WORKING GROUP

WORKING GROUP ON MATHEMATICS CLASSROOM DISCOURSE

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This working group on mathematics classroom discourse will focus attention on the specifically mathematical characteristics of discourse in mathematics classrooms. Participants will work together in small groups to respond to various artifacts from mathematics classroom discourse. In large-group discussion, we will hear from the small groups and work together to find some common ground.

Recap of First Meeting, Roanoke, 2005

Last year's discussion group on mathematics classroom discourse (Choppin et al., 2005) was structured around three guiding questions:

1. What theoretical frameworks might be used to study classroom discourse in demographically diverse settings?
2. What are the specific mathematical characteristics of discourse, and how do our analytic techniques account for these characteristics?
3. How can the study of discourse help us understand and transform the teaching and learning of mathematics?

Participants in this discussion group began to investigate the nature and role of discourse in mathematics classrooms. The 40 participants were introduced to three theoretical frameworks as examples of a range of frameworks for analyzing the discourse. Participants analyzed and interrogated these frameworks for researching the nature and impact of discourse practices in terms of both social and mathematical aspects. Furthermore, methodological and analytical challenges were considered.

Format for Working Group, Mérida 2006

Continuing the conversation from last year's discussion group, this working group will continue to be structured by the above three guiding questions. While our discussions last year primarily focused on question one, this year's working group will focus on the second of these three questions, and will depend more heavily on the participation of the assembled group.

The sessions will be centered on the consideration of mathematics classroom artifacts. In the first session, David Pimm will use one artifact to lead the group in a discussion about the mathematics register and its implications for classroom discourse. This discussion, which relates closely to this year's focus question on mathematical characteristics of classroom discourse, will underpin small-group discussions about other artifacts.

Participants in this working group will work together in small groups to respond to mathematics classroom artifacts that may include:

- video excerpts, drawn from the TIMMS video study model lessons (RBS, 2003)

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- audio excerpts
- transcripts
- student writing
- textbooks
- technological tools (e.g. graphing calculator)
- assessment instruments

The range of theoretical and methodological perspectives that participants bring to this working group, together with the focus on unique characteristics of mathematics classrooms, will provide rich ground for small-group discussion. Groups will be given artifacts to study and will be asked to address prompts such as the following:

- What features of the discourse do you see represented in your artifact?
- Relate these features to characteristics of classroom discourse that are unique to mathematics classrooms.
- Consider alternatives to the classroom discourses you see represented in your artifact.
- Identify constraints and affordances experienced by teachers interested in implementing alternatives to these discourses.
- What is the impact of your theoretical and/or methodological perspectives on your responses to the above prompts?

After groups will have had sufficient time to work on their artifacts the larger group will be convened for the small groups to share their findings. We hope that each group will have a chance to study more than one artifact. At the end of the last session there will be some discussion about future directions for the working group and potential writing projects.

Rationale for Work on Mathematics Classroom Discourse

Theoretical Frameworks

The word *discourse* can mean various things. A range of analytical tools has been used to study mathematics classroom discourse. Each analytical tool foregrounds its own aspects of discourse. In addition to the various scholarly approaches to discourse, the term has wide currency in professional literature. For example, the NCTM *Standards* documents (1991, 2000) stress the role of discourse in the learning and teaching of mathematics, and promote particular forms of discourse in an attempt to normalize certain classroom practices.

In this context, in which various educators refer to different aspects of discourse and even use some of the same words in differing ways, there is value in bringing people with different perspectives together. We can understand our own perspectives better when we listen to others describe their perspectives. We can work together toward common goals, complementing each other's foci.

The Mathematics in "Mathematics Classroom Discourse"

Studies focusing on features of discourse that are uniquely mathematical include investigations of argumentation (e.g., Lampert, Rittenhouse, & Crumbaugh, 1996), hidden regularities in interaction patterns (e.g., Voigt, 1995), the mathematical register (Pimm, 1987), metacommenting used by mathematics teachers (Pimm, 1994), and the triadic dialog (i.e., the IRF sequence) and its relationship to forms of *habitus* (Zevenbergen, 2001).

In addition to the need for extending present scholarship relating to mathematics classroom discourse, we need to consider carefully the relationships between characteristics of mathematics and the already-identified features of mathematics classroom discourse. There is also a need to develop more analytic tools that are specifically geared toward mathematics classrooms. While we can learn much about the social order of mathematics classrooms using tools developed by discourse analysts, these tools do not often take into consideration the specific mathematical content of the conversations taking place (Steinbring et al., 1998).

Though the characteristic abstraction and generalization associated with mathematics often directs attention away from critical socio-cultural issues such as social class, gender, and race, a focus on aspects of classroom discourse that are particular to mathematics classrooms can uncover such issues. However, these issues are rarely examined in discourse studies in mathematics classrooms. Focusing discourse studies on inequities can help us understand the range of language use and interaction patterns students bring to mathematics learning and illuminate issues of authority and power (Atweh, Bleicher, & Cooper, 1998; Herbel-Eisenmann, 2003; Herbst, 1997; Zevenbergen, 2001). Though significant work toward understanding mathematics classroom discourse has been done, the research community still has far to go in its attempt to understand many aspects of discourse (Steinbring et al., 1998).

Practical Implications of this Work

There is evidence that discourse practices have not changed much in the last two decades (Spillane & Zeuli, 1999; Stigler & Hiebert, 1999) and there is little evidence of the connection between the nature of discourse practices and mathematics achievement (Steinbring et al., 1998). From a practical perspective, it has been shown that mathematics teachers' discourse patterns are quite traditional, including those of teachers who are attempting to change their classroom practices (Cohen, 1990; Herbel-Eisenmann, Lubienski, & Id Deen, 2004; Spillane & Zeuli, 1999) and a broader sample of mathematics teachers in the US (Stigler & Hiebert, 1999). This is important given that the reform movement in North American mathematics education has made some particular demands on teachers.

Most of the scant literature where teachers have been involved in examining their own classroom discourse has focused on teachers in unusual situations, for example, teacher development experiments (e.g., Cobb, Yackel, & Wood, 1993) or teachers who are considered experts in mathematics education (e.g., Lampert & Blunk, 1998). Only recently have researchers used the tools and concepts of discourse analysis with teachers as they teach in their ordinary classrooms (e.g., Rowland, 2000).

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