

Abstract Number: 20020

Improving Our Own Teaching Practice: Mathematics Teacher Educators' Participation in a Cross Institutional Lesson Study

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Successful teaching practices require mathematics educators to have knowledge of mathematics, knowledge of students, and knowledge of instructional strategies. While university-based mathematics teacher educators (MTEs) have had training and exposure to best teaching practices, they often work alone while planning (Cerbin & Kopp, 2006). To address this isolation, we, five MTEs located at different universities, focused on the scholarship of our own teaching and learning by implementing a lesson study of a common lesson for elementary preservice teachers (PSTs). In this abstract, we share our methods, experiences, and outline results with lesson study.

As early career MTEs, we initially came together weekly to participate in a community of practice (Wenger, McDermott, & Snyder, 2002) focused on improving PSTs' mathematical knowledge for teaching (Hill, Ball, & Schilling, 2008). We chose lesson study as a means to investigate both our teaching and our students' learning and answer the question: How do early career MTEs from different institutions work together in a community of practice to inform and improve their teaching of a common lesson through a lesson study?

Following Lewis & Hurd's (2011) four-phase structure, in phase one of our lesson study, we examined our common curriculum to determine the lesson goal: to support PSTs to understand student multiplication strategies and make next-step instructional decisions based on Jacobs, Lamb, and Philipp's (2010) professional noticing of children's mathematical thinking framework. For the second phase, we developed a research-based lesson that supported PSTs' understanding of the meaning of multiplication, identification of the general progression of children's multiplication strategies, and decision making on a whole-class instructional next-step based on analysis of student work. Phase three's iterative cycle began with the lesson taught and videotaped at one of the institutions. We watched the lesson video, analyzed it, and then met virtually to debrief the lesson and collaboratively discuss our analyses. Based on the discussions, we made refinements to the lesson for the next iteration. The revised lesson was then taught by another MTE at another institution. This process of revising, analyzing, and teaching the lesson was completed for six iterations. The sixth iteration of the lesson was observed in-the-moment with one MTE teaching and others using Google Hangouts to observe the lesson. For the final phase of the lesson study, we reflected on and analyzed both the sequence of lesson changes and the lesson study process at the culmination of the semester.

Data from various sources in the form of lesson plan iterations, video and audio of the taught lessons, PSTs' work, MTEs' reflections and lesson analysis, group meeting notes, and transcribed audio recordings of the group meetings were analyzed via open and axial coding in stages. As a result of our individual analysis

and group discussion of each implementation, numerous changes were made to both the structure and to our own facilitation of the lesson which we will share in detail in the full paper.

Lesson study and the community of practice provided us with a means to collaborate with each other to improve our scholarship of teaching. Throughout the lesson study process, we established common instructional goals, discussed our understandings of mathematics education in a safe space, experimented with and perfected new teaching methods and strategies, and grew together as mathematics teacher educators. Also, because of our collaborations, we were able to orchestrate better discussions and engage the PSTs in the professional noticing framework in more organized ways which pushed the PSTs' learning to higher levels, more so than we would have been able to do on our own.

An Analysis of Middle School Mathematics Classroom Observation in China

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China has experienced mathematics education reform in the past decades, which has a huge effect on China national curriculum, textbooks and the way teachers perform a lesson. As we know, there is a big difference between class teaching and learning model in different countries, especially among western and eastern countries. The way teachers organize class and pass on skills or knowledge to students cannot live alone without the influence of their own cultural background. Each country has something special teaching model and also common ones. How to find out the similarities and differences of eastern and western countries' mathematics lessons and try to figure out the reasons behind them is always a hot topic in mathematics education field. This study investigates the 'characteristics' of Chinese middle school mathematics class, aiming at providing a picture of teaching-learning model in China. The framework used in this study draws from TRU (Teaching for Robust Understanding in Mathematics), which assesses lessons from 6 aspects (mathematics activities richness, cognitive demand, access to mathematical content, identity and formative assessment). Eight lessons have been chosen in this research, which contain topics of 'number and operation' 'algebra' 'geometry' and 'probability and statistics'. Each lesson lasts for almost 45 minutes (a normal time duration of Chinese middle school mathematics lessons) and the teachers who perform the lessons are from different provinces in China and selected by their own provinces because of good teaching. Generally speaking, there are 3 types of mathematics lesson in China: concept lesson and introduction lesson (teacher introduces new mathematics concept or formula), exercise lesson (teacher working with students on solving exercises and practices) and review lesson (teacher summarizes up main topics in one chapter or after a period of learning). We use the concept lesson and introduction lesson to do the analysis instead of the last two types since these three types class would lead to different teaching and learning model. The results show that Chinese middle school mathematics class has a high demand for students' math cognition, focus on solving routine problems. Teachers do not provide enough attention to get most of the students involved in activities or encourage students to explain and defend their own ideas.

Individualism and Collectivism in Classes: Comparative Analysis of Lessons in Germany and Japan

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The purpose of this research is to propose a collaborative research framework for class analysis and to clarify its theoretical and practical significance, through the comparative case study in German and Japanese school focusing on an issue of correlating individualism and collectivism.

Individualization of learning has been considered as an essential part for teaching in class. The fact that children generally come to classroom with their various cultural and social background requires teachers to take the degree of academic achievement of each student into consideration. In terms of ‘exam’ and ‘evaluation’ the same discussion arises in order to ensure the academic achievement of each individual learning. Considering the special needs education, there is no room denying the importance of ‘individual support’ or improving competency of individuals.

On the other hand, children explore their study under various human interaction and human connection. Although an individual statement delivered by a child seems to be an individual performance, his statement could play a significant role for other’s acquisition of subject contents. Teachers should not overlook that such statement often arises from the result of collective learning and discussion. As such, no one doubts that learning process in a class will be necessarily held both individually and collectively.

The international tendency toward focusing individuality also faces the new phase of searching for the way of correlating both individual and collective learning in class and school. Achievement tests like PISA had been announcing academic gaps among countries, schools, and even learning gaps among students. It could be said that OECD which exposed individual status through PISA, with observing the development of ICT and learning science, was ‘Personalising Education’ (2006) oriented; however, OECD changed its direction toward ‘interact(ion) in heterogenous groups’ as the key competency, which adopts e. g. the skills for problem solving with others (‘collaborative problem solving’ in PISA 2015). The latest argument on didactics has finally stepped into a broad consensus that both individualism and collectivism are somehow indispensable for class.

How do ‘individualism’ and ‘collectivism’ relate in classes, then? In which situations is individualism and collectivism emphasized in the teaching and learning process? This research therefore strives to provide an answer to these questions from the standpoint of didactics from two countries: Japan and Germany, where deep-rooted didactical perspectives still today keep a critical sight on current arguments. Accumulating comparative case studies will provide us with a characteristic perspective on the relation between

individualism and collectivism .

To achieve this goal, methodology and framework of our collaborative research should be firstly clarified, with overviewing trends and issues of lesson study in Japan and Germany. Based upon the methodology, one case study conducted by Japanese and German researchers will be analyzed in order to pursue the main question of individualism and collectivism. This case is taken from a science class of 3rd grade in 'M' elementary school, Hiroshima. Through analyzing the case by various sources, such as fieldnotes, video records, and Transcripts, Japanese and German researchers shared opinions about individualism and collectivism. It is in the end expected that the comparative-collaborative analysis on 'M' elementary school case will not only propose a research framework for international collaboration of lesson study but will also conceptualize a way of balancing individualism and collectivism in classes. The significance of collaborative class analysis will be articulated when our collaborative discussion successfully conceptualize the correlation of individualism and collectivism which must arise in the 'M' elementary school case.