Reflection on Cuboid Net with Mathematical Learning Quality

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Abstract. This research aims to formulate an alternative to the reflection in mathematics learning activities related to the activities of the professionalism of teachers motivated by a desire to improve the quality of learning. This study is a qualitative study using the Didactical Design research. This study was conducted in one of the elementary schools. The data collection techniques are triangulation with the research subject is teacher 5th grade. The results of this study indicate that through deep reflection, teachers can design learning design in accordance with the conditions of the class. Also revealed that teachers have difficulty in choosing methods of learning and contextual learning media. Based on the implementation of activities of reflection and make the learning design based on the results of reflection can be concluded that the quality of learning in the class will develop.

1. Introduction
Teachers are critical components in learning. Without the teacher’s role, however good and ideally a method, then the method may not be applicable. A good teacher is a teacher who has the knowledge to be taught and mastered the skills taught (1) so that he can develop the learning process in class. One way to develop the learning process is the reflection (2)(3). Reflection involves taking past experience as a starting point for learning (4). Teachers need to be trained to be ‘critical instructional design experts’ (5). Instructional design was created through a process of reflection on the concepts to be taught (6). In addition, the ability of teachers will also be developed through the dynamic interaction between the reflection of teaching result with a deep knowledge (7).

Not all teachers do the main task optimally, such as lesson planning, implementing the learning, assessing student learning outcomes, doing counseling and exercise and carry out additional tasks (8). To improve the performance of teaching, teachers should gain knowledge, insight, and scientific, especially in the implementation of the learning process in order to realizing effective learning (9). One appropriate container for teachers to improve teacher performance is through continuous professional development (10). Professional Learning Community (PLC) is an appropriate container for teachers to study and recommend the development of the ability of teachers in teaching should be
based on experience (reflection) (11) (12). Through reflection activities performed by the teacher, the teacher is expected to make preparations to teach well so that the quality of learning can be further improved (13). Teachers are also expected to be able to design the design of contextual learning. Based on these descriptions, the main focus of this study regarding the development of the quality of mathematics learning through reflection activities teachers. Reflection activities carried out consisted of three stages, namely before, during and after learning so that the resulting empirical didactic design.

2. Method
This study used qualitative study with Didactical Design Research (14). All data is displayed in the form of descriptive. Data collected in the form of words and pictures. The study involved 13 teachers from grades 5 and will be practiced in the fifth grade students in one school in West Bandung regency. The study started from making the topic is cuboid nets, making the design of cuboid nets learning, discussion and reflection about the activities carried out at the working group of teachers, a reflection on the students' work, and revision of instructional design and learning strategies.

Before, during, and after learning, all activity is logged and recorded teachers through interviews, classroom observations, video recordings, and document research. Semi-structured and open interviews conducted to determine the reflection activities undertaken by teachers and instructional quality development activities for reflection for action and reflection of the action. Classroom observations conducted to observe the reflection in action. Video recording made at the time of reflection for action in a working group of teachers and at the time of reflection in action. Studies document created at the time of reflection for action and reflection of the action. This is done to see the development of the quality of learning by reflection.

Results of interviews transcribed and analyzed to describe the activities carried out by teachers. The results of the observation sheets were analyzed to get a general idea of the interactions that occur in the classroom that can be used as material for improving the quality of learning. This is also done to confirm the answers to the interview conducted on the teachers.

3. Result and Discussion

3.1. Reflection Activities
Teachers do reflection consists of three stages, namely reflection for action, reflection in action, and reflection of the action. At this stage of reflection for action, each teacher to reflect on the learning he has done and determine the materials to be filed. The teachers agreed to focus on the topic of the nets of the cuboid. Reflection is done by analyzing the preparation of teaching and learning outcomes that have been made in their students.

The results of these reflections, taken at the next meeting which is held every two weeks at the school that has been determined to discuss preparations for teaching are made jointly and discussed with other teachers. In this activity, teachers analyze and reconsider the approach normally used in their classrooms. Then develop guesses about student responses may occur over a didactic situation developed on the purpose and learning materials, student needs, a task that will be given, and assessments will be conducted. Teachers also reflect on their learning difficulties or obstacles experienced by students with analysis of textbooks. This analysis shows that textbooks often do not accommodate the students' learning difficulties.

In designing the learning process in the classroom, the teacher start the interaction with students, also by reflection (reflection for action). This activity is done to help teachers create learning design that suits your situation and create milieul didactic suit students' needs. At this stage, teachers anticipate and consider the response and flow of student learning, thus avoiding the possible effects of Jourdain or Topaze effect (15). Teachers also develop course materials in a coherent and anticipate students' learning experience and knowledge. The medium used according to the subject matter and the characteristics of the students are waking up cuboid that consists of square and rectangular wake.
Next meeting, one teacher presented a paper nets of cuboid and comments by other teachers. The selected media is cuboid-shaped product packaging on the grounds that a variety of packaging products commonly found in the environment of students so that students will not feel strange with the media. Step in teaching cuboid nets are shown in Figure 1 below.

Figure 1. Hypothetical Learning Trajectory of Cuboid nets

Figure 1 shows that in explaining the cuboid nets, the first to do is open one side of the cuboid by cutting one of his ribs, then the cuboid is opened. Cuboid nets consist of 6 pieces rectangle. The cuboid has a net of more than one. In order to produce the nets the other cuboid, the teachers try to create a net of cuboid as much as possible by going to one side. This is done to anticipate the answers and the students’ responses. The teachers obtain 21 nets of cuboid. Teachers differentiate the sides of the cuboid, especially between the base and cap cuboids. This activity is done to help students think critically and creatively.

In the open class activity, the teacher presents a model of learning that has been prepared with a friend observed by other teachers in one cluster. It is observed response of the students, the learning path, learning media effectiveness, and efficiency of time (reflection in action). In presenting the subject matter, the teacher provides a variety of cuboid-shaped packaging. The teacher does not directly teach the nets of cuboid on the student, but the teacher invites students to identify known problems one by one, manipulate objects and provide questions that guide. Students are guided to be able to find the nets cuboids as much as possible together with the group.

Reflection of action do the teachers shortly after the open class activities. They analyzed the activity of teachers and students, teaching materials and student learning outcomes. Observations show that the model teacher has made learning according to the learning path that has been prepared, students are actively involved during the learning and the media used is also contextual. The results of the data obtained following the interview.

G: The learning objectives to be achieved, all of them can be met. Students can achieve all learning objectives designed. Because the materials are prepared already anticipating the response of students, students’ learning difficulties and HLT.

G: Teacher models look no difficulty in teaching, the teacher has mastered the subject matter. Learning Path according to the teaching preparation has been determined.

G: Teachers are able to apply cooperative learning. Students were active and able to cooperate with her. Teachers may need to further motivate students to learn efficiently and effectively so as to produce nets of the cuboid as much as possible.

G: A wide variety of packaging shaped cuboid used as a medium of learning for many students there are in the environment around .... Learning media are appropriate, easy, cheap, simple and attractive. In addition, the use of the projector to display a variety of cuboid nets are very attracted the attention of students. Teachers are able to use technology to become more varied learning activities.

G: Student learning outcomes are also satisfactory. Values meet the standards expected of students there are even students who earn a score of 100.
3.2. Reflection Activity Relationship Between Quality of Mathematics Learning

Activities performed by the teacher reflection, is very useful in improving the learning design. Instructional design in accordance with the conditions and needs of the students learn will be able to develop the quality of mathematics teaching in the classroom. Reflection activities undertaken will make teachers more effective because they have the knowledge and skills to teach deeper (1).

In reflection for action, teachers improve instructional design from the learning objectives to be achieved, media learning easier for students to learn, the learning needs of students, learning activities to be carried out, assigned tasks, as well as assessments to measure the achievement of learning objectives (16). In addition, teachers also set the time allocation will be used. The learning objectives are developed based on the standards and basic competencies to be achieved. The learning objectives load the picture and the process of learning outcomes, means that the learning objectives are formulated with verbs clear (not created an interpretation doubles), can be accomplished (students can do it) and measurable (assessable result either in writing, orally or in the form of the work of other students. Teachers who have a high teaching effectiveness will be easy to achieve the learning objectives (17).

Teachers prepare teaching materials with regard to the potential students, the context of student life and development of science and technology. Teaching materials developed from a simple material to material that is more complex, which can help students understand the net of the cuboid. Learning resources that teachers use varied after getting input from other teachers. Media learning using concrete objects in the form of a variety of cuboid-shaped packaging with the consideration that the media is easy, convenient, and familiar with the students. Students are directed to find and describe nets cuboids. The learning experience using a variety of packaging brought by the students will be easier for students to understand the material nets of cuboids. This is in accordance with the opinion of Piaget stating that students who are aged between 7-12 years were at the concrete operational phase. In the concrete operational stage, they have to think operationally, using logical reasoning but still in the concrete situation (18). The knowledge gained by the students, a new form of knowledge based on experiences gained direct them. In addition, the drawings cuboid nets are formed into a cuboid with the help of a projector very interesting students. Some students even can guess which side of the board and where the upper side of a net of cuboids. This greatly helps students to think critically.

Teacher learning strategy is designed so that students can be actively involved during the learning process. The teacher made allegations about student responses that may occur during the learning process so that teachers can anticipate didactic and pedagogical. This is important in order to create a tripartite relationship, namely, the relationship between teacher - student - mathematics (14). The learning method that Teacher is cooperative learning. Earlier, not all students can learn actively. This is in line with the results of the study (19) showed that teachers find it difficult to implement their group work in class. However, insert and suggestions from other teachers to convince teachers to apply these methods with some consideration so that the method can help students understand the material nets of the cuboid as well as the tasks given include cognitive, affective, and psychomotor.

Learning assessment conducted to monitor the process, progress, and improvement of student learning outcomes on an ongoing basis (20). Assessment by teachers target is to know the progress of learning outcomes, diagnose learning difficulties and provide feedback/improvement of learning outcomes. To view the progress of the students in understanding the net of the cuboid, the teacher made five exercises that must be completed by the student. The result is very satisfactory for most students get a value above the specified standards. Teachers analyze the design of learning based on reflection doing. The study design was revised after getting enter and advice from his friends. Design learning based on reflection for action is called hypothetical Design Didactic (DDH). DDH then practiced in its class with a friend observed by other teachers.

In the process of learning in the classroom, the teacher start the interaction with students, also based on reflection (reflection in action). Reflection is made to create a didactic situation. Before starting the study, teachers lead students in conditions conducive learning and doing aperception. Teachers also revealed the sequence of activities to be undertaken students, to clarify the message and
reduce the ambiguity of the message that will be used as feedback. Students are directed to form a variety of nets cuboids and then describe it. Teachers should try to anticipate the students' mental activity, what would be involved when students participate in learning activities in the classroom and consider how mental activities associated with the final destination (21).

To create a fun learning process, teachers always motivate and maintain student engagement in learning. It is useful to foster active participation through teacher-student interaction-math (14). Teachers also respond positively to any responses given by students, for example, by giving compliments respect the opinion of the students, being friendly flexible, courteous, and others. The use of good language and precisely tailored to the student's level of development, during the learning required in order to avoid misinterpretation and can be understood by students. So that students can redecontextualize and redepersonalize knowledge and present them in such a way and present them to identify what they produce with knowledge (15).

In the closing activity, the teacher reflection by asking students to recall important things about the net of cuboids that have occurred in the learning activities. Students are also guided to summarize and make conclusions and practice questions as many as five items. The questions are tailored to the stage of development of the students and adapted to their daily lives. From the series of these learning situations, students are expected to develop new knowledge gained to solve problems (12). Results of teachers' teaching then reanalyzed by teachers. This is done to see weaknesses that emerge, and revisited by teachers. Teachers also make nets of cuboids as much as possible. Teachers found the net 33 more nets of cuboid so that the total 54 nets.

The activities reflection in action, reflection in action, and reflection of the action was filmed using video. Video recordings were analyzed as consideration for DDH in order to revise instructional design that made the teacher can bring students to think critically so as to solve the problems they face. Analysis of the video footage and the collective activities of teachers are professionally useful learning tool for teachers to examine and improve the teaching challenges, structural and relational them that no one can have an impact on how effective the tool is being used (22). The results of the analysis in the form of instructional design called Empirical Didactic Design (23).

4. Conclusion
From the series of reflections that teachers, seen a change in mindset and attitude of teachers in designing learning and teaching. Learning approaches that do start turned into a student-centered, instructional media and learning resources be varied and the problems that made the problem solving. This makes the quality of mathematics learning increases, which is evident from the results of student learning and increased teacher competence. In addition, the confidence teachers in preparing teaching materials and learning strategies to increase. The teachers who were not initially involved in the making of teaching materials become increasingly active and able to work together to design instructional design. They seemed enthusiastic in every reflection, criticized the textbooks used in primary schools and understand how to do the learning nets of cuboids in grade 5. This is very important because teachers can design according to the characteristics of learning that students meet the learning needs of students, and can overcome learning difficulties experienced by their students. In particular, the analysis and discussions held during the teachers’ reflections give them the opportunity to pengembangkan knowledge and skills can also develop personality and social aspects.

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