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Realization Process of Mathematical Problem-solving Approach in the Student Teaching: A Case Study on One Student Teacher in Japan

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Mathematical problem solving approach is teaching approach to foster students' understanding mathematics and mathematical thinking. It is important to learn and realize mathematical problem solving approach for pre-service teachers, but it is not easy. The first opportunity of realizing mathematical problem-solving approach is student teaching. We expect student teachers to develop mathematical problem solving approach in student teaching. The duration of student teaching in Japan is three weeks, fifteen days. Student teachers teach mathematics at most three times. In this paper, we discuss process that a student teacher develops mathematical problem solving approach.

In order to analyze realizing mathematical problem-solving approach process, we consider two perspectives, pattern of lesson and connections related to consistency. Pattern of lesson is phase of activity, presenting a problem, individual problem solving, discussion, and summary. The connection related to consistency is found in the connection between the parts, as Stigler et al (1999) mentioned.

We collected data as follows. We focus on one undergraduate student who belongs to elementary teacher course and major mathematics. We videotaped her three mathematics lessons and fifteen times discussions that are discussions about a lesson plan, reflections and discussions of her three lessons and reflections and discussions of other student teachers' mathematics lesson. A lesson plan and her journal of teaching practice were made as photocopies. The content of lessons is the area of rectangle.

The result of analysis from a view point of pattern of lesson is as follows. A student teacher use pattern of lesson in discussion of lesson plan, at the beginning. The first lesson has also pattern of the lesson. Discussion and reflection in the third lesson, she reflected her lesson according to pattern of lesson. A student teacher can use and realize pattern of lesson even in the beginning of student teaching.

From the viewpoint of connections related to consistency is not easy for student teachers. The first lesson she related some students' solution through the idea of 1-by-1 unit. She mentioned the idea herself and explained connections of some students' solution. The connection depends on the knowledge and relates some solutions. Other solutions are remained to have no relations. This connection does not relate to consistency. In the third lesson, she related all students' solutions and she helped students to mention relations of them. The connection of students' solutions is thinking process that is transforming a shape as we knew the formulation of area. She could relate students' idea, knowledge, and so on through the connection that is thinking process of solving a problem. The connections related to consistency is thinking process of students in problem solving approach.

In the discussion process of reflection and writing a lesson plan, a collaborative teacher suggested the connection related to consistency from at the beginning of student teaching. A student teacher could not understand connection presented by a collaborative teacher at that time. In the end of second week, a student teacher mentioned that some pupils found relation of solutions themselves in the observed other student teacher's lesson. She noticed that pupils could think relations of solutions and she could imagine students

thinking process in observing lessons. She knew it was important to relate students' solution from the beginning of student teaching and developed her idea of connections at the end of student teaching.

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Enhancing Students Activeness and Concept Comprehension and Teachers Perception on Teacher Quality Improvement through Lesson Study

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Lesson study (LS) originally developed in Japan in over a century is a form of teacher inquiry in which teachers in small groups undertake collectively a cycle of 'plan-do-review/see' activities to improve pedagogy and so pupil learning and progress. LS has been practiced in many countries worldwide as well as developing countries in South East Asia region. This paper reported the implementation of LS on enhancement students' activeness in classroom and concept comprehension in biological class as well as teacher's perception on improving their quality as LS applied. The study was employed in Senior High School Muhammadiyah 4 in Bengkulu located in Southern Sumatra of Indonesia. One class from six classes of grade XI students was chosen randomly to use as a research subject. Meanwhile, five of seven biology teachers were chosen randomly as well to involve o the LS. We used cooperative learning model in three cycles of LS practice of this study. Each cycle consisted of three steps i.e. Plan, Do and See. Concept comprehension of students is collected based on the pretest and post-test at early and late cycle respectively. Students' activeness was evaluated during lesson process using 1-4 Likert scale. Student activity components which were observed consist of visual activities, oral activities, listening activities, drawing activities, mental activities and emotional activities. The instrument to gather insight on the teachers' perception of LS in regard of improving their professional quality was a survey questionnaire to verify their responses on LS implementation. The results showed that students' activeness during LS in cycle I was 1.9% of excellent, 46.3% of good, 50.6% of fair and 1.2% of poor. The students' activeness was better in cycle II to become 7.4% of excellent, 56.2% of good, 36.4% of fair and 0% of poor. In cycle III students' activeness rise to 11.7% of excellent, 71.6% of good, 16.7% of fair and 0% of poor. Students who had excellent and good categories collectively increase from 48% to 64% and 83 % in cycle I, II and III, respectively. In contrast, students who had poor activity decrease from 1% to nil in cycle I to the next cycle. Student activities during the open lesson that were recorded by observers and was analyzed after every cycle to improve lesson quality in the next cycle. Based on the reflection of the cycle I some efforts were conducted to refine LS cycle II, i.e. regrouping student that emphasized to heterogeneity and based on the high to low ability of students in each group, arranging student, improving learning media, using student's attribute to make observers easier to do their task, rearranging time allocation. Based on the reflection at cycle II, teaching plan of cycle III emphasized strategy to organized lesson implementation that produces the activity of students distributed uniformly both within group and class. Teacher randomly calls the student to respond in class discussion. Thus, all student must ready actively in response to the problem or topic presented in lesson process. LS

made lesson process better and enjoyable by students. It was mirrored by students comprehension on the biological concept in term of Reproduction in human in this study was increased from 64.2 to 75.8 and 82.7 in cycle I, II and III of LS, respectively. Those results reflected that LS implementation improved students' activeness on biology lesson and concept comprehension in biology. On the other hand, all teachers evolved in this study perceived that LS implementation can improve teachers' professional quality and promote teachers professional development. They strongly agreed that LS be beneficial for them to become a better quality biological teacher.

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Some Result of Study to Teaching Method Development by Lesson Study

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Background: It recommend to create a beneficial new method which is used on real class lesson and, can change to learning mode of students and teaching mode of teachers. Therefore, the Mongolian Ministry of Education, Culture, Science and Sports (MECSS) has collaborate with Japan International Cooperation Agency (JICA) and implemented projects which named 'teaching Methods improvement Project toward Children's Development in Mongolia' (2006-2009) and 'Strengthening of systems for improving and dissemination of child centered teaching methods in Mongolia' respectively.

Method: Within these projects we had conduct two staged experimental study which lasts six years. So we prepared introducing some result of these studies.

There are methodical eight teams had work in project 'teaching Methods improvement Project toward Children's Development in Mongolia' And chemical team processed 8-12 lessons according to newly issued method for three years, consistently. Then, we tried new lesson version on 9 model schools in Dornod, Selenge province and Ulaanbaatar city. The main aim of this project was inventing method variations which are favorable for students and can support their learning activity.

In first stage of this project, we studied lesson study with aimed for observing lesson which is created method that supporting student's learning skill and how this lesson study affect teacher's teaching mode or support student's learning mode. So as, we organized lesson study into differentiated management in 3 years, consistently. And it included 3 model schools of Ulaanbaatar city and compared with 3 local model schools which is affiliated Dornod province.

Also, there are methodical ten teams had work in project 'Strengthening of systems for improving and dissemination of child centered teaching methods in Mongolia' and chemical team monitored and advised for model schools (included Ulaanbaatar, Bulgan and Zavkhan province) where is implementing lesson study for three years, consistently. The main aim of this project was formulate and test management which is development of teacher's method toward supporting student's learning skill.

In second stage of this project, we aimed for management of lesson study, which depends on school or teacher centered activity, is possible to improve teaching method that supporting student's learning skill. We included 6 model schools of Zavkhan province.

Results: In first stage, we used descriptive and inferential statistics (T-test) in primary data of research. The change of self-evaluation of teacher who taught lesson in 2009, compared with in 2007 is increased ($p=0.003$). And change of lateral-evaluation of observer teacher's lesson in 2009, compared with in 2007 is increased ($p=0.000$). Also, the one year average of student's self-evaluation changes were $p=0.007$, $p=0.000$, $p=0.001$ each year.

In second stage, the lesson which is taught in 2010-2011, was teacher centered. In 2011-2012, lesson was student centered but aim of lesson and achieved result was not clear. Also, an activity that creating

knowledge by students, was play as a role in lesson, but it trended to form scientific mistake and false desire.

Conclusion: In result, 'Lesson study' is technology that developing teaching method, supporting learning activity and producing educational material. Also, lesson study management is key factor that provides possibility of research and it can determine issues which are beneficial for rational implementation of lesson study technology.

Also, we analyzed quality and collected primary findings which are studied changes in quality of lesson study and lesson. Based on result, we concluded that 'Lesson Study' can be technology which is develop teaching method that supporting student's learning skill and give a chance for teachers are improving their skill at place of employment. But it grounds rational model of part's team work.

Key words: Lesson study, Lesson study management, Changes in lesson quality, Changes in teaching method.