

Challenges of Constructing Core Concepts of Lesson Study in the Discourse of Teacher Education

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Previous research indicate some common challenges in attempts to implement Lesson Study in initial teacher education. Planning and conducting lessons are familiar activities for pre-service teachers, but considering a research lesson and formulating a research question has proven difficult. Similarly, prediction of students' responses and difficulties as well as planning and conducting observation of students' learning also constitute typical challenges for pre-service teachers who attempt to apply Lesson Study for the first time. In an attempt to mitigate these common challenges, three Norwegian teacher educators investigated their own introduction to Lesson Study for pre-service teachers in a master program of mathematics education.

Inspired by core principles of Lesson Study, this action research study considered the introduction of Lesson Study in the master program as a research lesson. A research question was formulated for the research lesson, and several rounds of careful planning was carried out and documented with a focus on three areas that often tend to be overlooked in attempts to implement Lesson Study in teacher education: formulating a research question for your own learning, prediction of student responses and common misconceptions, and observation of student learning. Data were conducted through field notes, audio-recordings of planning sessions and implementation of the research lesson in two parts, pre-service teachers' written report from their own implementation of Lesson Study in field placement, as well as audio-recordings from a debriefing session with the pre-service teachers. The data material was analyzed with a focus on how core concepts of Lesson Study were constructed in the teacher educators' discourse and in their communication with the pre-service teachers.

Results indicate that, despite the teacher educators' attempts to highlight common misconceptions of Lesson Study in their own introduction of Lesson Study, the pre-service teachers still struggled to formulate a research question. Although observation and prediction were discussed, the pre-service teachers seemed to focus more on student activity than student learning. Possible reasons for these challenging results are identified and discussed. The lack of focus on the research question might be related to the pre-service teachers' limited experience. Since the pre-service teachers are still novice teachers, their attempts to formulate and focus on a research question for their own learning may be overridden by their struggles with the very activities of planning and conducting teaching. Their challenges of focusing on prediction and observation of student learning might also be related to lack of experience as teachers, but we suggest that this challenge might also be related to a lack of precision in the teacher educators' discourse on learning. No clear definition of learning was presented by the teacher educators, and the concept of learning was not discussed and problematized. When they are not given the opportunity to participate in a precise discourse on learning, the pre-service teachers revert to a more everyday discourse on what students do instead. These

results emphasize that teacher educators need to pay careful attention to their own discourse when attempting to implement Lesson Study in higher education, and in particular when implementing Lesson Study in a teacher education context where the participants have little or no previous experiences with teaching.

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The Research Lesson: Exploring Which of the Given Three Sets of Lengths Could Form a Triangle

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This paper discusses the lesson study conducted at the pre-service education courses where triangle inequality is the key mathematical concept for discussion. The study problematizes the patterns of variation for discussing triangle inequality in the classrooms through the research lesson. Two perspectives are looked into, how students come up with the mathematical relationship and what we learned from the process. As it is hard to find empirical studies pertaining to the basic idea of triangle inequality, this study then aims to contribute to the understanding as to how teaching and learning about this basic concept of triangle inequality can be planned, implemented and assessed in a collaborative way. The study employs the lesson study design (Fernandez and Yoshida, 2004) and is carried out in three cycles while the development of the research lesson was based on the framework of variation theory (Marton, 2015), specifically on the patterns of variation.

The results showed that among the patterns of variation, it is fusion that is easier to observe while the students were doing the task. The separation pattern appears to require more explanations from the student's perspective to clearly describe how they used contrast and generalization as patterns of variation. In the case of what we learned from the experiences on developing and implementing a research lesson, several perspectives could be described, however we could state our learning based on the idea of patterns of variation and pedagogical content knowledge. On patterns of variation, we learned not only how to differentiate the different concepts in variation theory but also using the idea as a basis for developing the task and also as a tool for analyzing the data. The task started as a usual problem-solving task and then shifted its focus to analyze the critical aspects based on variation theory (Gallos Cronberg, Skodras, 2016). However, as we continued to make sense of the different aspects of variation theory, we shifted to focus on patterns of variation and trying to learn more about this especially as a tool in the analysis of results. It can be attested that the experiences on the development and implementation of the task have enhanced our pedagogical content knowledge. We learned that there is a possibility that the students would come up with different answers that could be backed up by any of the two different definitions for triangle inequality (Kiselman & Mouwitz, 2008; Sko överstyrelsen, 1979). Based on this knowledge of the content we had to adjust the design of the task as well as the plan for its implementation.

Although the findings of this study are far from generalizable because of its limitations such as data collection mainly relying on observations and no in-depth data on students' perspectives, the results could lead to identifying important ideas that could contribute to the process of developing mathematical tasks as well as interesting ideas about teaching and learning areas for further research.

References

Fernandez, C. & Yoshida, M. (2004). *Lesson study: A Japanese approach to improving mathematics teaching and learning*. New Jersey: Lawrence Erlbaum Associates, Publishers.

Gallos Cronberg, F. and Skodras, C. (2016). Triangle inequality and its critical aspects. Paper presented at the EARLI Sig 9 2016 Conference, *Different horizons: Setting directions for phenomenographic research*, Gothenburg, Sweden.

Kiselman, C. and Mouwitz, L. (2008). *Matematiktermer för skolan*. [Mathematics terms for the school]. Göteborg: Nationellt centrum för matematikutbildning (NCM), Göteborg universitet.

Marton, F. (2015). *Necessary conditions of learning*. New York: Routledge.

Skolöverstyrelsen [The School Board of Education]. (1979). *Matematikterminologi i skolan* [Mathematics terminology in the school]. Malmö, Sweden: Almqvist & Wiksell Hermods.

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Development of Designing Science Lesson Plan and Implementing Abilities of Student Teacher by using Lesson Study Approach Together with PLC

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The objectives of this research were (1) to study the lesson plan designing ability of the student teacher by using lesson study approach together with PLC, and (2) to study the implementing their lesson plan ability of student teacher by using lesson study approach together with PLC. The participants in the target group were the student teachers in Secondary Education Department, the Faculty of Education, Chulalongkorn University who teach in public schools and demonstration schools. The student teachers major in General Science, Biology, and Physics. The members of the professional learning community, researchers, teacher's buddy, and mentors were participated in all 4 steps of lesson study which were (1) subject matter analysis, (2) learning activity plan, (3) instruction, and (4) reflection. The research instruments were (1) an inquiry lesson plan designing checklist, and (2) a classroom observation form. Collected data were used to collect quantitative and qualitative data. Percentage, mean score, standard deviation, and content analysis were used to analyze the collected data.

The research findings can be summarized as follows:

1. After using lesson study approach together with PLC, the mean percentage score of student teachers' abilities in designing lesson plans was 91.96 percent, that was at a good level, which was higher than the mean percentage score before treatment was 70 percent, that was at a moderate level.

2. After using lesson study approach together with PLC, the mean percentage score of student teachers' abilities in implementing their lesson plans was 92.50 percent, that was at a good level which was higher than the mean percentage score before treatment was 67.50 percent, that was at a moderate level.