Rituals: Connecting the Social and Disciplinary Aspects of Mathematics Classrooms

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In this symposium we invite participants to contribute their personal and cultural understandings of "ritual" and join us in discussing this construct and what it might reveal about mathematics teaching and learning. Symposium presenters have each found it useful to use ritual to describe or notice qualities of mathematics teaching and learning in empirical projects. We share common curiosities and motivations in our research agendas, but we also have points of departure from one another in our conception of ritual. We invite participants to join us in considering how our various and distinct perspectives might complement one another in our shared agenda of conducting mathematics education research that sheds light on the social, cultural, and political contexts that influence all mathematics teaching and learning.

Introduction and Rationale

This symposium takes as its starting point Erikson's (1982) call to jointly consider the social and cognitive aspects of learning "if we are to develop an interactional theory of cognitive learning and teaching in social occasions" (p. 156). This statement is more than three decades old, and this call remains relevant, especially in mathematics

education. Studies that focus on the social dimensions of mathematics teaching and learning often neglect to consider the mathematical content being taught, while those looking at the mathematical content fail to consider the interactional aspects of teaching and learning. In bridging this gap, we have found Sfard's (2008) communicational theory, which conceptualizes mathematics learning as a particular form of social practice, an important step forward. In particular, we concentrate on her conceptualization of *ritual participation in mathematical learning*. The concept of ritual, which has been dealt with extensively in sociological and anthropological research, serves as a type of "conceptual boundary object" that enables us to connect the abundant research on social practices in the classroom with research on mathematical cognition and practice. All symposium presenters have found the notion of ritual to be helpful at capturing various "non-cognitive" aspects of mathematics teaching and learning. We have found that the notion of ritual helps us understand mathematics classrooms as spaces that are more than the sum of individual students' and teachers' knowledge and beliefs.

The general plan for the session is to begin by presenting our shared understandings and motivations and then highlighting the differences in our approaches. We have found that exploration of the distinctions has been generative to our own work, and we think that participants will similarly benefit in their own projects. To that end, we have invited a discussant whose work has touched upon the social aspects of classroom practice (e.g., Otten, Herbel-Eisenmann, & Cirillo, 2012), the disciplinary content in mathematics classrooms (e.g., Herbel-Eisenmann & Otten, 2011), and has used critical perspectives to consider mathematics classroom discourse (e.g., Herbel-Eisenmann & Wagner, 2010). We suspect that her insights will raise productive questions and serve to locate our theoretical and methodological dilemmas within wider challenges of mathematics education research.

Perspective One: Ritual as a Type of Disciplinary Practice

In this presentation, Einat will share her research on students' ritual participation in mathematical learning. Her framework draws on

Sfard's (2008) definition of ritual as performing routines for the sake of connecting with others (teachers, grownups, etc.) in contrast to explorative participation that is performed for the sake of describing the world mathematically. In exemplifying ritual participation, Einat will present two cases of 7th graders who studied under her instruction in an out-of-school course for 5 months. The first is Idit (Heyd-Metzuyanim, 2015), who, in addition to being instructed, was also followed for 2 years after the end of the course. Idit, who ended the course with high achievements, gradually became more ritualistic in her performance of mathematical routines, along with becoming extremely anxious about mathematics and failing her class at 9th grade. The case will be made that Idit's initial weakness in fractions at 7th grade, together with an educational environment at home and at school that encouraged procedural rule-following, provided fertile ground for the widening of her ritual participation.

The interactional aspect of ritual participation will be exemplified with the story of Dana (Heyd-Metzuyanim, 2013), who started the course with extremely low achievements and failed to progress despite intensive instruction. Close-up analysis revealed how Dana's ritual participation was, in fact, co-constructed by Dana and her teacher, Einat. Dana's case highlights the many factors (such as curriculum and parents' expectations) that, once a gap has been formed, hinder students from moving to explorative participation.

Broadening the Application of Perspective One: Ritual as a Characteristic of Both Teaching and Learning

In this presentation, Mellony and Einat will share their collaborative project in which they attempted to trace possible reasons for elementary school students' limited progress in numeracy in a low SES South African context. This was done through two lenses. One aimed to analyse two learners' (Mina and Rondaldo) ritual vs. explorative participation both in one-on-one interviews and in a small group "math club" lesson led by Mellony. The other lens examined the mathematical milieu in which these learners have been participating, through the analysis of a typical school-classroom lesson, similar to that in which

Mina and Ronaldo have been studying. We show that while Mina was acting in an extremely ritualized manner in the "math-club" lessons, Ronaldo was more explorative in his actions. However, the milieu, as seen in the school lesson, encouraged almost exclusively ritual participation. Thus while Mina was identified as a good and well-motivated student, Ronaldo was identified as an outcast or "trouble maker". We conclude by drawing implications about the tenacious nature of rituals in the mathematics classroom and the challenges of changing them.

Perspective Two: Ritual as a Lens for Recognizing Culture in the Mathematics Classroom

In this presentation, Andrea will summarize her understanding of ritual, especially in contrast to the preceding perspective. McCloskey (2014) has defined ritual as that aspect of action that is *symbolic, traditionalized, formalized performance*. These four characteristics of ritual enable researchers to attend to the sociocultural nature of classroom practices. For Andrea, ritual is one way to "get at" the cultural nature of a practice because it is a mechanism through which cultural patterns may be perpetuated (Giddens, 1994), or, more hopefully, transformed (Turner, 1969).

By way of example, Andrea and colleagues (McCloskey, Lloyd, & Lynch, 2014) conducted an ethnographic study of a 5th-grade mathematics classroom in the United States. Using interviews, classroom observations, and artefact gathering and by applying ritual as an analytic framework, we uncovered tensions and contradictions at work in the classroom. For example, the phrase "Show your work" was used often by the teachers in an effort to encourage mathematical thinking, but we found instances where the phrase served to funnel mathematical thinking into particular forms. In this session, Andrea will share these and similar findings. She will also describe and seek feedback on theoretical and methodological challenges that arise, such as *How can we make claims about the cultural nature of a practice when the primary point of contact and data collection are the activities and attributes of individual teachers and students? How can humanities-oriented approaches help researchers make the postmodern turn?*

Plan for Symposium

More specifically, we plan to use the 90 minutes as listed below:

1. A brief introduction, including the goals, agenda and an overview of the three presentations (10 minutes)
2. Presentations, as detailed in abstracts above (15 × 3 = 45 minutes total)
3. The discussant will offer feedback to individual presenters as well as to the ideas presented as a whole, and will invite participants' questions and ideas to constitute a larger discussion (10 minutes)
4. Symposium presenters will share recently collected data (video data and/or transcriptions) and invite participants to use one or both frameworks to analyze the data. Participants will be invited to reflect and offer critique on the applicability and usefulness of the frameworks. Possible questions include:
   a. How useful is ritual for conducting research in mathematics education? What are the similarities and differences with other constructs in use in mathematics education research?
   b. What are possible implications for practitioners from either or both perspectives of ritual?
   c. What is foregrounded and what is obfuscated when ritual is used as way of thinking about mathematics teaching and learning? (25 minutes)

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