisis kemampuan literasi numerasi peserta didik ditinjau dari kecemasan matematika. In *ProSANDIKA UNIKAL (Prosiding Seminar Nasional Pendidikan Matematika Universitas Pekalongan)* (Vol. 3, No. 1, pp. 351-360).

Widiastuti, E. R., & Kurniasih, M. D. (2021). Pengaruh model problem based learning berbantuan software Cabri 3D V2 terhadap kemampuan literasi numerasi siswa. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 5(2), 1687-1699. <https://doi.org/10.31004/cendekia.v5i2.690>