

学位論文の要旨 (論文の内容の要旨)

Summary of the Dissertation (Summary of Dissertation Contents)

論 文 題 目  
Dissertation title

Identifying Mathematics Teacher Educators' Professional Learning and Issues in Lesson Study Approach in Laos

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The objective of this research was to identify mathematics teacher educators (MTEs)' professional learning and issues in the lesson study approach in Laos. The study aimed to answer these research questions 1) what does MTEs' professional learning emerge during the actual process of lesson study practices among Lao MTEs? 2) how deep is the emergence of the MTEs' professional learning in actual lesson study practices among Lao MTEs? And 3) what are the issues occurring in the actual lesson study practices in Lao TTCs?

To identify the emergence of the MTEs' professional learning, the researcher developed a conceptual framework that consisted of 4 domains, including knowledge, teaching-learning resources, instruction, and collaboration that are interrelated to each other. The researcher also conceptualized four levels of MTEs' professional learning that are associated with the conceptual framework to identify the depths and the related issues. Level 0 included instruction and collaboration; level 1 included teaching-learning resources and description of knowledge; level 2 associated with analysis, interpretation, and making connection of the students thinking to the mathematical concept and the long-term development goal; and level 3 included creating local teaching theory or linking to the existing theory or theory of mathematics education.

This research collected the data from 34 respondents from the three Lao Teacher Training Colleges during February - April 2019. Each TTC conducted 2 lesson study practices for about two weeks. This study collected multi-faceted data, including observation, interviews, video recording, and documents. The discussion protocol during each step of actual lesson study practices, interviews, and observation was qualitatively analyzed by following some reliable theories, including thematic analysis, content analysis, grounded theory, and category construction (Clarke & Braun, 2016; Strauss & Corbin, 1998; Merriam, 2009). The licensed software MAXQDA 10 has been used to manipulate and analyze the qualitative data.

This study found that MTEs' professional learning has emerged in two roles. First, MTEs as the role of teachers, there was an emergence of the MTEs' professional learning scattered in the knowledge, teaching-

learning resources, instruction, and collaboration. This knowledge included mathematical knowledge, curriculum knowledge, and students' conceptions. The emergence of mathematical knowledge was evidenced by the discussions about several possible solutions to the mathematical problems, the demonstration of solving mathematical tasks by the MTEs themselves, and the expression of mathematical anxiety to be asked to solve other types of radical inequalities. However, the study found several issues regarding the mathematical knowledge that conceptualization about the main mathematical concept of the selected topics was missing. There was no exploration or anticipation regarding several alternative solutions of the students and student teachers. The mathematical problems were not clearly and properly designed, and the team members did not mathematically test accuracy in solving process and solutions for the unexpected questions.

Whereas the emergence of the curriculum knowledge was illustrated by the MTEs' ability to see and aware the connection between the lesson objective with the content within the lesson; how the content was connected to the later parts of the lesson; and how the main lesson content could be applied to solve the exercises. Nonetheless, some issues have occurred that the broader sense, including the connection across the lessons, units, and grade levels, were missing in their discussions. MTEs did not consider or were unable to see the broader view of how the selected topics are related to the other topics in other lesson units and other grade levels.

While the emergence of the students' conceptions was demonstrated by the MTEs' expression regarding the students' inability to understand the meaning of subtraction but memorizing its position. MTEs were also able to see that the students got results at first before proceeding the decomposition, multiplication without parenthesis, and mistake in transforming the exponential equation. However, the issues have emerged that the MTEs were unable to analyze or interpret students' mathematical ideas. There was no making connection of the students' work to the meaning of mathematics in a broader sense of mathematics education, and they were unable to see the mathematical concept through the eyes of their students (Clivaz & Ni Shuilleabhain, 2019).

The study also found the emergence of teaching-learning resources in which it was demonstrated by the MTEs' discussions about the strategy for students' engagement, mathematical task design, and observation protocol focusing on how students respond to each teaching process. Nonetheless, there appeared some issues that a series of lessons and task examination for the best selection of examples or representations to design mathematical problems were still missing in the MTEs' discussions.

Concerning the instruction, this study found the criticism on the teacher's explanation, on the using questions, and on the explanation and modification where the students made a mistake. The study also found the discussion about instructional sequencing, criticism of the unordered instructional sequence, and complaining about wasting time in repeating students' works. Moreover, this study found evidence of the issues that MTEs conducted lesson study in order to increase student performance and to come up with the correct answer because the homeroom teacher gave some exercises to practice at home a day before the actual research lesson has been conducted. During the lesson planning, MTEs emphasized the homeroom teacher to make a clear explanation about reviewing the previous lesson for the student to copy it. As a result, the homeroom teacher emphasized the students to copy that method. The worksheet itself was already designed with clear mathematical ideas of the subtraction by decomposition. And, each observer interfered with students while they were doing the task.

Regarding the finding of the collaboration, this study found MTEs' collaboration through sharing ideas about good and weak points, receiving others' views, and exchanging teaching experience to each other. Nonetheless, workload issues, consensus time to meet each other, and not enough time in planning were regarded

as the issues of collaboration in lesson study practice. The number of the participants was decreased in the second lesson study practice and only a few members actively and dominantly expressed their ideas. The lesson implementer wasn't fully participated in both the first and second lesson planning and the first lesson plan wasn't used due to the technical problem. Even though they were well collaborative as the case of TTC2-G3, they were always facing difficulty in the lesson conclusion part and a very short time in the post-lesson discussion.

Second, MTEs as the role of teacher educators, there was an emergence of curriculum knowledge, teaching-learning resources, and instruction. The curriculum knowledge is revealed when the MTE stimulated lesson study team members to consider designing the lesson objective to suit the main lesson content of today's lesson during the lesson design; when the MTE encouraged team members to think of another possible objective to suit the main lesson content, providing a hint to the members to think further, and offering an alternative idea of the objective. Regarding the emergence of the teaching-learning resources, as the role of teacher educator, this was expressed by the suggestion about strategies for student engagement and improvement of mathematical task design. The strategy for student engagement was expressed by the evidence of the suggestion a strategy to deal with the students when they come up with unexpected solving methods. This emergence of the mathematical task design was expressed by the suggestion of removing the equal sign and the supportive statement about retaining the way of providing formula material for the next lesson. Regarding the instruction, this was suggested by the strategy for improving instruction about the quantity comparison, improving questions to stimulate students to think, and the illustration of alternative instructional strategy to the group during the planning. Also, there was the suggestion to emphasize making the same base and explaining about the reviewing related previous lesson regarding the law of exponential equation. However, MTEs' encouragement was not yet related to stimulating others to think about the mathematical concept and students' conceptions.

In conclusion, as the role of teachers, the emergences of the MTEs' professional learning were evidenced by the subject matter knowledge and curriculum knowledge, students' conceptions, teaching-learning resources, instruction, and collaboration. While as the role of teacher educators, the emergences of the MTEs' professional learning were evidenced by the curriculum knowledge, the teaching-learning resources, and the instruction. However, of these two roles, the level 1 is still regarded as the highest level of the MTEs' professional learning because the MTEs put emphasis only on commenting and describing those emergent domains; while a lot of issues hindered the effectiveness of the lesson study approach were found. These issues included the situation of using superficial checklists, lack of analysis of the main mathematical content, lack of analysis of the connection of the curriculum, lack of analysis of learners' mathematical thinking, and lack of connection of student mathematical thinking with the mathematical concept in a broader aspect. This study suggested using questions instead of checklists to guide the focal points when conducting lesson study. MTEs should focus deeply on learners' mathematical thinking, analyzing, making a connection of mathematical concepts, and correlate with a theory or theorizing their own teaching theory in order to reach high-quality of the lesson study practice. Furthermore, the study suggested MTEs be able to supervise both schoolteachers and colleagues constructively and professionally. The study also recommended the MoES to consider revising the lesson study guidelines and including lesson study as a subject in teacher education.