Setting the Stage for Mathematical Discourse

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Research Research tells us that complex knowledge and skills are learnt through social interaction (Vygotsky 1978; Lave & Wenger 1991). In class students are exposed to new knowledge. They need to apply and refine the new information and then connect it to prior understanding. Interaction allows them to communicate their ideas with others such that their thinking is made visible. In the process they are guided in mathematically sound directions and are also encouraged to evaluate each other's ideas in a safe environment making learning meaningful and joyous.

Teachers must be clear of the learning outcomes of the lesson so that appropriate tasks can be chosen to stimulate students to make connections among different topics / units and to link previously learnt concepts to new knowledge. Tasks that are higher in cognitive demand, support students' thinking and reasoning (Smith, M.S and Stein, M.K., 1998). In this presentation, a Framework adopted from (Smith, M.S and Stein, M.K., 2011) for orchestrating mathematically productive discussions which are rooted in students-thinking will be discussed. This framework identifies a set of instructional practices that will help teachers achieve learning objectives by using students' work. Such practices allow the teachers to deal with whole-class discussions and hence helping themselves to be more effective in orchestrating discussions.

A Network Learning Community comprising of teachers from four different Secondary Schools adopted this Framework in their Mathematics lessons. This team created several tasks. Some of these tasks were used to consolidate a chapter taught so that students see the connections between the units within the chapter. Other tasks created were more cognitively challenging. Students had to analyse the questions, think carefully, and communicate their thought processes clearly with their peers before coming to a decision. In the process, students learn to collaborate as a team and to analyse the questions from different perspectives.

These tasks were created and conducted for secondary students (13 to 16 year old). Participants in this session will be brought through the processes involved in selecting appropriate tasks to the delivery of the lesson. Lesson exemplars, samples of students' work and feedback from the teachers concerned will also be shared.

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What Teachers Have Learned through Using Classroom Video?

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A central task and challenge for teacher educators is to design learning experiences that offer the greatest potential for improving teacher practice (Seago, 2004). Recently, videos of classrooms have emerged as tools for teacher learning. For Thailand experience, teachers who participating in the Students' Mathematical Higher Thinking Development Project in Northeastern of Thailand, have been introducing Open Approach as a new teaching approach and Lesson Study as new context of collaborative work to improve the teaching approach. Teachers need to observe, interpret and analyze teaching during the initial period. The opportunities to analyze videos of teaching can be seen as a way to enhance the development of teachers' professional vision and improve their instruction (Osmanoglu, 2016). There are large number of research on using video in teaching professional development that described how to video in specific purpose such as stimulating discussion in teaching reflection and comparing teaching in different context. This research was aimed to literature analyze and identify aspects that teachers have learned through using classroom video in professional development.

Data collected by study more than 30 research reports on using classroom video in collaborative reflection, discussion stimulation and different context classroom teaching comparison that conducted with teacher students, pre-service teachers and in-service teachers for wide range of use and aspect. Data analysis was done by critical review research on using video and presented by using an analytic description.

Research results were shown that issues teachers have learned when they analyzed portrayals of exemplary practices are as follows: (1) Realistic evidence significantly contrast with idealistic image of classroom (2) Instructional vision derived from carefully observation and collaborative discussion on model classroom, would motivate teachers to create such instruction in their classroom (3) Awareness of their strong ideas on teaching that might be not correspond to colleagues ideas and need to discuss in detail.

Patterns of Teacher Dialogue That Promote Professional Learning Communities

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The objective of this study is to reveal the dialogic features that help to build professional learning communities. This study focuses on the relationship between the way topics are reported in a group discussion, and how these topics are discussed among the group members. By revealing the features of the dialogue of the discussion, this study aims to find some tips for better discussion in order to help participants think collaboratively and to gain mutual understanding.

The data was collected in semi-formal discussion settings offered by the board of education with an aim for teachers' professional development. Participants are 16 teachers, 12 from public elementary schools and junior high schools, and 4 from the board of education. All the participants joined the program autonomously, and the 4 teachers from the board of education participated as facilitators for the group discussion. For each session, the participants were divided into three groups, and in each group, one participant was designated as the reporter whose job it was to bring an outline of a lesson plan or a copy of a textbook they're already taught. Sessions were held every two months with the same members and facilitator in each group. In addition to the assigned group members, the author also participated in the discussions of one of the groups. 228 minutes of group discussions were recorded, and a discourse analysis was performed on the transcriptions in three steps as follows: First the discourse of the reporters was analyzed. Second the discourse of the participants, the other members including the facilitator, were coded. Third, these two features are compared to elucidate the relationship between the reporters' discourse and the participants' discourse.

In the first phase of the analysis, the reporters of each group showed one of three different types of discourse: (a) reporting teaching practices focusing on their facts and consequences, (b) reporting teaching practices and perceptions of their consequences, and (c) reporting teaching practices focusing on positive teaching skills. In the second phase of the analysis, five dialogic features were common to the members within the three groups. These five features of the discourse are: 1) Co-constructive talk, 2) Suggestion for improvement, 3) Topic control, 4) Argument development, and 5) Acknowledgement. All these were observed in the discussions of the three groups, but the frequency of each feature varied according to the way the topic was introduced.

In type (a) group, argument development, topic control and co-constructive talk frequently occured after the reports. In type (b) group, co-constructive, topic control, and acknowledgement followed the reports. In type (c) group, suggestion for improvement and argument development frequently took place. Out of 1,718 turns in total, co-constructive occurred more frequently than other types of discourse. Since the participants were from different schools, teachers tried to clarify the meaning of the reporters' statements by actively listening and co-constructing the statements.

By understanding the types of groups and their preferred communication methods through their dialogic features, this study encourages collaboration and mutual understanding among teaching

professionals, and may eventually contribute to the creation of effective professional learning communities.