

HOW TO IMPROVE PROBLEM SOLVING ABILITY THROUGH LESSON STUDY?

Dian Mayasari^{1*}, Abdul Rachman Taufik², Irmawaty Natsir³

^{1,2} Universitas Musamus, Merauke, Indonesia

*Corresponding author.

E-mail: mayasari_fkip@unmus.ac.id^{1*)}
taufik_fkip@unmus.ac.id²
natsir_fkip@unmus.ac.id³

Received 09 January 2022; Received in revised form 11 June 2022; Accepted 15 November 2022

Abstrak

Pemberian soal oleh guru seringkali dengan soal berupa algoritma tanpa mengajaknya berpikir tingkat tinggi dan hampir tidak pernah diberikan soal sehari-hari. Hal ini terlihat masih ada guru yang belum melakukan penilaian kompetensi dan mewajibkan siswa menyelesaikan kompetensi tertentu. Penelitian ini bertujuan untuk menghasilkan LKS kerjasama sekolah serta menganalisis jawaban siswa dalam menyelesaikan permasalahan tersebut dan pelaksanaan pembelajaran dilakukan dengan metode *Lesson Study for Learning Community* (LSLC). Penelitian ini menggunakan metode penelitian desain dengan pendekatan kualitatif. Teknik pengumpulan data dalam penelitian ini menggunakan wawancara, observasi dan tes tertulis. Tahapan dalam penelitian desain jenis penelitian pengembangan/design research. Subyek penelitian ini adalah siswa kelas VII SMPN 1 Merauke. Dari penelitian ini dihasilkan LKS tentang perbandingan langsung dan bilangan bulat. Berdasarkan hasil analisis jawaban siswa terhadap LKS, sebagian siswa dapat melakukan menyelesaikan masalah dengan baik sehingga LKS ini telah dianggap valid dan praktis untuk digunakan.

Kata kunci: Desain; komunitas belajar; *lesson study*; *problem solving*.

Abstract

The teacher frequently asks questions in the form of algorithms without challenging the student to think at a higher level and nearly never gives daily questions. As can be observed, some teachers have not done competency assessments and hence do not require pupils to accomplish specific competencies. The purpose of this project is to create school collaboration worksheets and examine student responses to these problems, with the goal of implementing learning through the *Lesson Study for Learning Community* (LSLC) method. Data collection techniques in this study used interviews, observations and written tests. This study employs a qualitative approach and a design research method. Design research is divided into two stages: development research and design research. The study's subjects were seventh-grade pupils from SMPN 1 Merauke. This investigation culminated in the development of worksheets on direct comparisons and integers. According to the results of the examination of students' responses to the LKS, some students were able to solve problems effectively, indicating that this LKS was legitimate and useful for use.

Keywords: Community study; design; lesson study; problem solving



This is an open access article under the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

INTRODUCTION

The industrial revolution is a rapid transformation in a manufacturing process in which work previously performed by humans is replaced by

machines (Supriatna, 2018; Ozaltun Celik & Bukova Guzel, 2020). The emergence of this revolution led in the automation of previously manual tasks. The industrial revolution has had an

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

effect on education, beginning with learning that was previously conducted in a classroom due to the covid-19 pandemic being replaced by virtual face-to-face interactions, and laboratory activities that were previously conducted in a laboratory being conducted virtually (Yilmaz & Kostur, 2021; Asyari et al., 2016). This advancement necessitates rapid adaptation on the part of each individual by strengthening the necessary life skills for each pupil. With this progress, one of the student's skills that can be improved is problem solving ability. This problem-solving ability becomes the basis for students to adapt to change.

Some current research rarely uses problem solving in solving math problems because the teacher presents the problem and solves it with a certain algorithm (Ozaltun Celik & Bukova Guzel, 2020). This is inconsistent with the Minister of Education and Culture's requirements for the assessment standard used to determine skill competence. Additionally, the government has established a program to develop a 2045 golden generation equipped with 21st century skills, including 1) character qualities such as religion, nationalism, independence, self-reliance, mutual cooperation, and integrity; 2) literacy, which includes language literacy, numeracy, science, technology, finance, culture, and citizenship; and 3) competencies, which include critical thinking, creativity, communication, and collaboration (Nurwidodo et al., 2018).

The government plans to build a 2045 golden generation equipped with 21st century skills that require three things, including 1) character qualities consisting of religiosity, nationalism, independence, mutual cooperation, and integration; 2) literacy consisting of

language literacy, numeracy, science, digital, finance, culture, and citizenship; and 3) competencies consisting of critical thinking, creativity, communication, and collaboration (Kemdikbud, 2017).

To complete this effort, it can be done with Lesson Study for the Learning Community (LSLC). There are several things that are still lacking in the learning system, including some teachers are still not able to manage the class well (Bustang, Zulkardi, Darmawijoyo, Dolk, & Van Erde, 2013); teachers do not pay attention to students who have learning difficulties because of the difficulty of teachers guiding them individually (Sari et al., 2021) and also the education system in schools still pays less attention to the evaluation system and the learning process that takes place in the classroom (Sutadji et al., 2015). While education discusses how students learn and how to teach teachers, not only on learning outcomes (Dudley, 2014).

The purpose of the lesson study system in education is to collaborate among colleagues to assist, experiment with, discuss, and reflect on previously completed learning, where numerous modifications will indirectly increase the quality of learning by redesigning it (Sari et al., 2021; Winarti et al., 2021). This is because lesson study is a collaborative endeavor in which students work in groups with unique final responses from each student in order to establish an integrated and mutually supporting relationship amongst students (Sari et al., 2021)

Enabling learning can increase the quality of learning or educational practice by fostering collaborative and collectivist learning communities (Segal et al., 2021; Dudley, 2014). This contradicts Vygotsky's idea that

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

learning is more successful when assisted by others (Tsui et al., n.d.).

Numerous studies demonstrate that Lesson Study for Learning Communities (LSLC) has a beneficial effect and can improve the quality of learning (Indrawan, 2017; Richit et al., 2021) when students are able to convey material through analogy, chronological, and contextual presentation. This condition alters the learning environment by increasing not only the teacher's dominance, but also the students' engagement in the conversation. This demonstrates that educational activities create an open space within the learning community. Benidiktus (Tanujaya & Mumu, 2020) stated the same thing: learning through lesson study can improve the quality of mathematics learning activities. Observers can capture the paucity of learning that is not collected by the teacher through lesson study. As a result, these issues can be effectively addressed through collaborative solutions developed by teachers and observers. Students participate actively in group discussions during class.

The students' thought processes were effective. The learning environment is more casual, with students being more assertive and active participants in class discussions.

Students are more capable of posing questions, raising concerns, and offering corrections. The objective of this research is to develop genuine and practical challenges for students to solve when doing integer operations. The purpose of this project is to create school collaboration worksheets and examine student responses to these. The development research carried out in this study is in the form of LKS on integer materials. The LKS development stage began with a discussion with mathematics teachers regarding the design of materials and questions contained in the LKS. Therefore, it is necessary to develop teaching materials in the form of LKS to improve problem-solving skills.

METHOD

This research is a design research that takes a qualitative approach and follows the stages of design development research. The purpose of this project is to create a school cooperation LKS and examine students' responses to these problems, with the aim of implementing learning through the Lesson Study for Learning Community (LSLC) method. The design research stages can be seen in Figure 1.

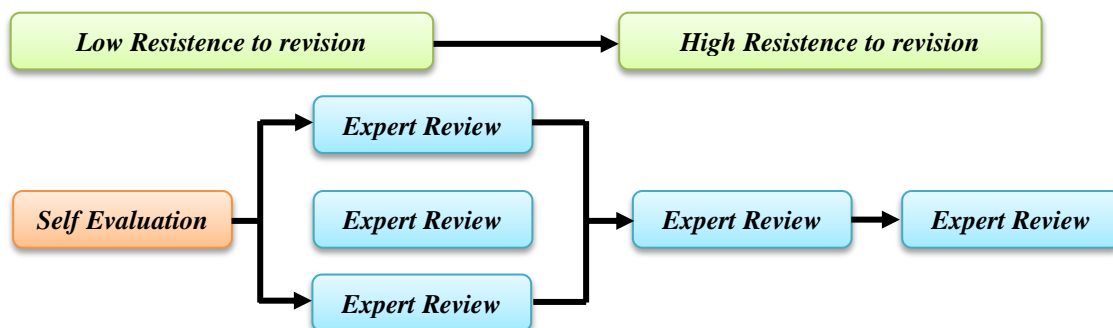


Figure 1. Design Research Stages

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

This research was conducted at SMP Negeri 1 Merauke with the subject of the study as many as 30 students. Data collection techniques in this study used interviews, observations and written tests. The interview conducted by the researcher is structured, where they have prepared questions that will be submitted to the speakers. Observations are carried out during the learning process in the classroom. The observer in this case acts as an observer and sees the implementation of LKS in the classroom. The test carried out is in the form of a test that can measure students' mathematical problem-solving ability.

This research will be carried out through the use of lesson studies with steps of planning (plan), implementation (do), and reflection (see). The plan stage begins with planning learning tools with a mathematics teacher. The learning tools are compiled in the form of LKS, tests and will be adjusted to the abilities of students in the classroom. After the learning tools are compiled, it is continued with the stages of learning in the classroom. In this Do stage, teachers, researchers along with observers together see the implementation of learning. The teacher in this stage will act as a model teacher, while the researcher and other teachers will act as observers. The last stage that is carried out is reflection (see). This reflection aims to look back at the learning process. This research was conducted on integer material at SMP

Negeri 1 Merauke. The study was conducted in a condensed face-to-face period to ensure that each class received therapy twice. The study lasted for two weeks.

RESULT AND DISCUSSION

This research was undertaken during the development stage, with lessons studied at the plan, do, and see stages (reflection). Each stage will be discussed. Planning at the first meeting, at the implementation of this stage of planning, the model teacher begins to dictate the teaching material about numbers. The model teacher prepares a plan for the implementation of learning, questions and student worksheet. The questions that will be prepared are in the form of problem-solving skills, rubrics and solutions of the problem.

The data collected from observation, field record, and interview were presented descriptively and were analyzed. The improvement of students' problem-solving ability was calculated by using three indicators from Polya; they were: 1) understanding the problem, 2) devising a plan, and 3) carrying out the plan and the fourth indicator, which is evaluating the answer, was not used under the consideration that the indicator could not be seen only by using documentation of test result. The assessment of the three indicators used an assessment rubric.

Tabel 2. Problem-solving skills rubric

Indicator	Score	Explanation
Understanding the problem	2	Write down what is identified, unknown in the question and answer correctly
	1	Write one correct answer correctly
	0	Do not write down what is known and asked in the question

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

Indicator	Score	Explanation
Devising a plan	2	Problem solving is carried out in accordance with the initial planning with the appropriate stages
	1	Part of the formula/model/plan is correct
	0	Empty or there is no plan (formula/step), or there is a formula, but it is not correct
Carrying out the plan	2	Correct planning and problem solving
	1	The plan is correct, but the answer is not correct, or the plan is not correct
	0	There is no answer

At the planning stage, the implementation is carried out by redesigning the learning design, teaching materials to be applied and instruments relevant to learning objectives. Based on the discussion, the model teacher revised the learning tools according to the suggestions and input from the observers. The next stage is the stage of doing, namely the implementation of learning in accordance with what was previously planned and applied in the classroom. At this stage the learning process carried out by the model teacher was observed by three observers who worked to observe and record the learning activities carried out by lecturers and students. Good or bad activities will be recorded through instruments that have been prepared in advance

The last stage of Lesson Study is the viewing stage, which includes reflection and evaluation of learning between the model teacher and the observer. The model teacher does self-reflection on the learning process that has been carried out in accordance with what had been previously planned, explaining some important things that have or have not been done according to the lecturer model in accordance with the designed learning plan.

Next, the observer presents the results of his observations during good

learning process based on student learning actions or teacher models. Based on reflections between lecturers and observers, they devote several ways to improve the lesson plans for the next stage. By using the plan, do, and see steps in each cycle, improve the learning process collaboratively.

Where the learning tools that have been prepared by the model teacher will be discussed together with lecturers and observers who will see the implementation of learning in the classroom. Where during the plan stage, the model teacher will get some input that will add to the perfection of the learning tools that have been prepared in advance.

At this planning stage, the model teacher obtains some notes from observers and lecturers for problems given to the student worksheet and to the problem-solving ability assessment rubric. In addition, the model teacher should also consider other possible solutions provided by students where if to see the student's problem-solving ability can be seen from different solutions. In this problem solving ability rubric, the model teacher must create a real event so that the problem is able to determine the expected ability. When discussion activities take place in the classroom, students should be guided by the teacher so that students can have an idea of the teaching material.

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

In the problem-solving ability assessment rubric, it should be given some information on the indicators that will be achieved by the student, for example when the student completes the problem but the solution is not appropriate, the model teacher must give an assessment of the student.

At the planning stage for the second meeting the model teacher is given advice on the stages of solving problems that can be solved with various solutions. Where with these diverse solutions can improve students' problem-solving skills. In learning activities carried out by the model teacher in the classroom should be carried out with the first stage, core and closing activities where this aims to be organized learning and the management of the class carried out by the model teacher goes well

But in the implementation of this planning stage, there are also some observers who do not date on time so that the predetermined allocation is not in accordance with what is carried out. The instructions for using the question work should be explained first in class so that students are not confused in solving the problem. The implementation of learning at this second meeting can go well. The implementation of learning that is not conducive can be conditioned by the model teacher so that students easily understand the material.

The learning carried out by the model teacher in the previous activity didn't provide an apperception at the beginning so that for the second meeting the teacher could manage the time well and carry out the initial, core and closing stages according to what had been planned in advance.

The results of the see stage at meeting 1, the model teacher received some suggestions related to the use of

time that was not in accordance with the previous planning, which resulted in commotion in the classroom. In addition, the teacher has given some examples that do not fit the plan. The implementation of the activities that have been carried out can be seen, there are students who focus at the beginning of learning but when the teacher gives a monotonous example, the student does not pay attention to the teacher again.

This is because the ability of students who are more than their friends makes them feel bored quickly for things that have been known before. At the time of solving the problem, students are less able to solve the problem because the time given by the teacher is very short. This greatly affects the teacher's lack of ability to manage the classroom.

The results at meeting 1 are that teachers have not been able to control students and use learning time in the classroom. The average result of students' solving ability in the classroom in stage 1 was 72.5. At the end of stage 1, a reflection is carried out on the implementation of learning, the results of the reflection will be input for the model teacher for the second stage to be carried out.

The results of reflection in stage 1 are: the model teacher needs to accommodate students in solving problems, the model teacher can maximize the time that has been planned in advance for each stage of learning, there needs to be improvements in student worksheet, especially in the instructions for use and problem solving.

Based on the results of the reflection of stage 1, the model teacher can design a group of lecturers and observers for phase II, in the form of a learning implementation plan (RPP) and

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

student worksheet as well as the media needed in the learning process, making a grid of questions and answer keys for posttest phase II, as well as preparing an assessment rubric the ability to solve the problem.

In this planning activity for the second phase, the model teacher needs to improve the time allocation contained in the RPP and write the learning syntax for activities that are outside the hours given a description and written in full on the RPP, as well as In the activit and Plan in phase II

The model teacher gets some advice from the observer where the student worksheet given to students. Given guiding questions relating to supposed remedial teaching. In this second stage, it can be seen that students can follow learning well.

The model teacher is able to guide students to learn and can follow the whole process of learning. And the results of Do activities in general , model teachers can manage classes well, master mature concepts and be able to use time efficiently. However, there needs to be an improvement where the student worksheet given to students does'nt need to be completed directly by the teacher but the teacher can guide learning activities to stimulate students' abilities by finding problems.

The result of the Do activity in phase II is that the model teacher masters the material well so that he can explain concepts when there are misconceptions and class management is very good. However, teachers should be sensitive to classroom conditions, for example, when students ask questions during learning, the teacher gives a lot of time to solve students' questions.

The results of the See activities in phase II in general, the model teacher has carried out learning according to

plan but the time allocation has not been as planned. The result of Reflecting phase II is that in general learning runs smoothly, model teachers can manage classes well. Mastery of mature concepts but there needs to be improvement and discipline in terms of time allocation so that there is no slow learning and free time for students can be used to talk about other things outside the topic.

The results showed an increase in problem solving ability seen through each indicator and all indicators of problem-solving ability. the third category of indicators and all indicators are "very good" after lesson study-based learning is carried out.

In the process of implementing learning in the classroom, applying learning through real situations in questions given to students. The purpose of presenting the problem is so that students can easily understand the solution according to problem solving.

Through problem solving, students are expected to be able to see information and what is not inside information and students with this information, students are expected to be able to solve problems and find alternative solutions that may arise in the conditions that arise from the problem.

The solutions made by students are expected to be more varied. After students can solve problems, in problem solving students can also formulate steps/strategies that will be used by connecting the known variables in the problem with the variables developed. Through the accuracy of students in seeing the relationship between variables can be a determinant in determining the right solution to solve the problem.

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

CONCLUSIONS AND SUGGESTIONS

The findings of this study are as follows: (1) the LSLC system process, Collaborative Learning, Problem-based Learning Approach, and Research Design are a series of appropriate learning to be used in learning at SMPN 1 Merauke; (2) during the learning process, students can recognize the use of context in everyday life such as school cooperatives, allowing them to more easily solve integer problems; (3) there are still some students who have problems calculating integer op (4) Overall, students are very helpful in completing the number operations material after researching the research. Suggestions for future research include creating student worksheets to help students improve their life skills. Suggestions for further research is to use a comparison between classes that use lesson study and those that do not apply lesson study in terms of mathematical ability.

DAFTAR PUSTAKA

- Asyari, M., Al Muhdhar, M. H. I., Susilo, H., & Ibrohim, I. (2016). Improving critical thinking skills through the integration of problem based learning and group investigation. *International Journal for Lesson and Learning Studies*, 5(1), 36–44. <https://doi.org/10.1108/IJLLS-10-2014-0042>
- Dudley, P. (2014). Lesson Study: a Handbook. *UK LS Developments*, 393–405. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-636X2016000300868&lng=pt&tlng=pt
- Indrawan, P. O. (2017). Prestasi Belajar Siswa Dalam Diklat Lesson Study. *JPI (Jurnal Pendidikan Indonesia)*, 6(1), 39–48. <https://doi.org/10.23887/jpi-undiksha.v6i1.8847>
- Kemdikbud. (2017). Materi Pendukung Literasi Numerasi. In *Kemdikbud*.
- Nurwidodo, N., Hendayana, S., Hindun, I., & Sarimanah, E. (2018). Strategies for establishing networking with partner schools for implementing lesson study in Indonesia. *Jurnal Pendidikan Biologi Indonesia*, 4(1), 11. <https://doi.org/10.22219/jpbi.v4i1.5489>
- Ozaltun Celik, A., & Bukova Guzel, E. (2020). How to Improve A Mathematics Teacher's Ways of Triggering and Considering Divergent Thoughts through Lesson Study. *International Electronic Journal of Mathematics Education*, 15(3), em0605. <https://doi.org/10.29333/iejme/8461>
- Richit, A., da Ponte, J. P., & Tomasi, A. P. (2021). Aspects of Professional Collaboration in a Lesson Study. *International Electronic Journal of Mathematics Education*, 16(2), em0637. <https://doi.org/10.29333/iejme/10904>
- Sari, E. M., Ilma, R., Putri, I., Info, A., Study, D., Proportion, D., Study, L., & Arithmetic, S. (2021). *Development of Worksheets Based Project*. 10(1), 41–52.
- Segal, R., Oxman, V., & Stupel, M. (2021). Using Dynamic Geometry Software to Enhance Specialized Content Knowledge: Pre-Service Mathematics Teachers' Perceptions. *International Electronic Journal of Mathematics Education*, 16(3), em0647.

DOI: <https://doi.org/10.24127/ajpm.v11i4.4750>

<https://doi.org/10.29333/iejme/11065>

<https://doi.org/10.29333/iejme/11103>

- Supriatna, A. (2018). Kegiatan Lesson Study sebagai Upaya Guru untuk Menemukan Pembelajaran yang Memenuhi Keperluan Anak Hidup pada Zamannya (Era Revolusi Industri 4.0). *Seminar Nasional Edusainstek FMIPA UNIMUS*, 1(1), 1–5.
- Sutadji, E., Ibrohim, I., Utama, W., & Askury, A. (2015). Kefektifan Pembelajaran Bermakna Melalui Lesson Study Di Sekolah Dasar. *Jurnal Pendidikan Dan Pembelajaran Universitas Negeri Malang*, 22(1), 33–38.
- Tanujaya, B., & Mumu, J. (2020). Improvement of mathematics learning activity through lesson study. *Journal of Physics: Conference Series*, 1613(1). <https://doi.org/10.1088/1742-6596/1613/1/012033>
- Tsui, A. B. M., Edwards, G., Real, F. L., Kwan, T., & Law, D. (n.d.). *Learning in School-University*.
- Winarti, A., Saadi, P., & Rajiani, I. (2021). Applying transcript based lesson analysis in enhancing communication pattern between teacher and students in chemistry classroom. *European Journal of Educational Research*, 10(2), 975–987. <https://doi.org/10.12973/EU-JER.10.2.975>
- Yilmaz, A., & Kostur, M. (2021). Rethinking Principles of School Mathematics during the COVID-19 Pandemic: A Multiple-Case Study on Higher Education Courses Related to Teaching Mathematics. *International Electronic Journal of Mathematics Education*, 16(3), em0653.