Fruit salad's recipes in the design of learning mean in eight-grade

P T Rahayu and R I I Putri
Universitas Sriwijaya, Jl. Srijaya Negara, Bukit Besar, Palembang 30139, Indonesia
E-mail: ratuilma@unsri.ac.id

Abstract. This study makes the learning process in the 2013 curriculum encourage students to provide learning processes with real challenges and solve them so that 21st-century skills can be realized. The study aims to determine the role of activities in average learning that are expected to help students analyze, solve problems, and implement the making of fruit salads. The method used in this study is the type of validation research design; research subjects are students of class eight grade. There are three stages in the validation of this type of research design; the research design has three cycles: the preliminary design, design experiments in the form of Initial Teaching Experiments (Pilot experiments) and teaching experiments, and retrospective analysis. The teaching experiment results show that if 50% of students complete the jumping task, applying (the implementation phase) in the process of making fruit salad. Errors in carrying out activities are not careful in reading the information, so people mistakenly see the price of fruit salad ingredients and their weaknesses in calculating and not understanding the material provided.

1. Introduction
Mean is an important part of basic statistical material [1]. It is part of the concept by distributing them fairly in terms of measuring data concentration [2]. How important the Mean subject matter is not only as a mathematical topic learned at school but also very closely related to daily life [3]. Bakker [4] states that mean is the first to learn important basic concepts in measuring concentration data. Stating intent means determining what is "typical" or "representative" in a data set [5]. Mean that the average material is very important to be taught by students which is one of the basics of statistics and is useful for everyday life.

Based on the 2013 curriculum, ministry regulation number 81A 2013 has been revised in 2014 and the last revision of 2016 is the integration of HOTS (High Order Thinking Skills) and 21st Century skills consisting of 4C (Communication, Collaborative, Critical Thinking, Creativity) into the learning process [6]. Putri and Zulkardi [7] stated that the focus of 2013 curriculum learning must be student-centered (Student-center). So, the 2013 curriculum encourages teachers to guide students in learning mathematics to achieve 21st or 4C century skills including communication, collaboration, critical thinking, problem solving, creativity, and Innovation [8].

One of them from 4C, Collaboration requires students to work together in groups and carry out their respective responsibilities, the Lesson Study system of activities the application of the Collaboration strategy [9]. The learning activity system is called Lesson Study for Learning Community (LSLC). Lesson study is the first learning system in Japan [10]. To improve students' pedagogical abilities, a collaborative learning process is needed [11]. Learning using the Lesson study system that students can...
solve problems in an appropriate solution by being given the allowed opportunity to discuss, ask questions, and argue in groups through group discussion [9]. Arifin [12] stated that Lesson Study learning to be more effective and improve quality on an ongoing basis. Lesson Study is a system that includes a plan, do, see, and re-design in which cooperation between colleagues who are in the school environment according to grade level [13]. Lesson Study is a system that includes a plan, do, see, and re-design in which cooperation between colleagues in the school environment according to grade levels and subjects [14]. Lesson study is an ongoing activity, this is the teacher explores the real challenges in learning that they face in the classroom to solve them [15]. Therefore, Lesson Study is an ongoing learning system, where teachers collaborate together in designing learning, planning more effective learning activities to improve the quality of learning.

To explore the real challenges in learning, an approach which is oriented to everyday life by students requires an appropriate approach that is Realistic Mathematics Indonesia (RME) or which has been adopted in Indonesia, called Pendidikan Matematika Realistik Indonesia (PMRI) [16,17] where the learning of mathematics is to link human activities and mathematics significantly with a context of the daily life of students related to the source of development and application areas through the mathematical process [18]. The PMRI is learning innovation in teaching mathematics in Indonesia [19]. It is in accordance with historical aspects in the approach and learning of mathematics that can reform mathematics education in Indonesia and create innovation in mathematics learning [19, 20]. Furthermore, PMRI states can increase learning activities by using applications that are focused on student activities in the learning process so that students can easily understand and complete mathematics learning in the class [21]. So that, PMRI is a place of learning that can reform mathematics education by increasing learning activities that support student activities in the learning process with students who can complete learning with the understanding that is easily understood by everyday learning.

PMRI has characteristics, one of which uses the real-world context as the real-world context as a starting point for learning [22]. A learning approach that uses a real and meaningful context as a starting point for learning is the learning approach of PMRI [23]. Students will not learn directly to formulas if they use a context [24]. Learning involves 21st-century skills including communication, collaboration, critical thinking, problem-solving, creativity and innovation using LSLC and PMRI then making research by making fruit salad is a real and meaningful context rather than a camouflage context which in learning is not meaningful or less in accordance with the actual conditions [25]. Learning by incorporating 21st-century skills including communication, collaboration, critical thinking, problem-solving, creativity, and innovation using LSLC and PMRI approaches, the researcher makes learning by making fruit salad, where fruit salad is the real context and starting point of learning. So, the researchers made a learning trajectory in average learning by using the context of fruit salad through LSLC and PMRI.

2. Method
This research uses design research as the method with the type of validation studies. Design research is used because this research aims to develop a Hypothetical Learning Trajectory (HLT) with collaboration between researchers and teachers to improve the quality of learning, and the role of activities in learning mathematics. Which is expected to be able to help students make a real contribution to the skill of mathematics learning on Eight-grade. The subjects of this research are eight-grade students of junior high school's 19 Palembang.

Data collection techniques in this study, namely classroom observation, interviews, literature review, documentation, and field notes. The stages of Design Research (DR) type validation studies which are an appropriate way to answer the research and achieve the research objectives that start from preliminary design, teaching experiments, and retrospective analysis [26-28]. In this study focus, that of the preliminary and teaching experiment is considered.

In preparing for the experiment stage (Preliminary), the researcher conducted a literature study about mathematics material on 8 grade and using PMRI and LSLC. The second stage, design experiment contains two cycles, cycle 1 (pilot experiment) as cycle 1 and Teaching Experiment as cycle 2; testing the Hypothetical Learning Trajectory that has been designed by teachers and researchers to see the extent
to which the allegations and instruments that have been made by researchers are carried out. The last stage is Retrospective analysis; analyze data obtained from pilot experiments and teaching experiments to develop local learning theory-based.

The implementation of Lesson study is emphasized in 3 stages, specifically Plan (design), Do (Implement), and See (reflect) [29]. Plan phase (first’s phase), here a group of math teacher identified problems are found in the classroom. The identification of problems with teaching materials, schedules, students’ characterization, class conditions, teaching methods, teaching media, and evaluation instruments toward the teaching process and result. Do phase (Second’s phase), teacher implemented the lesson plan which has been designed in plan phase with teacher and researcher at the time of learning i.e. apperception for 7 minutes the teacher forms U-shaped student seats and divides the group into 2 groups consisting of 8 people with low, medium, and high student abilities. So, they can collaborate together in completing student activity sheets. The teacher, expert, the researcher observed the process using the prepared observation sheet. The observer recorded the lesson, about student expression, student’s answers sheet along the learning process. And the end See phase (third’s phase) after the teacher implemented in the class, was given time to state plan lesson teacher’s feeling as long as implementation both for themselves and their students. Furthermore, time is given to observers, both experts, and other teachers, to share the data they collect on student activities followed by video shows. The presentation teacher, then, is asked to respond to the observer's comments. What is important is that it was developed as a basis for making improvements to further teaching [30]. Lesson studies are composed of two tasks that need to be used as training when conducting collaborative learning and high-level thinking processes, namely sharing tasks and jumping tasks. Sharing tasks are the first task that can still be answered by students or easy questions, but researchers design sharing tasks by thinking more critically because the purpose of learning is to analyze and solve problems that fall into that category. while jumping assignments are tasks where the questions gave are difficult so students are challenged to think more critically. Not only critical thinking students also have to implement by carrying out making fruit salad and analyzing whether the results of the answers from the planning (sharing task) and implementation (jumping task) are the same or different.

3. Result and Discussion
In the preparing for experiment stage for design research and plan for the stage in LSLC, the study conducted a literature review as follows, the materials used, the use of LSLC and PMRI. The results are used to make the Student’s Worksheet. In detail, the things that are done are designing the instrument together with the teacher, analyzing the material, indicators, then designing with some activities from the planning stage to the implementation stage.

![Figure 1. The process of making fruit salad](image)

The analysis that has been done with the teachers in Figure 1 (Before revised) in the information section about the process of making fruit salads, in statement 1, keep all diced fruits in the refrigerator with a minimum of two hours of storage replaced in Figure 1 (After revised), which all fruits are cut into cubes because they are easily understood and concise, statements 3 and 4 in figure 1 were changed to statement 3 and 4 corrected by mixing all the ingredients in separate containers, stirring evenly and statement 4 without cheese so pour sauce over the fruit, stir well see Figure 2 (After revised).
Figure 2. Question’s five

In question number four becomes number five, question number four is too long and difficult to understand is Write the mean size of the weight of the fruit to be made fruit salad to meet 1 cup (400 ml) using a measuring spoon see figure 3 (before revised). corrected with the teacher become question number 5 write down the mean weight of a fruit salad to fill 1 cup (400 ml), see in figure 3 (after revised).

At the pilot experiment (small group) stage or conducting stages at Lesson study for learning community, it aims to improve, see students' abilities and improve learning instruments (student worksheets, lesson plans) that have been made jointly by researchers and teachers, with Small Group trials on two a group of eight people with low, medium and high abilities. At this stage students collaborate with each other if there are friends who are able or understand teaching friends who do not understand by saying "Please teach me". In the implementation of small groups, researchers as models of teachers who teach these small groups. The model teacher first explains giving apperception for 7 minutes look at the figure 4 that is the material given on average, with a seat forming the letter U, after that form a small group and provide student worksheets to be completed in collaboration with fellow groups seen in Figure 3.

Figure 3. At the beginning of learning students make the letter U and the teacher explains learning in the middle of student (Apperception given no more than 7 minutes)

Implementation of learning with lesson study with arrangements resembling like Figure 4 (for the letter U) so all the students are active in learning and next to form small groups consisting of four students [30].
Figure 4. Small Group

After apperception, in the core activities (small groups) in Figure 4, students are divided into two groups, where each group consists of four people with low, medium and high abilities respectively. for the second phase of the activity of making a fruit salad (two men and two women, whose chairs have been arranged according to the rules of the Lesson study).

Figure 5. Students presentation the results of the answers

After the planning stage in making fruit salad, each group makes its fruit salad together based on what has been planned when it is finished, then the teacher appoints students to present the results of students' answers after completing the planning and implementation stages. Look at the Figure 5 that students present the results of the answer and show the fruit salad results to the teacher to be assessed.

Figure 6. The first activity about students making plans or estimates for making fruit salads

In Figure 6 on the student worksheet about planning or estimating fruit counting and planning in making fruit salad. The second activity is the implementation phase. after students plan or estimate, students will make a fruit salad see in Figure 7.
Figure 7. The second activity students were asked to make a fruit salad that had been planned and compared.

At the field test stage wherein the second cycle stage of the teaching experiment, students are given an activity sheet consisting of two. For the first activity, the planning stage and the second stage are the implementations in making fruit salad. The results of the analysis of student answers seen from cognitive are low, medium, and high abilities.

**Figure 8.** The answers of the students with medium ability with the first activity predict the fruit salad ingredients to fill 1 cup (400 ML).

Figure 8 shows that the results of students' answers in the planning stage evenly divide the ingredients of fruit salad to fill a 400 ML cup. Students have shown solving a problem of daily life using the average material see in the Figure 9.

**Figure 9.** The answers of the students with medium ability with the second activity were the implementation of making fruit salad.
In the implementation phase the results of students’ answers indicate that the planning stage is different at the implementation stage but students can complete it by filling the cup fully in Figure 9.

4. Conclusions
Based on the results of the analysis of student worksheets in the first activity students are still wrong in completing the planning in calculating the prices of fruit salad ingredients and the implementation stage there are materials that are not used so that the results of planning and implementation are different but students can conclude themselves after carrying out the implementation phase. in both cycles namely, pilot experiment and teaching experiment the results of the study showed that 50% of students successfully completed the second activity (Jumping task) means that the design of learning through activities provided to student worksheets in the context of fruit salad through PMRI and LSLC was suitable to be applied in class eight-grade.

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