Title: Conflicting Discourses, conflicting values

Caroline C. Williams, University of Wisconsin-Madison, 244 West Lakelawn Place, Madison, WI 53703,
ccwilliams3@wisc.edu

Abstract: Research designed to elicit middle-school mathematics teachers' perceptions of connections between in-school and out-of-school mathematical reasoning revealed an unexpected clash. The teacher participants gave evidence of valuing both student efficiency and student understanding, but the simultaneous salience of those values was positioned by the teachers as problematic. Rather than viewing efficiency and understanding as complementary aspects of mathematics learning and doing, teachers spoke of the two values as conflicting and in opposition to one another.

Considerable research indicates that students demonstrate mathematical knowledge outside of the classroom that may not be equally well demonstrated within the classroom setting (e.g. Saxe, 1988; Nunes, Schliemann, & Carraher, 1993; Nasir, 2002). In order to develop more equitable learning environments, teachers must acknowledge that students bring informal mathematical knowledge to the classroom, and that such knowledge should be built upon when teaching (Carpenter & Lehrer, 1999). Staples and Hand (under review) found that a factor in creating equitable reform classrooms may be the expansion of what teachers accept as mathematical contributions from students, which emphasizes the importance of teachers' beliefs in what mathematics *is* and how it is *done*. In this study, an emergent theme indicated that the teachers perceived a conflict between student efficiency and student understanding in their profession of middle-school mathematics teaching. The investigation of this theme utilizes Gee's (1990) Discourses and Goffman's (1981) lamination to explore the various beliefs of the teachers in navigating the space between efficiency and understanding.

Methods

Teachers' practices and beliefs are examined in a study originally designed to elicit the teachers' perceptions regarding the logical and mathematical reasoning of their students in three environments: mathematics classrooms, non-mathematics classrooms, and outside of school (1). Ten teachers with experience teaching middle-school mathematics as well as other middle school subjects (experience ranging from 3 to 19 years) were audio-taped as they participated in one-on-one semi-structured interviews (Wengraf, 2001). Transcripts of the interviews were created by the researcher, and qualitative analysis was conducted utilizing NVIVO 7 to examine emergent themes. Analysis relevant to this focus stemmed from the data, which identified the mathematical strategies the teachers valued and espoused to value, as evidenced by their explicit and implicit judgments.

Participants were presented with two scenarios that exemplified informal mathematics reasoning from Nunes, Schliemann and Carraher (1993), and asked to interpret the solution strategies. Then participants discussed strategies their students may use to solve those scenarios, and gave examples of strategies they would prefer or consider more sophisticated. For each strategy identified by the participants, they were asked to justify why they would or would not encourage students to use it.

Results

An unexpected result that arose from the data concerns a salient conflict perceived by teachers between valuing student efficiency and valuing student understanding. First, the participants explicitly recognized all strategies as being valuable, but the majority stated preference for more traditional algorithms. The participant-expressed qualifiers for mathematical sophistication primarily involved speed, accuracy, and conciseness. Similarly, nearly all participants stated willingness to accept alternative strategies within their classrooms, but generally considered them to be an access point to understanding that *may* support teaching students a more formal algorithm. Such strategies were considered indicative of mathematical understanding, but most of the participants felt that such strategies were insufficient, and that further algorithmic usage was necessary.

One way to interpret these findings utilizes Gee's (1990) conceptualization of Discourses, paying close attention to the power structures that encourage continuance of established values within individual Discourses. Gee states that

> each Discourse protects itself by demanding from its adherents performances which act as though its ways of being, thinking, acting, talking, writing, reading, and valuing are 'right,' 'natural,' 'obvious,' the way 'good' and 'intelligent' and 'normal' people behave. (p. 191)

I therefore view the participants as present within a conflict between two Discourses with two (sometimes aligning) sets of values, behaviors, norms, and ways of *doing* mathematics.

Central to my conceptualization of these Discourses are the participants in the study and their perceptions, as well as their explicit and implicit definitions. As definitions arising from the data, these two conflicting Discourses are characterized as the *traditional* mathematics Discourse and the *sense-making* mathematical Discourse. Student understanding is summarized as *the conceptual comprehension of mathematical content as expressed through student sense-making strategies*, and student efficiency is summarized as *the ability to quickly solve mathematical problems through utilization of precise and generally pre-defined algorithms*. When I refer to these terms, I intend the participant-driven definitions above.

The participants moved in and out of the two Discourses throughout the interviews, and spoke of the two Discourses as if the salience varied for them. Participants sometimes appeared to strongly identify with the values of one Discourse, only to switch and strongly identify with the other. Often, the values of the two Discourses overlapped, either supporting each other or – more frequently – conflicting. While Gee's theory includes the idea of multiple Discourses and their individual characteristics layering, the results of my analysis make concrete an example of such layering and, specifically, how it affects teachers' beliefs. To illustrate more deeply the layering of these two Discourses the concept of *lamination* is adopted from Goffman (1981) to emphasize the *simultaneous* presence and salience of both Discourses for the teachers in their conceptualization of student mathematical reasoning. The key contribution of *lamination* to this analysis is the tension created by the dominant mathematical Discourse as teachers reflect upon student understanding, efficiency, and accuracy: the participants, regardless of which Discourse they most identify with, must frame their own values within the traditional values of the dominant Discourse. Most participants spoke of preferring the values ascribed to the sense-making mathematical Discourse, and yet struggled to negotiate this discourse within the traditional mathematical Discourse.

Discussion

The conflict these teachers perceive when they speak of *efficiency* and *understanding* is cause for concern, as the values are spoken of as if they are in opposition rather than reconcilable. Defining successful mathematics-doing as requiring the element of speed narrows the opportunities for all students to thoroughly engage in understanding mathematics, and therefore further limits the access students have to the important field of mathematics. Furthermore, this research indicates the need to examine more closely how exactly mathematics learning takes place in classrooms in which the teacher perceives a conflict in values between simultaneously salient Discourses.

The key finding of this research is not how these particular seven teachers conceptualize the traditional mathematics Discourse and the sense-making mathematical Discourse, nor how they talk about negotiating the two, but rather the insights about the layering of multiple Discourses "over" a single person. When multiple Discourses are in play, there may be complementary values as well as conflicting values that are difficult or impossible to reconcile. When examining the activity of even a single person, what may appear to be a single Discourse may in fact be a layering of various Discourses that interact in complex ways. In order to fully understand the many factors at play for individuals or dynamic classrooms, increased attention to the values, beliefs, and ways of acting and talking can reveal the laminated Discourses that conflict over or support certain ways of mathematics-doing and learning.

Endnotes

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(2) All names are pseudonyms.

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