8th Grade Student’s Collaboration In Circle Material By Using System Lesson Study For Learning Community

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Abstract. This study aims to describe the collaboration of students through lesson study for learning community in circle lesson. The data is obtained through the result of the observation and documentation of photos and videos. The subject of this study is second-grade students of Junior High Scholl at 1 Palembang. This is a descriptive qualitative study with PMRI approach. The learning process is done by doing a Jumping Task where students solve the problems individually and are encouraged to ask other students when difficulties are found. The use of lesson study for learning community has brought a positive impact for second-grade students like showing up a sense of care, decreasing the rise of competitiveness and creating collaboration among students in the learning process.

1. Introduction

At this time, the spotlight of the learning process in education system contributes less attention to the process of learning and evaluation system at class. National Education System in the Constitution of the Republic of Indonesia, number 20 of 2003, aims to manifest an active and creative learning atmosphere and process so that students can expand their potency. Self-potency occurs in the learning environment through a series of learning activities to achieve national education purpose. Nowadays, the 2013 curriculum advice teachers to guide the students in learning maths to achieve 21st Century Skills, namely 4C (Communication, Collaboration, Critical Thinking, and Creativity) [1].

Furthermore, in the 21st Century, reformation inside school and learning process is essential. School reformation has vision and philosophy, that is learning community. The mission of the learning community at school is to ensure learning right of every student and improve the quality of learning [2]. The quality of education will be achieved by helping students to participate in emphasizing problem-based learning. The suitable learning model is expected to optimize student collaboration skills. Lesson study for learning community (LSLC) is one of the learnings which directed to student activities and how the student learns [3]. As a result, good interaction among students, students, and teachers will be achieved.

LSLC is a learning system which is not only focused on the way teachers teach the students, but also focused on how students learn at class, become rationale in a real situation, and teachers help students to create a good learning process [2]. On the other hand, lesson study is the educator training profession through collaborative and sustainable learning based on the principles of mutual learning and colleagues to build a learning community [4,5]. Lesson study is learning activity which starts by a plan that teacher does and continued by doing where students learning business are based on collaborative learning that directly observed by headmasters, teachers, supervisors, and lecturers of university where even parents and others are involved in it, and the elements of the activity is a collaborative and caring community [6].

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In the context of collaborative learning, the existence of tasks and exercise materials are essential to stimulate students to think, communicate, and collaborate [7]. Through sharing task and jumping task, students will think and collaborate [8]. The process of sharing the task and jumping task also create dialogue, effective interaction, and collaboration [9]. The method of sharing the task and jumping task will be more interesting if the context is used. According to Fatiyah, Putri, & Susanti [10], the use of context is one of the characteristics of PMRI, context, situation, or real problem in daily life is the starting point of mathematics learning. PMRI is one of the approaches which compatible with the 2013 curriculum. This is because PMRI creates a better relation between mathematics and the student's environment [11], the problem in the form of test which is given to the student by using PMRI approach makes students happy and challenged to solve mathematical problems and gain a maximal result [12–15].

Based on the explanation above, jumping task problem in circle material has been designed to this research, and later implemented to second-grade students of secondary school to observe students collaboration through Lesson Study for Learning Community. So, the study aimed to describe students collaborations in solving problems of circle lesson by using the learning system of Lesson Study for Learning Community (LSLC).

2. Method
The research method in the study was descriptive qualitative, which is to explain the phenomenon as deeply as information through collecting data about facts in the field [16,17]. In this study will be explained about students collaborations in solving problems of circle lesson by using the learning system of Lesson Study for Learning Community (LSLC). The learning process of Lesson Study for Learning Community was conducted in 3 stages, namely Plan, Do, and See [18–20].

On plan activity, teacher and researcher designed lesson plan, sharing the task, jumping task and written test which was adjusted to the principles and characteristics of PMRI, making predictions of student’s idea which might occur in jumping task so that student was able to collaborate (learning community). This study involved 32 students of the second grade of secondary school, which consisted of 16 female and 16 male students. Later, students have divided into groups with 4 people consisted of 2 female and 2 male who had high, average, and low ability in each group, where a grouping of high, medium, and low abilities can be seen in table 1.

| Student Ability | The Prediction of Answer |
|-----------------|--------------------------|
| High            | Students with high ability are expected to solve the problems as a whole. |
| Average         | A student with average ability is expected to solve the problems correctly; however in part b, a student will directly notice that the diameter of the clock is 6 cm, which means the radius is 3 cm. |
| Low             | - A student with low ability, in the question part a and b, might make a fault in measuring the azimuth at 14.30 o’clock.  
|                 | - In part c, a student might not search the diameter or radius and directly write 17.5 m and 6 m into the formula. |

The result of the learning design of jumping task subsequently applied in the Do stage. At this stage, the observers watched all activities carried out by students in learning. The last stage was See, where in this case, the model teachers and the observers did reflection towards the learning which had been done. Lastly, the research data and photos and videos documentation obtained by the observers was analyzed.

3. Result and Discussion
The collaborative learning which has been designed by the model teachers and some of the subject teachers is subsequently applied to the second grade of about 32 students. Then, a group of 2 male and
2 female students who have different ability is formed. There is 2 collaborative learning process, namely sharing the task and jumping task [8].

3.1 The Implementation of Lesson study for learning community at class

The learning practice is started by apperception. Students are invited to recall the elements of the circle, area of circle, and circumference. Students are subsequently introduced and associate the learning which will be studied with the context to be used in learning. A context of student comprehension starting point regarding the teaching material [10,21].

![Image](image1)

**Figure 1.** The problem used is jumping task

The teacher then delivers the rule of the game in the learning system. A student has to say “please teach me” to the group friends if the student does not understand and other students who are asked for help have to answer. Later, the teacher gives an activity sheet to the students, in which the first activity is sharing the task, and the second activity is jumping task. The problems used in the second activity can be seen in figure 1. The teacher instructs the students to work in a group, where if one student finds difficulties, the student is recommended to ask for help to other friends with working rules in the group (see figure 2). The indicator given in jumping task is to solve a problem related to the relation of a central angle, length of the arc, and the area of a sector.

![Image](image2)

**Figure 2.** Process discussion in jumping task

The following is one of the conversation transcripts in solving the problem of jumping task. Information (T is a teacher, and S is a student).

| T   | If you do not understand, you may ask your group friends for help |
|-----|---------------------------------------------------------------|
| All | Yes, mam                                                     |
| S1  | Please help me with question number 1, which is about Ampera |
| S2  | The question requires the formula of the sector area         |
| S1  | The azimuth of the clock is divided by the whole azimuth and multiplied by the circumference.” |
S2 : It is wrong... it should be multiplied by the area of a circle, then write the numbers
S1 : Okay, thank you

Based on the discussion process in the learning process. Students can solve the problems in the lesson of the relation among a central angle, length of the arc, and the area of a sector. The example of one of the student answers can be seen in Figure 3.

![Figure 3](image_url)

**Figure 3. The result of the student answer**

Figure 3 is the answer to low ability student. Even though there are several students from each group who have low ability are facing obstacles in solving the problems. However, through collaborative learning, students with low ability can solve the problem in jumping task. Therefore, the result shows that the students have learned in the group [2].

4. Conclusion
The study shows that students can solve math problems in the circle lesson by doing collaborative learning in the system of lesson study for learning community (LSLC) and PMRI approach. Collaborative learning put the students in contact with each other by using the rule of “please teach me”, which is very helpful for students who have the average and low ability in understanding concept. Furthermore, LSLC also brings positive impact for students by stimulating the sense of care towards friends, decreasing the rise of competitiveness and creating collaborations among students.

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