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Mathematics teachers' meaning making – Problematizing the process of learning in and from daily practice

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Mathematics teachers' development and the understanding of what constitutes learning are an on going topic and highlighting the complexity in the processes of learning in and from practice. This study builds on the idea that mathematics teachers' professional development needs to be based on their classroom practice (Goodchild, 2008; Kazemi & Franke, 2004). Teacher participating in a working group, a learning community, and reflect on their own teaching and students learning. Working collaborative the mathematics teacher developed understanding of mathematical communication and mathematical reasoning in their teaching algebra.

Keywords: Developmental research project, mathematical communication and mathematical reasoning.

AIM AND RESEARCH QUESTIONS

Results from a pilot study showed teachers' difficulties with describing the concepts mathematical communication and mathematical reasoning as well as with using these concepts in their teaching. Based on the results from a pilot study and by means of using developmental research (Gravemeijer, 1994) the main study was designed as a collaborative work between mathematics teacher and a researcher. Also based on the results from the pilot study the reflection group decided to focus on; how could teachers develop classroom communication to stimulate students' mathematical reasoning? The main purpose of this study is to gain understanding of a process, of what and how teachers learn when participating in a reflection group.

THE THEORETICAL PERSPECTIVE

The theoretical perspective used in this study is *communities of practice* (Wenger, 1998), where learning is considered to be a function of participation and participants are constantly involved *negotiation of meaning*. From this theoretical perspective *reification* and *participation* are used in the process of *negotiation of meaning* (Wenger, 1998).

THE METHODOLOGY

This is a study of single case, consisting of five mathematics teachers from different elementary schools (grade 1–6). The five teachers and a researcher meet monthly in a workgroup, *the reflection group*. The project has used the model of *the developmental research cycle* (Goodchild, 2008, p. 208) as a methodology. This model is a cyclic process for both the professionals' mathematics teachers and the researcher. The model gives opportunities to analysing developmental activities with special emphases on the relation theories and practice (Goodchild, 2008). My interpretation and using *the developmental research cycle* (Goodchild, 2008, p. 208) is mutual between the researcher and the mathematics teachers, empirical data was generated from discussions and activities in the reflection group. The preliminary and on going results of the analyses fed back in the reflection group to provide development for practice (Goodchild, Fuglestad, & Jaworski, 2013). In the reflection group the teachers prepare mathematic tasks collaboratively, to be used in different classrooms. The participants use reflections in three different levels. These reflections are both individual and shared in the reflection group. The teachers make individual reflection before, during and after implemented lesson. When the teachers meet in the reflection group they discuss and reflect

together both on own reflections, on the student work generated and on the videotapes from their teaching. The third level of reflection the researcher present as questions from previous meeting. These reflections are used as a tool to problematize the on going education in mathematics.

PRELIMINARY RESULTS

The study indicates how teachers in this learning community came to understand the concepts communication and reasoning in mathematics and shifted their ways of talking about students' mathematical reasoning. I identify four shifts that teachers made in there learning about students' mathematical reasoning. *Understand, identify, interpreting and applies* the mathematical reasoning in their education.

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