



## **IMPROVING NUMERACY SKILLS OF ELEMENTARY SCHOOL STUDENTS THROUGH PROBLEM-BASED LEARNING: AN IMPLEMENTATION OF LESSON STUDY**

Mu'jizatin Fadiana<sup>1</sup>, Yulaikah<sup>2</sup>, Zenny Taufikurrizal<sup>3</sup>

<sup>1</sup>Universitas PGRI Ronggolawe, <sup>2,3</sup>SD Bina Anak Sholeh Tuban

e-mail: [mujizatin000@gmail.com](mailto:mujizatin000@gmail.com)

---

Diterima: 13 Januari 2022 | Direvisi: 24 April 2022 | Disetujui: 31 Mei 2022 © 2022  
Pendidikan Guru Madrasah Ibtidaiyah Fakultas Agama Islam Universitas Islam Malang

---

### **Abstrak**

Literasi dasar yang dapat diaplikasikan dalam pendidikan sekolah dasar salah satunya adalah literasi numerasi. Tujuan penelitian ini adalah mendeskripsikan peningkatan kemampuan literasi numerasi siswa sekolah dasar di SD Bina Anak Sholeh (Islamic Fullday School) di Tuban melalui pembelajaran berbasis masalah. Penelitian ini dilakukan pada Kelas V-B tahun akademik 2021/2020 yang berjumlah 27 siswa. Pembelajaran berbasis masalah dilaksanakan dengan pendekatan *lesson study* yang meliputi tiga tahap yaitu *plan* (perencanaan), *do* (pelaksanaan), dan *see* (observasi dan refleksi) untuk setiap siklus. Hasil penelitian menunjukkan bahwa model pembelajaran berbasis masalah dapat diterapkan dalam upaya untuk meningkatkan kemampuan literasi numerasi siswa SD. Kemampuan guru dalam menyusun rencana pembelajaran berbasis masalah, menyajikan permasalahan dalam bentuk literasi, merencanakan strategi pembelajaran, serta menyusun instrumen penilaian kemampuan literasi numerasi. Kemampuan literasi numerasi siswa SD mengalami peningkatan.

**Kata kunci:** *literasi numerasi, pembelajaran berbasis masalah, lesson study.*

### **Abstract**

*One of the basic literacy that can be applied in primary school education is numeracy literacy. The purpose of this study was to describe the increase in numeracy literacy skills of elementary school students at SD Bina Anak Sholeh (Islamic Fullday School) in Tuban through problem-based learning. This research was conducted in Class V-B for the academic year 2021/2020, which consisted of 27 students. Problem-based learning is carried out with a lesson study approach which includes three stages, namely plan (planning), do (implementation), and see (observation and reflection) for each cycle. The results showed that the problem-based learning model could be applied to improve the numeracy literacy skills of elementary school students. The ability of teachers to develop problem-based learning plans, present problems in the form of literacy, plan learning strategies and develop numeracy literacy assessment instruments. The numeracy literacy ability of elementary school students has increased.*

**Key words:** *numeracy literacy, problem-based learning, lesson study.*

## INTRODUCTION

Reading ability is the first step in understanding other basic literacy, such as scientific literacy, numeracy literacy, digital literacy, cultural literacy, citizenship, and financial literacy (Kemendikbud, 2017). One of the basic literacy that can be applied in primary school education is numeracy literacy. Numerical literacy is defined as a person's ability to use reasoning. Reasoning means analyzing and understanding a statement, through activities in manipulating symbols or mathematical language found in everyday life, and expressing these statements through writing and orally (Abidin, et al, 2017). Numerical literacy is a part of mathematical material. Thus, the components in the implementation of numeracy literacy cannot be separated from the cover material in mathematics.

Numerical literacy in the PISA 2012 framework is referred to as mathematical literacy. If referring to the PISA 2012 framework, mathematical literacy can be achieved through the stages of the mathematical process including formulating, using, interpreting, and evaluating (OECD, 2016). The mathematization process is not just making a model or mathematical representation of a real problem but also involves the process of translating real problems into the mathematics to the process of solving problems. Mathematical literacy process according to PISA with mathematical modeling of how to represent mathematics in the real world (Sari, 2015). The modeling process begins with conceptualizing several problem situations, then simplification, structure, and making the situation more precise according to the knowledge already possessed. Through the mathematization process, relevant objects, data, relations, conditions, and assumptions from domains outside of mathematics are transformed into mathematics. This process produces a mathematical model to obtain a mathematical solution to the problem. The solution needs to be re-translated in a domain outside of mathematics or according to the context. The process is summarized in four steps, namely understanding the task/problem, establishing a model, using mathematics, and finally explaining the solution.

Based on the results of observations and interviews (02/08/22) with teachers for grades IV, V, and VI SD Bina Anak Sholeh Tuban, the teacher said that students' numeracy literacy skills were still low. Students are not used to solving problems in the form of literacy. There is a sense of anxiety and worry among teachers about the readiness of students to face the AKM (Minimum Competency Assessment) which will be held in October 2021. The Minimum Competency Assessment (AKM) is an assessment of basic competencies needed by all students to be able to develop their capacity and participate positively in Public. The competencies measured by the AKM include two competencies, namely: reading literacy and mathematical literacy (numbering). The obstacles faced by SD Bina Anak Sholeh Tuban in implementing numeracy literacy include 1) students' competence in using mathematical concepts in everyday life is still low, 2) the low

level of student motivation in participating in literacy activities, this is because the majority of students think that reading is a boring activity, 3) limited learning strategies developed by teachers to improve students' numeracy literacy skills.

One of the suggested learning models to be implemented to develop numeracy literacy skills is problem-based learning. Problem-based learning is a learning approach that is used to stimulate students' higher-order thinking in situations that use real-world problems as a context for students to learn (Rusman, 2010). Problem-based learning is an innovative learning model that involves students being active in solving a problem (Fadiana, 2016). At the beginning of the learning process, students are faced with problems that are not structured but have something to do with problems in the real world. Furthermore, students are allowed to think, propose creative ideas, and communicate with their friends. The problems given must be able to challenge students to solve them immediately and try to explore their knowledge (Fadiana & Andriani, 2021).

The characteristics of problem-based learning include; making the problem as a starting point in learning, the problems raised are problems in the real world that are not structured, problems require multiple perspectives, problems challenge students' knowledge, attitudes, and competencies, and students learn to self-direction, use of diverse knowledge sources, collaborative, communicative learning and cooperative, developing inquiry and problem-solving abilities, the openness of processes in problem-based learning including the synthesis and integration of a learning process (Rusman, 2010). Based on the description above, this study aims to improve students' numeracy literacy through a problem-based learning model. In implementing this problem-based learning, the researcher uses the Lesson Study approach.

Lesson Study is a model to improve the professionalism of a teacher and lecturer through collaborative and simultaneous learning based on the principle of collegiality and mutual learning to build a learning community (Mulyana, 2007). According to Lewis (2002), the ideas included in lesson study are concise and simple, namely, when a teacher/lecturer wants to improve the quality of his/her learning, one of the appropriate ways is to collaborate with other teachers/lecturers to design, monitor, and reflect on learning strategies. which is conducted. The implementation of lesson study in this study uses a cycle system, where each cycle is carried out in the following stages; plan-do-see/reflection-redesign-do result of redesign-see/reflection.

The use of lesson study in this study aims to improve teacher learning abilities in implementing problem-based learning in the classroom. As included in the principle of collegiality in lesson study, starting with preparing lesson designs, carrying out the learning process, as well as reflection and evaluation carried out collaboratively. Therefore, the lesson study approach not only encourages teachers to prepare lessons well but also provides valuable input from other colleagues to make better improvements for the next learning process.

The results of research conducted by Subadi, et al (2013) show that the implementation of lesson study on mathematics teachers shows a significant improvement in the quality of teachers in preparing lessons, increasing teacher collaborative work, increasing the ability to apply learning strategies and the use of learning tools, especially information technology, and increasing the ability to develop learning assessment instruments. In addition, Lewis, et al. (2009) also concluded that lesson study was able to increase the knowledge and self-esteem of teachers, the professional community of teachers, and the quality of learning resources. Therefore, this study aims to improve the numeracy literacy of elementary school students to improve the professional abilities of mathematics teachers in learning, especially in the implementation of problem-based learning. More generally, mathematics learning at the elementary school level can be designed to be fun and liked by students (Novianti & Sulistiani, 2020).

## **METHOD**

This research is qualitative descriptive research on the practice of lesson study in schools. This research was conducted on students of class V-B SD Bina Anak Sholeh Tuban for the academic year 2021/2022. The research subjects included 27 students, 1 lecturer, 1 principal, and 5 teachers. Each teacher has the same opportunity to become a model teacher and observer. When a teacher becomes a model teacher, other teachers including lecturers and school principals become observers. The data was collected using the method of observation, field notes, interviews, and tests. Data analysis was carried out through a descriptive method using three stages (Miles & Huberman, 1994), which consisted of data reduction, data presentation, and concluding. The increase in teacher professionalism in the implementation of lesson study was observed through the method of observation, field notes, and joint reflection. Data collected from observations, field notes, and interviews were presented descriptively and analyzed using the Miles & Huberman (1994) method. The increase in students' numeracy literacy is calculated using four components of numeracy literacy, namely understanding the problem, establishing a model, using mathematics, and explaining the solution.

## **RESULT AND DISCUSSION**

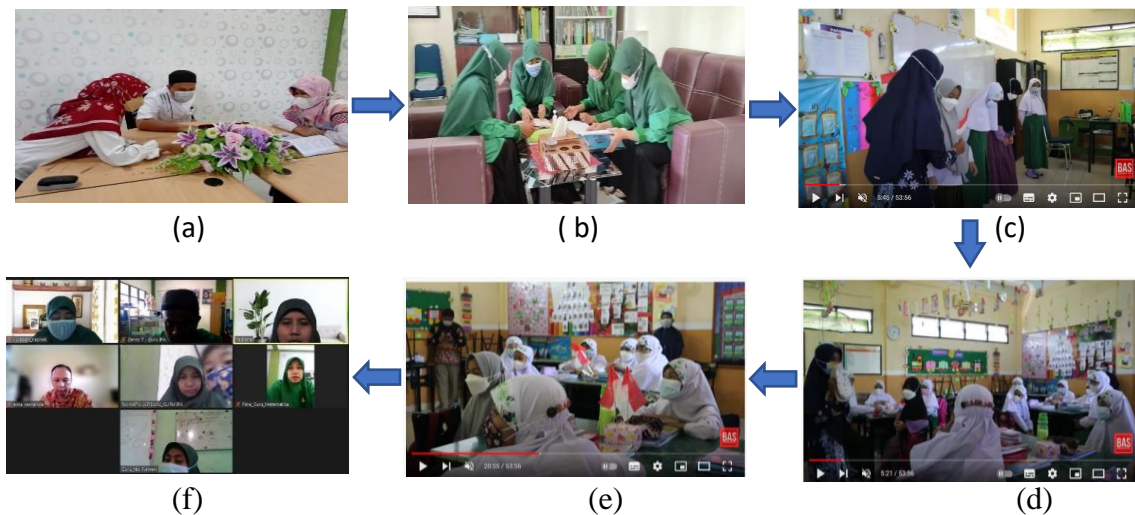
The implementation of problem-based learning in mathematics in Class V-B SD Bina Anak Sholeh (Fullday School) Tuban Regency in the classroom is carried out in four cycles according to the Lesson study cycle. Each cycle consists of three

stages which include a plan-do-see. At the plan stage, the activities carried out are discussing the lesson plans that have been designed by the model teacher. The learning design includes lesson design, teaching materials, student worksheets, learning media, and assessment instruments that are relevant to the learning objectives. Based on the results of the discussion, the model teacher revised the learning tools according to the input and suggestions from colleagues. The next step is the do phase, which is the implementation of the lesson plans that have been made in class. In this step, the learning activities in the model teacher class are observed by five people consisting of the lecturer, the principal, and four teachers. Observation observes and records student activities. Observers are not allowed to observe teacher activities.

Observations were made in-depth and closer to the position of the students being observed. Observers record student words, photograph student gestures or expressions, and write down keywords spoken by students both positive and negative moments that occur during the learning process are recorded using the prepared instruments. The last step of the Lesson Study is the seeing phase, which is a joint reflection and evaluation between the model teacher and the observer, led by a moderator. The model teacher does self-reflection on the learning process that has been carried out, presenting several things that are appropriate or not following the lesson design. The model teacher provides reflections regarding the achievement of learning objectives. Observers convey the results of observations about the learning and activities of students that have been observed.

The observer together with the model teacher discussed several ways to improve the lesson plan for the next stage, namely the second cycle with the same stages as the first cycle, namely, plan-do-see. At the planning stage, the model teacher then together with the team discusses the lesson plan that has been designed by the model teacher. The learning design must pay attention to the findings, suggestions, and input from the observer at the reflection stage. The learning design includes lesson design, teaching materials, student worksheets, learning media, and assessment instruments that are relevant to the learning objectives. This is following the opinion (Cahyanto et al., 2021; Frasandy & Anggraini, 2021; Siswantoro & Suwito, 2021) that the media has a big role in the success of learning. Furthermore, the do and see stages of the activities carried out are the same as the activities in the previous stage. Through the plan-do-see stages in each cycle, the improvement of the learning process can occur simultaneously in a collaborative manner (Khotimah & Masduki, 2016). The implementation of each stage that has been carried out can be seen in the following figure.

Figures (a) and (b) show activities at the planning stage, pictures (c), (d), and (e) show activities at the do stage and picture (f) shows activities at the see stage. This research was carried out in four learning cycles with different materials. The topic of learning cycle I am the number factor; cycle II is a fraction; cycle III is the actual distance on the map and cycle IV is the distance on the map. Based on the results of learning observations in four cycles and interviews with partner teachers, it was seen that there was a significant increase in the quality of the learning carried out. Improving the quality of teacher learning is shown through improving the ability to (1) compiling lesson designs according to the problem-based learning steps, (2) develop teaching materials and student worksheets based on numeracy literacy, and (3) design learning strategies that encourage students to be active in discussions, voice opinions, cooperate, and think critically; and (4) developing assessment instruments to strengthen numeracy literacy skills.



**Figure 1. Stages of Activities**

In addition, the collaborative Lesson Study System encourages teachers collegiality to learn from each other, discuss, and they are more open to all forms of suggestions and criticisms related to their learning process. The results of the study complement the empirical evidence that the lesson study approach serves as a model that can be used to improve professionalism as reflected in the research conducted by Lewis, et al. (2009) and Subadi, et al. (2013). One indicator of the success of the learning process is seen through learning outcomes, in this case, numeracy literacy skills (Rini et al., 2020; Rismawati et al., 2021). To find out the increase in numeracy literacy skills, this study was tested three times. The first test was carried out after the implementation of the first two cycles; the second test is

carried out after the third cycle and the third test is carried out after the implementation of the last cycle. The increase in numeracy literacy skills can be seen through numeracy literacy indicators, namely; understanding problems, establishing models, using mathematics, explain solutions. The average value of each indicator's numeracy literacy ability and the average numeracy literacy ability score are shown in Table 1.

Test	Indicator				Mean
	1	2	3	4	
I	3,12	2,87	2,89	2,91	2,95
II	3,36	3,17	3,32	3,21	3,27
III	3,81	3,48	3,79	3,62	3,68

**Table 1. Average Score of Numerical Literacy Ability**

The data shows several indicators such as (1) understanding the problem, (2) setting a model, (3) using mathematics, and (4) explaining the solution. The data in Table 1 shows that there is an increase in the average score of students' numeracy literacy skills on each indicator and all indicators from the first test to the third test. The ability to understand problems (indicator 1) increased from an average score of 3.12 on the first test to 3.36 on the second test and finally reached 3.81 on the third test with the "Very Good" assessment criteria. Furthermore, for the second indicator setting of the model, in the first test, it was 2.87 and increased to 3.17 in the second test than on the third test it increased to 3.48 and was categorized as "Very Good". The score for the indicator using the mathematical model increased from 2.89 on the first test to 3.32 on the second test and continued to increase to 3.79 on the third test with "very good" criteria. Furthermore, for the fourth indicator, which explains the solution, the score for the first test is 2.91, the second test is 3.21 and the last is 3.62 for the third test with the "very good" category. Overall, the average score of numeracy literacy skills from the first test to the third test increased from 2.95 to 3.27 and finally to 3.68 with the "Very Good" criteria. The data shows that learning using problem-based learning can improve the numeracy literacy skills of elementary school students in learning mathematics. The criteria for assessing students' numeracy literacy skills after the application of problem-based learning are included in the "very good" category.

The results of this study are in line with the results of previous researchers (Smith & Cekiso, 2020; Andani et al., 2021; Vetter et al., 2020), that the problem-based learning model is one of the learning models that can improve students' numeracy literacy. . This is because the problem-based learning model can provide experiences that support the numeracy literacy capacity of students by

collaborating with psychomotor abilities, audio abilities, and students' visual abilities in various learning media. Numerical competence must collaborate with other knowledge in both social and scientific contexts (Wulandari, 2021). This shows that numeracy literacy can help individuals recognize and apply the role of mathematical knowledge in real life which is used as a basis for making decisions on problems in social and individual contexts (Abdullah & Rido, 2017).

## CONCLUSION

The Lesson Study approach encourages teachers to prepare and carry out a better learning process. Improving the quality of learning is shown through the ability of teachers to 1) compile lesson designs following the steps of problem-based learning; 2) develop teaching materials and student worksheets based on numeracy literacy; 3) design learning strategies that will encourage students to be active in discussions, able to voice their opinions, cooperate with other students, and think critically; and 4) developing assessment instruments to strengthen numeracy literacy skills. Overall, the average score of numeracy literacy skills from the first test to the third test increased from 2.95 to 3.27 and finally to 3.68 with the "Very Good" criteria. The data shows that learning using problem-based learning can improve the numeracy literacy skills of elementary school students in learning mathematics. The criteria for assessing students' numeracy literacy skills after the application of PBL is in the "very good" category.

## REFERENCES

- Abidin, Yunus, Tita Mulyati, Hana Yunansah. 2017. *Pembelajaran Literasi Strategi Meningkatkan Kemampuan Literasi Matematika, Sains, Membaca, dan Menulis*. Jakarta : Bumi Aksara.
- Andani, M., Pranata, O. H., & Hamdu, G. (2021). Systematic Literature Review: Model Problem Based Learning pada Pembelajaran Matematika Sekolah Dasar. *PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, 8(2), 404-417.
- Cahyanto, B., Maghfirah, M., & Hamidah, N. (2021). Implementasi Pembelajaran Daring di Masa Pandemi Covid-19. *At-Thullab: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, 5(1).
- Dirjen Pendidikan Dasar dan Menengah. (2016). *Menumbuhkan Budaya Literasi di Sekolah*. Jakarta : Kementerian Pendidikan dan Kebudayaan.



- Fadiana, M., & Andriani, A. (2021). Metacognition Profile of Vocational High School Students in Mathematics Problem Solving Based on Logical Thinking Skills. *AL-ISHLAH: Jurnal Pendidikan*, 13(2), 1027-1037.
- Fadiana, M. (2016). Strategi Generalisasi Pola Siswa SMP Kelas VII. In *Prosiding Seminar Nasional Matematika X Tahun*.
- Warli,W., & Fadiana, M. (2015). Math Learning Model that Accommodates Cognitive Style to Build Problem-Solving Skills. *Higher Education Studies*, 5(4), 86.
- Frasandy, R. N., & Anggraini, S. (2021). Hubungan Penggunaan Media Nyata Dengan Kemampuan Berpikir Kritis. 3(November), 43-54.
- Khotimah, R. P., & Masduki, M. (2016). Improving teaching quality and problem solving ability through contextual teaching and learning in differential equations: A lesson study approach. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, 1(1), 1-13.
- Lewis, C. C. (2002). *Lesson Study: A Handbook of Teacher-Led Instructional Change*. Philadelphia, PA: Research for Better School, Inc.
- Lewis, C. C., Perry, R. R., Hurd, J. (2009). Improving Mathematics Instruction Through Lesson Study: A Theoretical Model and North American Case. *Journal of Mathematics Teacher Education*, 12: 285-304.
- Miles, B. M., Huberman, A. M. (1994), *Qualitative Data Analysis*. Second Edition. Publication: California, US.
- Mulyana, Slamet. (2007). *Lesson Study*. Makalah. Kuningan: LPMP-Jawa Barat.
- Novianti, D., & Sulistiani, I. R. (2020). Efektivitas Pembelajaran Kooperatif Tipe Pair And Check Dalam Pembelajaran Matematika. *Elementeris: Jurnal Ilmiah Pendidikan Dasar Islam*, 2(2), 1-13.
- OECD. (2016). *Results: Excellence and Equity in Education, PISA, OECD Publishing*. (Volume I) <http://dx.doi.org/10.1787/9789264266490-en>. (diakses 24 desember 2016).
- Rusman. (2010). *Model-Model Pembelajaran*. Bandung: Rajawali Pers.
- Rini, T. A., Akbar, S., Maningtyas, R. D. T., & Cahyanto, B. (2020). The Effectiveness of E-Module through Metacognitive Construction in Blended Learning System. *Proceedings - 2020 6th International Conference on Education and Technology, ICET 2020*, 1-6. <https://doi.org/10.1109/ICET51153.2020.9276588>

- Rismawati, B. V., Arif, M., & Mahfud, M. (2021). Strategi Madrasah Ibtidaiyah Dalam Meningkatkan Profesionalisme Guru Kelas Di Era Revolusi Industri 4.0. *Elementeris: Jurnal Ilmiah Pendidikan Dasar Islam*, 3(1), 59. <https://doi.org/10.33474/elementeris.v3i1.10538>
- Sari, R. H. N. (2015). *Literasi Matematika: Apa, Mengapa dan Bagaimana*. Seminar Nasional matematika dan pendidikan matematika UNY (Vol. 8). Yogyakarta: Universitas Negeri Yogyakarta.
- Siswanto, E., & Suwito, A. (2021). Development of Pised Media Based on Realistic Mathematics Education in Elementary School. *Elementeris: Jurnal Ilmiah Pendidikan Dasar Islam*, 3(2), 55. <https://doi.org/10.33474/elementeris.v3i2.11151>
- Smith, C., & Cekiso, M. (2020). Teachers' understanding and use of visual tools in their numeracy classrooms: A case study of two primary schools in gauteng. *South African Journal of Childhood Education*, 10(1), 1-8. <https://doi.org/10.4102/SAJCE.V10I1.887>
- Subadi, T., Khotimah, R P., Sutarni, S. (2013). A Lesson Study as a Development Model of Professional Teachers. *International Journal of Education*, 5(2), 102-114.
- Sutama, Haryoto, dan Narimo, Sabar. (2013). Contextual Math Learning Based on Lesson Study can Increase Study Communication. *International Journal of Education*, 5(4), pp. 48-60.
- Vetter, M., O'connor, H. T., O'dwyer, N., Chau, J., & Orr, R. (2020). Maths on the move': Effectiveness of physically-active lessons for learning maths and increasing physical activity in primary school students. *Journal of Science and Medicine in Sport*, 23(8), 735-739.
- Wulandari, M. D. (2021). Pengelolaan Pembelajaran Berorientasi Literasi Numerasi di Sekolah Dasar dalam Kegiatan Kurikuler dan Ekstrakurikuler. *Jurnal Pemikiran dan Pengembangan Sekolah Dasar (JP2SD)*, 9(2), 116-131.