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Teachers learning through participatory action research – developing instructional tools in mathematics primary classrooms

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Introduction

In many classrooms, from first grade through the whole school system, there are many students whose mother tongue is not the same as the teachers' language used for instruction (Khisty, 2001). In Sweden, newly arrived immigrant children with limited Swedish language knowledge are learning Mathematics together with children who have spent their entire life in a Swedish context. Considering the large number of students with limited knowledge in the language of instruction one of the most important tasks for teachers in Swedish primary education is to create conditions to support the development of mathematical knowledge in these students.

Lately, the role of language in mathematics education has received a profound interest in educational research. Researchers have emphasized the importance of teachers using specific strategies to facilitate the classroom communication to and support students' mathematical thinking (O'Connor & Michaels, 1993).

Specifically, in the syllabuses (Skolverket, 2011) it is particularly prominent that mathematics is dominated by discourse-intensive approaches, and the use of instructional tools such as talk moves, give ample opportunities for student learning (Chapin & O'Connor, 2007). Similar strategies for supporting students' learning in mathematics have received attention among effective teachers of second language learners in mathematics (Khisty, 2001).

This study uses action research which is characterized by ongoing processes of self-reflection, which can be thought of as a spiral of self-reflective cycles on planning a change, followed by acting and observing the process and reflecting on the process and then re-planning and so forth (Kemmis & Wilkinsson, 1998). Using PAR gives an attempt "to help people investigate and change their social and educational realities by changing some of the practices which constitute their lived realities" (Kemmis & Wilkinsson, 1998, p.22).

Method

The poster gives a brief presentation of a one-year research project where four primary teachers at the same school (year 2, 4 and 5) have been working together with a researcher, using participatory action research (PAR) (Kemmis & Wilkinsson, 1998) to develop their instructional tools in order to support students' mathematical development in multilingual classrooms. Data collection has continued throughout the whole action research process during the academic year. The empirical data includes teachers' logs, teacher questionnaires with open answers, researcher's notes, audio-

recorded discussions from the meetings twice a month in the project group and 3-4 video-taped mathematics lessons in each classes, 14 lessons altogether

Results

Although the focus in this project has been on instructional tools for supporting students' talk in order to enhance their development in communicating and reasoning mathematically, it is noteworthy that the teachers express their development, not only in terms of (1) instructional tools but also regarding other aspects such as (2) classroom organization and (3) focus on mathematical content.

Methods structured in these three themes above constitute a teacher *tool kit* to support students' learning mathematics in multicultural classrooms.

Conclusions

By using PAR, the teachers had the opportunity to reflect critically, analyze and act as coparticipants in the challenge to change the practices in which they interact, which also challenged their approach to teaching.

When teachers act and reflect on their use of specific strategies of classroom talk they also start reflecting and acting on other aspects of teaching, such as classroom organization and how to keep attention to the taught content. Thereby, the change in practice became more than just temporary changes.

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