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Video as a Tool in Prospective Mathematics Teachers' Professional development

Proposal information

The presented teacher education project is part of a four years long intervention project where we collaborate with teachers in two primary schools to create a successful learning culture in early learning of mathematics with special emphasis on language development. In this study we follow a group of student teachers in their third year of initial teacher education programme having their field practice with one of the collaborating teachers. This presentation is on preliminary findings from a study of student teachers' mathematical dialogues with third graders, with the aim of supporting the pupils' mathematical reasoning. The research question in this presentation is: How can video recordings facilitate identification of qualities and challenges in student teachers' mathematical dialogues with pupils?

Research shows that mathematical reasoning is important for children's later achievement in mathematics (Nunes, Bryant, Sylva & Barros, 2009). Differences in pupils' mathematical thinking and reasoning could be attributed to the type of questions that teachers ask (Kazemi & Stipek, 2001). However, questions posed within mathematics classrooms across the world fail to provide students with opportunities to reason about mathematical concepts or to explore mathematical connections (Hiebert et al., 2003). Asking questions that probe pupils' thinking is a complex skill that requires thoughtful planning, as well as analysis of the mathematical and pedagogical goal of the lesson (Manouchehri & Lapp, 2003). According to Henning and Lockhart (2003) prospective teachers pose questions quickly with few follow-ups, giving little time for the pupils to expand their answers. Thus, developing questioning skills for mathematical understanding and content knowledge is an important part of learning to teach mathematics.

As with questioning, learning how to listen to and interpret pupils' mathematical ideas is not a simple task (Chamberlin, 2005). As a consequence, researchers contend that developing the capacity of professional noticing must be an early focus of teacher education programs (Sherin & van Es, 2005; Star & Strickland, 2008). Jacobs et al. (2010) define and conceptualize professional noticing as a set of three interrelated skills: *Attending* to children's strategies, *interpreting* children's understandings, and *deciding* how to respond on the basis of children's understandings (p. 172). Work with practicing teachers in the context of video-clubs show that the teachers improved noticing over multiple experiences discussing video from their own teaching. Moreover, conversations about what the participant teachers noticed shifted from a focus on what the teacher was doing to what the pupils were saying (Sherin & van Es, 2005). Videotaping seem to help teachers examine their ability to facilitate discussions by slowing down the fast pace of classroom life so that explicit noticing of particular aspects of the discussion can be further analyzed. In this sense, video coaching, the use of taped activities of the student teachers' own teaching, which leads to group discussions, can play an important role in field practice (Masats & Dooly, 2011).

Methodology
The presented study is from an intervention where we explore use of video in field practice. A group of four student teachers were voluntarily recruited from their third year of a four-year teacher education programme with special emphasis on mathematics. With the presented theory in mind, the student teachers together with the mentors were instructed to plan for productive mathematical whole class dialogues. The executions of these dialogues were video recorded, and discussed in the mentoring session after teaching. Thus, the mentoring followed a cycle of three phases, planning-teaching-reflection.

For research purposes, all phases were video-recorded. A video-based design encompasses the complexity and diversity of voices, perspectives and issues at play during teaching and learning in classrooms. Video makes it possible to freeze, capture and recapture in detail situations in teaching and learning processes. Moreover, in studies of language and communication, details and correct accounts are of great importance, both verbal and non-verbal expressions.

There are two kinds of data material. One is videotapes and transcripts from the student teachers' teaching and from mentoring sessions before and after teaching. In the latter the videotaped dialogues from the classroom, were observed and discussed. The second data source is the student teachers' daily reflective logs from their period of field practice.

Through an inductive approach, we have used procedures and techniques from the constant comparative method (Strauss & Corbin, 1998). In this process, questions and comparisons were used as main analytical tools: Did the actual teaching go according to the plan? What was in focus/present in the different phases of planning-teaching-reflection? What kinds of questions were asked in the dialogues? How were pupils' utterances treated? What are the indicators of the student teachers' competence as mathematical dialogue partners?

Preliminary findings are discussed with the student teachers and the mentors.

Conclusions, Expected Outcomes or Findings
Preliminary analysis of the data material adds some nuances to previous research as the student teachers were well prepared regarding which questions to pose to facilitate a productive mathematical discussion. To support this, the student teachers also managed to give the pupils reasonable time to think. What seems to be prominent is the challenging task of representation. Even though focused in the planning session, the student teachers found it hard to select *what* to write on the smart board to capture the pupils' responses, and *how* it should be written. This indicates that the student teachers struggle with *contingency,* the ability to respond appropriately to contributions made by pupils. This is one of four categories in the Knowledge Quartet, and this captures the ability to handle unplanned events (Rowland, Huckstep & Thwaites, 2005). The student teachers did not foresee the need for making clear representations of the pupils' strategical thinking on the smart board. The result was that part of the group were not able to follow and learn from the schoolmates' explanations and reasoning. In the mentoring session, having video recording of the classroom discussion the mentors and the student teachers got the possibility to freeze the discussion in the classroom at crucial points and analyse the ideas made by the pupils and reflect on different possible ways to respond and different ways to represent the ideas on the smart board.

Intent of publication
The presentation will be developed into an international article, journal not decided.

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