

Negotiating Identities for Mathematics Teaching in the Context of Professional Development

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Abstract

In this article, we present an analytical approach for documenting the identities for teaching that mathematics teachers negotiate as they participate in two or more communities that define high-quality teaching differently. Drawing on data from the first two years of a collaboration with a group of middle-school mathematics teachers, we focus on a critical initial condition for teachers to improve their practice—determining that the effort required is worthwhile. Our analysis indicates that the teachers were constructing distinct identities for teaching mathematics as they worked in the institutional context of the school and the context of ongoing professional development. The results of this paper speak directly to a central issue that arises when supporting teachers' efforts to improve their instructional practices: their motivation for affiliating with a vision of teaching that involves centering instruction on student thinking.

In this article, we address an issue that is central to instructional improvement: how teachers become motivated to improve their classroom practice. We consider a situation that is common to many professional development endeavors; when the vision of high-quality mathematics instruction that orients professional development is not aligned with the vision in the institutional context of the schools in which the teachers work. A critical question in such cases concerns the changes that teachers go through as they determine whether it is worthwhile to attempt to change their teaching practice.

The data for this paper come from the first two years of a five-year professional development collaboration between middle-school mathematics teachers and mathematics education researchers¹. We focus here on the first two years of the collaboration because of our interest in a critical *initial condition* for teachers to improve their practice—determining that the effort required is worthwhile. The case is significant because an analysis of the professional development collaboration in subsequent years (in particular, years 4 and 5) demonstrated that teachers did indeed change their classroom practices in a manner consistent with the instructional commitments that they talked about during years 1 and 2 (Visnovska, 2009). Our goal in this article is to document the teachers' development of these initial instructional commitments or, in other words, the process by which they came to identify with the vision of high-quality mathematics instruction that oriented our professional development work with them. The contribution of the article stems from our reframing the issue of teacher motivation in terms of supporting their development of a particular type of *identity* as mathematics teachers.

Teachers' motivations concern not simply their ideas about teaching, but their desire to learn to teach in a particular way. Our interest in teachers' motivation for developing the forms of instructional practice promoted in professional development stems from findings in the

literature that suggests that improving instructional practice is not limited to developing a deep understanding of the content (Hill, Rowan, & Ball, 2005), but also involves reconceptualizing what it means to teach mathematics (Cobb, McClain, Lamberg, & Dean, 2003; Kazemi & Franke, 2004; Franke, Carpenter, Levi, & Fennema, 2001), and coming to believe that the effort required to improve practice will be worthwhile (Warren-Little, 1993). Our analysis focuses on this process of coming to believe that the effort is worthwhile by considering the forms of instruction with which teachers come to identify, or their *identities for teaching*, and particularly how those identities change (cf. Akerlof & Kranton, 2005).

Our analysis builds on two related theories of identities, both of which emphasize the role of others in shaping how identities are defined: Gee's (2001) notion of different sources of identity (specifically, institutional and affinity), and Cobb, Gresalfi, and Hodge's (2009) explanation of the relationship between normative and personal identities. Drawing on these theories of identity enables us to treat motivation as a developmental process rather than a trait that people either do or do not possess. Specifically, we illustrate that changes in the types of instructional practices with which teachers identify, and thus in their *personal identities* as mathematics teachers, involves changes in their motivations for teaching.

In the case we present we document that the institutional context of the teachers' schools and the context of the professional development sessions held contrasting views of effective mathematics teaching, and thus presented two distinct *normative identities* for mathematics teaching. These two visions of high-quality teaching were in tension for many of the teachers. Their personal identities for teaching mathematics evolved as they contributed to the constitution of the normative identity established in the professional development sessions, and as they

worked to reconcile the conflicting normative identities for teaching established in their schools and in the professional development group.

Theoretical Framework

Research on student learning in a range of mathematical domains indicates the value of engaging students in mathematical activity that is intellectually demanding and in which they can see some value (Kilpatrick, Martin, & Schifter, 2003). Attaining the resulting vision of high-quality mathematics instruction involves significant learning for most teachers. First, teachers necessarily have to develop a relatively deep understanding of the mathematical ideas that they are asked to teach (Ball & Rowan, 2004; Cochran-Smith & Lytle, 1999; Schifter & Fosnot, 1993). Doing so often requires that teachers personally engage in forms of mathematical activity that differ from those they experienced as students, and also requires that they reconceptualize the nature of what it means to do mathematics (Cohen & Ball, 1990; Schifter, 2001).

Second, teachers have to reorganize their current instructional practices in ways that support students' engagement with central mathematical ideas (Heaton, 2000, Schifter, 2001; Sherin, 2002). Many studies of student learning have documented that what students learn is inextricably bound with the nature of the classroom activities in which they engage (Bransford, Brown, & Cocking, 2000; Cobb & Bowers, 1999; Greeno, 1991; Lave, 1988). For example, students in classrooms in which the traditional IRE (Initiate-Response-Evaluate) (Mehan, 1979) pattern of interaction predominates have the opportunity to respond to known-answer questions posed and evaluated by the teacher, but do not have the opportunity to learn to pose questions or to evaluate each other's arguments. In other classrooms in which teachers routinely rephrase or revoice students' contributions (O'Connor & Michaels, 1996), thereby framing them as topics of conversation, students have the opportunity to respond and evaluate each other's ideas. These

different types of instructional practices support students' development of different types of mathematical competencies. There is a broad consensus in the mathematics education research community that the forms of mathematics instruction that Stigler and Hiebert (1999) showed are typical in the United States need to change if students are to have opportunities to develop deep conceptual understanding of central mathematical ideas.

Third, the school and district settings in which teachers work have to be considered in instructional improvement efforts if teachers' attempts to improve their practices are to be supported effectively (Cobb et al., 2003; Franke et al., 2001; Gamoran et al., 2003). For example, if teachers' are to develop instructional practices that focus on conceptual understanding as well as procedural facility, then it is important that school and district leaders recognize such practices as instances of good mathematics teaching (Cobb & Smith, 2008; Gamoran et al., 2003; Nelson & Sassi, 2005; M.K. Stein & Nelson, 2003). As a second illustration, the findings of a number of investigations indicate that teachers' participation in professional networks and communities can support their development of instructional practices of this type (Franke & Kazemi, 2001; Gamoran, Secada, & Marrett, 2000; Kazemi & Franke, 2004; Little, 2002; M.K. Stein, Silver, & Smith, 1998). Creating supportive conditions for professional teaching communities by scheduling time for teacher collaboration and providing sustained, job embedded professional development constitutes a significant change in the institutional settings in which most mathematics teachers work (Grossman, Wineburg, & Woolworth, 2001).

Given the demanding nature of instructional practices compatible with current reform recommendations, it is critical that teachers consider the effort involved in developing new practices to be reasonable and worthwhile (Cobb & Yackel, 1996; Warren-Little, 1993). This requirement highlights the importance of teachers coming to identify with the view of high-

quality mathematics teaching established in professional development contexts, and thus becoming motivated to improve their classroom practices. In this regard, Stein, Silver, and Smith (1998) observed that:

The reform movement challenges most ways that the majority of teachers have come to view themselves and their role in the teaching and learning process. Hence, viewing the transformation from a skills-oriented to an inquiry-oriented teacher as a journey involving personal identity development is quite appropriate. (p. 48)

Identities for Teaching

As we have indicated, we draw on two specific frameworks to understand changes in teachers' identities for mathematics teaching. As background, we note that the term identity has been used in a variety of ways in mathematics education and related fields. Conceptualizations of identity range from an emphasis on individual teachers' beliefs about themselves (Knowles, 1992), to the stories teachers tell about themselves (Connelley & Clandinin, 1999; Drake, Spillane, & Hufferd-Ackles, 2001), to the ways that teachers participate in particular types of activities (Kazemi & Franke, 2004). The lines of research that have focused on teachers' beliefs and narratives demonstrate that the ways teachers conceive of and recount their work experiences are related to the changes that they make in their practices (Drake, Spillane, & Hufferd-Ackles, 2001; Knowles, 1992). However, conceptualizations of identity for teaching as beliefs and as stories are less useful in informing the design of teacher professional development. This is because these lines of work foreground and separate what is believed or recounted from the contexts in which beliefs or stories are constructed.

In the third line of work, identity is conceptualized in terms of the ways teachers participate in particular types of activity (e.g. professional development, classroom instruction). In this view, teachers' identities for teaching are profoundly shaped (but not determined) by the

norms, values, and practices of the specific contexts in which they participate professionally. This perspective is useful because it makes it possible to connect the nature of professional development activities and the ways in which teachers participate in them with the personal identities for teaching that they are developing. In this article, we draw on a conceptualization of identity developed within this tradition by Gee (2001). This conceptualization is useful for our purposes because it allows us to take account of both the professional development context and the institutional context of the school. Gee argued that the process of *recognition* is central to identity formation, noting that in any given context an individual is recognized as acting as a certain "kind of person." In this view, identity is not a set of personal characteristics or beliefs. Instead, identity refers to the set of practices and expectations that shape participation in particular contexts. Identity is therefore conceptualized as an interactive accomplishment.

Gee distinguished four different bases for these acts of recognition. Two of these, which Gee (2001) termed *institutional* identity and *affinity* identity, are directly relevant to our purposes in this article. An institutional identity refers to instances in which someone is recognized as being a certain kind of person based on the ways that a particular positional role (for example, principal or mathematics teacher) is defined and legitimized by authorities within an institution. In contrast, an affinity identity refers to instances in which someone is recognized as being a certain kind of person based on the ways in which she participates in a particular group (for example, a professional teaching community).

It is important to clarify that a focus on the role of recognition in the negotiation of identity does not deny individual agency; a teacher can accept or oppose the ways in which her instructional practices are recognized. We extend this key aspect of Gee's treatment of identity by proposing that the process of *identifying* in a particular context can be understood as a relation

between two elements: the *normative identity* that has been established in that context, and the *personal identities* that individuals develop as they participate in the practices of that context (Cobb, Gresalfi, & Hodge, 2009).

The normative identity for teaching established in a particular setting comprises a set of obligations that a teacher would have to fulfill to be recognized as a competent mathematics teacher in that setting (cf. Jackson, 1966). In Gee's terms, the normative identity for teaching established in a school constitutes the basis upon which a teacher is recognized as a certain kind of teacher by school leaders and other teachers. Similarly, the normative identity for teaching established within a professional teaching community constitutes a different basis for being recognized as a certain kind of teacher. It is therefore possible that observations of a teacher's instruction will be seen as indicative of high-quality teaching in one context but not in the other.

It should be clear that the normative identity for teaching established in both types of contexts is *not* an individual or personal notion, but is instead a collective notion with respect to which teachers are recognized as effective or not by others in that context. It is also important to clarify that a normative identity for teaching is not synonymous with the norms established in a particular setting, although the two are closely related. The norms established in a setting encompass the set of obligations that people expect each other to fulfill in that setting. In contrast, the normative identity for teaching established in a setting comprises the subset of expectations that are specific to instructional practice and that a teacher would have to fulfill in order to be recognized as competent. We purposefully introduce the term identity when referring to this subset of obligations to emphasize that in coming to identify with the concomitant form of instructional practice, teachers become motivated to develop that type of practice (c.f. Cobb, Gresalfi, & Hodge, 2009).

The *personal identity* that a teacher develops in a particular context concerns the extent to which she identifies with others' expectations for competent teaching in that context. There are three cases to consider. First, a teacher might see little value in the normative identity established in a particular context, but none-the-less attempt to comply with others' expectations for her classroom practice. In merely complying, the teacher would attempt to fulfill *obligations-to-others*, be they those of the principal or other school leaders, or the other members of a professional teaching community. Second, a teacher might come to value what counts as competent teaching in a particular context and thus be motivated to develop instructional practices of this type. In identifying with what counts as competent teaching in this manner, *obligations-to-others* become *obligations-to-oneself* for the teacher. This view is consistent with Holland, Skinner, Lachicotte, and Cain's (1998) description of identification as a process whereby communal activities "in which one has been acting according to the directions of others becomes a world that one uses to understand and organize aspects of one's self and at least some of one's own feelings and thoughts" (p. 121). Third, the teacher might oppose what counts as competent teaching in a particular setting by developing contrary instructional practices, in the process being recognized as less than competent by the principal and other school leaders, or by other members of a professional teaching community.

To illustrate the relation between normative and personal identity, imagine a classroom in which the noise level is routinely high as students talk to each other excitedly about the task they are completing, move around the room to get materials on their own initiative, and leave the classroom to go to the bathroom without requesting permission. Some school leaders might consider this classroom to be out-of-control, and therefore the teacher to be incompetent. In this case, the school leaders' taken-as-shared understanding about what counts as a productive

classroom environment and effective teaching constitutes the normative (institutional) identity with respect to which the teacher's capabilities are recognized. The recognition of the teacher as ineffective or incompetent might entail negative formal evaluations of teaching and critical feedback from school leaders after they make informal classroom observations, as well as complaints from other teachers that the class is distracting.

However, the attribution of incompetence by others based on the normative institutional identity does not necessarily impose a *personal identity* of pedagogical incompetence on the teacher. In the case above, the teacher might apologize for her students' behavior, or be embarrassed or anxious when the principal or another school leader observes her teaching. In responding in these ways, the teacher contributes to the regeneration of the school norms for effective teaching with respect to which she is recognized as incompetent, and develops a *personal identity* of an incompetent teacher. Alternatively, the teacher might challenge how she is recognized by school leaders, in the process developing a personal identity as a renegade reform teacher. Thus, what matters are the ways that the teacher's instructional practice are recognized, named, and reified with respect to the standards for good teaching established in a particular context (normative identity), and the ways in which the teacher responds to these acts of recognition (personal identity). This treatment of identity therefore acknowledges both social structure and personal agency.

In this article, we analyze how the middle-school teachers with whom we collaborated coped with conflicting normative identities for mathematics teaching established in their schools and in professional development sessions, and how they became motivated to improve their classroom practices as they reconciled this tension. In illustrating this transition, we document the personal identities that the teachers were developing by determining whether the obligations

that comprised the normative institutional identity established in their schools and the normative affinity identity established in the professional development group remained obligations-for-others or became obligations-for-oneself (Cobb, Gresalfi, & Hodge, 2009; Sfard, 2006).

Evidence that the teachers were fulfilling obligations for themselves in one of these settings indicates that were *identifying* with the expectations of either institutional authorities or colleagues in the teacher group (c.f. Cobb, Gresalfi, & Hodge, 2009).

In the sections that follow, we first outline the history of the professional development collaboration between the research group and the middle-school mathematics teachers. We then share the results of our analysis of the normative institutional identity for mathematics teaching that was constituted in the teachers' schools, and of the normative affinity identity for teaching that was constituted in the professional development group. Against this background, we report how the teachers negotiated between these two normative identities for teaching, in the process developing relatively coherent personal identities for teaching.

History of the Professional Development Collaboration

The data for this study were collected during the first two years of collaboration with a group of nine middle school mathematics teachers. The teachers worked in five different schools in an urban school district that served a 60% minority student population and was located in a state with a high-stakes accountability program. The district had received an external grant to support its reform efforts prior to the research team's collaboration with the teachers. The research team began working in the district to provide professional development about statistical data analysis at the invitation of the district's mathematics coordinator. The primary criterion that the coordinator used when selecting the teachers with whom the research team worked was that they were seen to be resisting using a NSF-funded reform-oriented mathematics text that the

district had recently adopted as the basis for their instruction. During the second year of the collaboration, teachers elected to continue to participate (or not) based on their own initiative. During the first two years of the collaboration, the research team met with twelve teachers for a three full-day work session each summer as well as three full-day sessions during the first school year and six full-day sessions during the second school year.

In contrast to professional development initiatives that are undertaken to familiarize teachers with a new curriculum or to model specific instructional practices, our overall goal was to support the teachers in learning to use cognitively demanding tasks productively. Our purpose in undertaking this work was to investigate teachers' development of instructional practices that involve building on student reasoning. As a consequence, the collaboration with the teachers was conducted as a teacher development experiment (Simon, 2000) in which we tested and revised conjectures about the process of the teachers' learning and the means of supporting it (Cobb, Zhao, & Dean, 2009). Although we and other members of the research team led the professional development sessions, we did not we did not engage the teachers in a predetermined series of activities. Instead, our decisions about the types of activities to use in a particular session were informed by a detailed analysis of prior sessions and took account of the teachers' expressed needs. As part of this process, we assessed and, if necessary, revised our conjectures about the course of the teachers' learning and the means of supporting it as we reviewed video-recordings of and products the teachers had created in prior sessions (cf. Cobb, Zhao, & Dean, 2009). The way in which we adjusted our plans both between and during session based on our ongoing assessments of the teachers' participation in professional development activities was consistent with the way in which we hoped that they would adjust their mathematics instruction based on ongoing assessments of their students' participation in classroom activities.

Our focus in this article is on how teachers become motivated to improve their classroom practice rather than on the sequence of activities undertaken in the professional development sessions, and the extent to which they supported the teachers' learning about mathematics and students' reasoning (see Dean (2005) for a detailed account of the professional development sessions). Our intent in outlining our goals and giving an overview of the types of activities that we enacted in the professional development sessions is to set the stage for the analysis of the teachers' motivations.

As we have indicated, the overall goal of the professional development sessions was to support the teachers' development of instructional practices that involved building on students' reasoning to achieve a mathematical agenda, with a specific focus on statistical reasoning. During the sessions, the teachers engaged in activities from an instructional sequence that was designed, tested, and revised during prior classroom design experiments conducted with middle-grade students (Cobb, 1999; McClain & Cobb, 2001). The teachers worked through the statistics activities as learners and used activities from the sessions in their own classrooms; copies of students' written work that teachers collected then became a focus in the next professional development session. In addition, the teacher group worked on activities such as designing interviews that they could use with their own students in order to gain insight into their understanding of particular mathematical ideas, and discussing video-recordings from the statistics design experiment.

A second goal of the professional development sessions was to support the development of a professional teaching community. This required that the teachers' instructional practices become deprivatized so that accounts of their classroom instruction could become topics of conversation. To this end, we initiated several discussions with the teachers about the norms of

the teacher group, and engaged the teachers in activities in which the school contexts in which they worked became an explicit focus of analysis (Dean, 2005). In addition, we attempted to guide the development of norms for analyzing others' instructional practice during discussions of classroom video-recordings.

Methods

All fifteen professional development sessions conducted during the first two years of the collaboration were videotaped with a camera positioned at the back of the room in order to get a broad picture of the entire group. Additionally, all conversations were audio-recorded and multiple recorders were used when the teachers worked in groups in order to capture all voices. The data for this article consist of transcripts of the 90 hours of video and audio recordings of sessions conducted during the first two years of the collaboration.

Data Reduction and Analysis

The first author, who was not involved in the professional development sessions during the first two years of the collaboration with the teachers, conducted a systematic review of the video recordings with the goal of testing the conjectures about the teachers' motivations that had emerged during the collaboration. The coding process involved a grounded coding methodology (Glaser & Strauss, 1967; Strauss & Corbin, 1990): the first author reviewed all transcripts of the professional development meetings and created an emergent coding scheme to document themes that pertained to identity (details about these codes are given below). Once a list of codes had been generated, she reviewed all transcripts a second time, applying the set of codes to exchanges (interactions in which an idea was taken up by more than one member of the group) that pertained either explicitly or implicitly to the nature of teaching. The second author, who participated in all the professional development sessions, then examined all exchanges using the

same coding scheme; instances in which there were disagreements were discussed until consensus was reached.

The analysis proceeded by detailing: (1) the normative affinity identity for mathematics teaching that was constituted collectively by the members of the teacher group, (2) the normative institutional identity for mathematics teaching as perceived and described by the teachers, and (3) the personal identities that teachers were developing as they participated in the activities of the teacher group. We describe the details of the analysis process below.

Documenting normative identities. We sought to document both the normative affinity identity for mathematics teaching that was constituted in the professional development sessions and the normative institutional identity as described collectively by the teachers in the sessions. As we have indicated previously, the normative identity for teaching constituted in a particular setting corresponds to the norms or standards for good teaching with respect to which teachers were recognized. We examined the normative identities constituted in both the teachers' schools (normative institutional identity) and the teacher group (normative affinity identity). Our analysis of the *normative affinity identity* focused on the expectations for high-quality mathematics teaching that were jointly constituted by the members of the teacher group. In documenting the normative identity of the affinity group, we sought to identify the emerging expectations that the teachers had for each other in discussions of and reflections on teaching. The *normative institutional identity* refers to school and district authorities' expectations for good mathematics teaching. Our analysis focuses on the normative institutional identity as it was perceived, described, and explicitly negotiated within the teacher group. Limiting the analysis to teachers' perceptions is reasonable because the teachers' actions were influenced by their understanding of school and district leaders' expectations for mathematics teaching. However,

we also triangulated our findings with interviews conducted with principals from four of the five schools in which the teachers worked during the first year of the collaboration.

The normative affinity identity and the normative institutional identity do not correspond to the teachers' individual ideas or opinions but were instead constituted collectively the group. Thus, the process of documenting the normative institutional and affinity identities involved identifying collective norms of the group. This process has been described by Cobb and colleagues (Cobb, Gresalfi, & Hodge, 2009; Cobb, Stephan, McClain, & Gravemeijer, 2001; Stephan & Rasmussen, 2002), but is worth reviewing briefly.

The question of whether a particular practice has become normative can be addressed by focusing on the consequences of particular utterances or actions in subsequent interactions. The strongest form of evidence that a particular norm has been established usually occurs when someone *violates* it (Cobb et al., 2001) as there is usually an overt response to a breach. For example, in some teacher groups, members are expected to accept others' ideas and not oppose them publicly. Evidence that this might be the case centers on the group's response to an overt challenge. If other members of the group respond by rebuking the challenger—for example, by looking away, exchanging looks with raised eyebrows, or even more overtly by saying “take it down a notch,” they are attempting to communicate that “we don't do that kind of thing here.”

A second, important kind of evidence for the establishment of a norm can be seen when a way of reasoning or acting that was previously discussed and negotiated explicitly later serves as justification for other ideas or actions (Dean, 2005; Stephan & Rasmussen, 2002). For example, the idea that students do not persist in attempting to solve challenging problems because they have not previously been asked to solve such tasks might initially require extensive discussion.

Later, this idea might become a routine way of explaining classroom observations (for example, when teachers add comments like: “of course, we’ve never asked them to do that before”).

To document the normative institutional and affinity identities for teaching that were constituted by the group, we identified exchanges in which the teachers explicitly discussed what it means to be a teacher, what counts as good teaching, and the standards to which they were held accountable in their teaching. In addition, we looked for exchanges that, although less explicit, related to a vision of good teaching, such as when the teachers discussed the challenges they faced in their teaching, what is important to teach and why, and how students learn.

After completing this first level of coding, we determined whether the teachers were discussing aspects of the institutional settings in which they worked, or the practices of the teacher group. These differences were indicated by the referents of the discussions. For example, exchanges were coded as relating to the normative institutional identity when the conversation explicitly mentioned an aspect of the school context. Exchanges were characterized as relating to the normative affinity identity when the conversation referenced the professional development group. Ambiguous references were not included in the analysis. As part of the process of developing an overall picture of the normative institutional and affinity identities, we accounted for the commonalities across the teachers’ contributions, and for tensions in their individual views about what counted as good teaching in the two contexts.

Finally, we also analyzed interviews with the principals from four of the five schools in which the teachers worked, conducted during in the middle of the first year of the collaboration. We transcribed the interviews and coded them by looking explicitly for moments when principals discussed the standards by which they judge the quality of mathematics teaching. We then triangulated the analysis of these data with exchanges the professional development sessions

that focused on school contexts by looking for commonalities and inconsistencies.

Documenting personal identities. As we have indicated, the personal identity for teaching that a teacher is developing concerns the extent to which he or she identifies with the normative identities established in various contexts. First, we examined whether teachers appeared to *consent to* or *resist* the normative institutional and affinity identities. Second, in cases where the teachers consented, we distinguished between *identifying* and merely *complying*. We operationalized this distinction by documenting whether the teachers attempted to fulfill obligations merely to satisfy others' expectations (obligations for others) or because the obligations were integral to their personal views and values (obligations for themselves). We considered occasions when teachers were fulfilling obligations for themselves as evidence that the teachers were identifying with those norms or standards for high-quality instruction.

As we have discussed elsewhere (cf. Cobb, Gresalfi, & Hodge, 2009), evidence of personal identities can be gained by focusing on participants' understandings of their obligations in a particular setting, their valuations or appraisals of those obligations, and the grounds for their valuations. To conduct this analysis, we examined exchanges for indicators of how the teachers' valued of their obligations in the two settings, and whether they found them to be reasonable and enabling, or arbitrary and constraining or debilitating. Specifically, we attended to overt demonstrations of agreement or disagreement with a particular expectation, value, or belief ("I am so frustrated by..." or "I am really working hard on. . .").

Results

One goal of the professional development sessions was to support teachers in changing the ways they planned for instruction and made sense of what occurred during instruction. The teachers' engagement in activities with this focus gave them repeated opportunities to discuss,

RUNNING HEAD: IDENTITIES FOR MATHEMATICS TEACHING

work on, and refine their vision of what it means to be an effective mathematics teacher. In the course of these discussions, the teachers' perceptions of the ways school authorities assessed their competence were made increasingly explicit. In addition, the members of the teacher group jointly constituted an alternative vision of high-quality mathematics teaching. The teachers' efforts to cope with the tension between this normative affinity identity and the normative institutional identity established in their schools were apparent in the ways that they talked about and held themselves accountable for various aspects of mathematics teaching. Table 1 summarizes our findings about the normative institutional and affinity identities, and reports the counts of the conversational exchanges that correspond to each theme.

Table 1: *Themes and Counts for Normative Institutional and Affinity Identities*

| Exchanges related to Institution (53) | | | Exchanges related to Affinity group (52) | | | Unclassified exchanges (51) | |
|---------------------------------------|--------------------------------|------------------------|--|-------------------|--------------------------|-----------------------------|-------------------------------|
| Aligning with standards | Generic Aspects of Instruction | Teaching independently | Content of mathematics | Student potential | Collaborate for planning | Students are capable or not | Connecting math to real world |
| 21 (40%) | 8 (15%) | 7 (13%) | 19 (37%) | 9 (17%) | 5 (10%) | 17 (33%) | 5 (10%) |

Normative Institutional Identity

Our coding scheme focused on both the teachers' explicit comments about the standards to which they were held accountable in their schools, their more implicit comments about the practices of an effective teacher, and the expectations for effective teaching and learning in their schools. Overall, of the 156 exchanges that involved either explicit or implicit references to teaching practice, 53 were classified as relating specifically to the school context. The comments made within the teacher group that provided insight into the normative institutional identity were quite consistent over the two years. In this context, being a good teacher meant teaching in accordance with state standards, attending to generic features of teaching, and preparing for teaching independently without collaboration.

Accountability. One aspect of the normative institutional identity that was frequently discussed involved being accountable to state mathematics standards and the related state test. Forty percent (21 exchanges of 53 total) of teachers' exchanges that related to the institutional settings in which the teachers worked referenced this directly. The perceived pressure of ensuring that students performed well on the state test was a recurrent theme, particularly at the beginning of the collaboration. In addition, the teachers made it clear that being a good teacher, from the perspective of their school leaders, involved aligning to state mathematics standards. The following two excerpts are representative of teacher exchanges about standards and tests:

- T1: One good example, we were doing [a statistics activity developed by the researchers] yesterday, my principal came in [and] she saw me at the overhead and the room was kind of dark and the kids were talking about batteries. And she is looking at me like, "End of Grades [EOG test] and you are talking about batteries?" And she left the room and didn't say nothing.
- T2: My principal took flack because the superintendent came in to my room and I was teaching Roman Numerals and they are not on the [state test]. (Year 1, February)
- R1: When your principals come into your classrooms, what do you think they are looking for?
- T3: When my principal comes into my classroom, he wants to see an objective written in the corner of the board saying what specific piece of the end-of-grade test I am working on that day.
- R2: Do you mean the Standard Course of Study [state mathematics objectives]?
- T3: Yes, Standard Course of Study, but that is really for the EOG test. He wants to be able to walk into my classroom and tell in 10 seconds, what part of the test I am teaching. (Year 2, June)

The 21 exchanges indicate that school leaders did not recognize mathematics instruction as high quality unless it was aligned with state mathematics standards. Interviews with the principals confirmed this focus; all four principals mentioned the importance of students performing well on standardized tests, and two explained that this focus was also a pressure that they felt from the district office.

Attention to generic features of teaching. A second aspect of the normative institutional identity concerned school leaders' focus on issues such as classroom management rather than on aspects of teaching that were specifically mathematical or that related to student learning. This was indicated both by the ways in which the teachers initially talked about each others' teaching and by their more explicit comments about what they were held accountable for. Fifteen percent (8/53) of exchanges involved this theme. The following two exchanges are representative in this regard. The first exchange occurred after the group had watched a video-recording from one of the statistics design experiments. All the teachers had focused on the behavior of the students, rather than on the nature of their mathematical reasoning (the intended purpose for viewing the videotape), and this focus became an explicit topic of discussion.

T4: I just wanted to point out something that, [T5] and I were looking at, and I guess I just wanted someone to [get] feedback off of, while I was looking at this video tape. But, if I was an administrator in Jackson Heights¹ public schools, and just looking at some of my own evaluations, if I had the same lesson as [the teacher] had, I think I would have a score of a 3 or a 2 just from the fact of the number of times [the teacher] called females to participate, like, in this higher order thinking to the number of kids that we saw on task....And if our principals were watching it, they would be like, "hmm, I don't know, because everyone is not actively involved, because you had some kids blinking, some kids leaning back, they weren't doing the subtle things like talking or anything but they didn't seem to be paying attention," like the first videotape we had when we were dealing with the batteries.

T6: Were Barry and the other kid in the same group [referring to a group in the video]?

R4: No.

T6: Because if it was the same group, you could see how only certain students were participating. (Year 1, June)

Another exchange from early in the second year echoed this same idea:

T5: They are trying to require us to observe others during our planning period. We just got the results of what we are looking at. And how we looked at the video, you know, we looked at the lack of discipline of the kids, well that is what we, I guess by nature, have

¹ Here and elsewhere, all names are pseudonyms.

focused on instead of content, we looked at how someone handles the classroom first, and then we starting to break down the walls.

T6: Well that is how we have been evaluated for so long.

T7: Exactly,

T5: Yeah.

Other teachers: Yeah. (Year 2, October)

Taken together, the eight exchanges that focused on the evaluation of generic features of teaching suggest that the normative institutional identity for being a competent teacher focused on aspects of teaching that could be applied across content domains: covering state standards and maintaining classroom control. Foreshadowing slightly, this vision of high-quality mathematics teaching contrasts sharply with the normative affinity identity for mathematics teaching constituted by the professional development group.

The principals' interviews were consistent with the teachers' perceptions of what they were held accountable for. When asked how they evaluated teachers, all four principals described generic aspects of classroom practice such as whether the day's objective was written on the board, how many students raised their hands, and whether the classroom was under control. One principal indicated that she treated disciplinary issues as an indication of the quality of the lesson. A second principal said that she was concerned about what students were learning, but indicated that her primary means of assessment was to see whether students were engaged in "meaningful mathematics" rather than "drill and practice." Overall, the principals' descriptions of what they considered to be high quality teaching aligned well with teachers' statements about school leaders' expectations.

Teaching as an independent activity. When the teachers initially discussed the challenges they faced in their teaching, they often mentioned a perceived lack of support from the institution. The teachers complained repeatedly that they did not have time to talk with or work with others, and that times that were allotted for joint work (such as common planning times)

were frequently appropriated by other tasks authorized by school leaders. For the teachers, the implicit message was that being an effective teacher did not involve collaborating with others. This topic was apparent in 13% of the teachers' exchanges (7/53) across the two years. The following exchange, which took place at the beginning of the first year of the collaboration, is representative in this regard:

T2: I think that one of the important things is that we mentor new teachers. But of course, there is no real time to do that.

R3: It is so important to find colleagues to discuss math content with. It's just such a resource—and it's important to find time to have these discussions.

T2: You know, that's what our study groups were *supposed* to be about. Each middle school was supposed to meet six times a year and talk about what was working with the [reform mathematics curriculum] and what wasn't working. This was all supposed to be structured by [the district math coordinator's] grant. But nothing ever really happened...and of course with the winter a couple of the meetings were cancelled because of the weather.

Teachers discuss when study group will next meet.

T4: You know, I think it's a great idea about meeting together, but I don't have a lot of time to do it, and I don't feel compensated enough for the time I put into it. I am spending so much time already on lesson plans, etc. (Year 1, September)

This and other exchanges consistently indicate that the teachers did not consider collaboration to be a part of the culture of their schools, or a part of the normative institutional identity for being an effective teacher. This exchange is characteristic of the way that members of the teacher group talked about working together during the initial professional development sessions; they did not expand on the value they saw in such collaborations, but merely complained about the absence of such opportunities. During the second year of the collaboration, the teachers began to talk explicitly about the role of collaboration in supporting the improvement of their classroom practices (Dean, 2005).

In interviews, the principals all said that they valued collaborative work, and created time for teachers to work together. However, three of the four principals mentioned having interdisciplinary grade-level teams rather than mathematics teachers co-planning together. This

is consistent with their focus on generic aspects of teaching. The fourth principal mentioned that she organized her school schedule based on the needs of the students as opposed to fitting the schedule to figure out “what is best for teachers.” It would therefore seem that collaboration was defined differently by the teachers and the principals; while the teachers believed that collaboration should focus on teaching mathematics, their principals appeared to view collaboration as an opportunity to connect with other teachers more generally.

In summary, the normative institutional identity for teaching as perceived by the teachers involved addressing state mathematics objectives, maintaining classroom control, and working independently. As we discuss below, not all teachers appeared to endorse, or identify with, this normative institutional identity for teaching. However, all the teachers contributed to discussions about school leaders' expectations, and there was little disagreement about the nature of those expectations. The vision of effective mathematics teaching communicated by institutional authorities was quite broad and applied to any subject matter domain. This is one of the key differences between the normative institutional and affinity identities for mathematics teaching.

Normative Affinity Identity

In the initial professional development sessions, the exchanges that we analyzed focused primarily on the teachers' perceptions of the normative institutional identity for teaching mathematics. This is reasonable given that the group was still in the process of establishing collective norms and expectations. We identified 11 exchanges in the first session that relate to the normative institutional identity of the group, but only 2 exchanges that relate to the normative affinity identity of the group. This pattern gradually shifted, and after two years there were equal or more exchanges that related to the normative affinity identity. Out of the total 156 exchanges

across the two years that involved implicit or explicit statements about teaching, 52 related to the normative affinity identity of the group.

The normative affinity identity for teaching was constituted as the teachers discussed their engagement in statistical activities that targeted their own mathematical thinking; their experiences in working on these and other activities with their students; their analyses of student work; and their ideas about nature of teaching and learning. By the end of the second year of the collaboration, the members of the group had jointly constituted an affinity identity for teaching that was subject-matter specific. This normative affinity identity involved a vision of high quality teaching that included: determining what needs to be taught in mathematics, viewing students as capable, and teaching in collaboration with others.

It is important to note that the researchers were members of the professional development group and initiated and attempted to guide discussions in the group. Thus, this affinity group emerged as the researchers' attempted to support the teachers' learning while taking account of their needs. The following account of the affinity identity established by the group documents the initial results of these efforts. As mentioned previously, details about the exact activities that were used in the professional development meetings, and how they supported change over the five years of the collaboration, can be found in Dean (2005) and Visnovska (2009).

Mathematical goals for instruction. The normative affinity identity for teaching that was constituted in the group focused specifically on the goals for students' learning. As Dean (2005) has documented, the teacher group began to distinguish between learning mathematical facts and procedures, and coming to understand central mathematical ideas. Indeed, the issue of what the goals for mathematics teaching *should* be, and the extent to which those goals aligned with school leaders' expectations, became a repeated topic of discussion. Teachers did not always

agree about either the nature of mathematical understanding, or the best way to support its development. Nonetheless, over the course of the two-year collaboration, the scope of conversations within the teacher group increasingly extended beyond students' learning of facts and procedures. In the process, the normative affinity identity constituted by the teacher group came to involve supporting both students' reasoning about central mathematical ideas and their mastery of facts and procedures. This topic was raised in 37% of the exchanges in the professional development group that related to the normative affinity identity (19 of 52 total).

The following illustrative exchange occurred as the teachers were analyzing student work from a statistics activity. The researchers facilitating the session had asked the teachers to order students' solution strategies in terms of sophistication in order to decide which students they might select to present their ideas in a whole-class discussion.

T5: And I understand the need to teach thinking and reasoning. And this is definitely an avenue for thinking and reasoning. This is an avenue for them to become geniuses. But this is some seriously powerful stuff, but again, I guess I am argumentative too, but the harsh reality is, if our schools can structure our course offerings that would expose kids to having to think, to take the pressure of having to cover for a test, to create a course that allows risk taking and room for error and room for debate on why they think their answer is valid. Then our thinking would definitely improve, but unfortunately the people who need to hear this [i.e., school authorities] are not here. The reality of a course may never ever be created.

T1: But why can't we do that with anything we teach now?

T10: Yes, I think...

T5: It would in essence mean that state department of public instruction would have to sit down with people and rethink and reword how they suggest, create an equilibrium for not instruction but for curriculum, there is a difference.

T1: I can think of so many things that I am supposed to teach now, or have taught in the last few of weeks, and if I could use the strategy of actually sitting down and talking with my students, getting to understand what they feel about the topic, what they really understood about it and gone on from there and they probably would have learned a whole lot more than standing up and saying, today we are going to do this, da,da,da,da,da....

T5: Oh, yeah.

T1: And I am about making changes within the system. I am not happy with the way the system is now. So I can see doing this with any lesson, I would have to teach to make a difference. (Year 2, October)

This exchange (one of 19 such exchanges) suggests that some teachers were coming to see it as their responsibility to support students' understanding of mathematical ideas. However, this issue was far from resolved and had yet to become normative in the group; as T5's comments indicate, the teachers struggling to understand whether instructional goals of this type would fit with the institutional contexts in which they worked. The contributions that the teachers made during the planning session for principals conducted at the end of year 2 indicate that three of the nine teachers present for the discussion (including T1) were firmly convinced of the importance of focusing on big ideas, four made comments that indicated that they believed that mathematical ideas should be central to teaching, but also occasionally made contrary comments, and two (including T5) continued to struggle with this issue.

This emerging vision of high-quality teaching contrasts sharply with the normative institutional identity. Whereas the normative institutional identity for teaching recognized aspects of teaching that were not specifically mathematical (covering objectives and maintaining control), in the affinity group, the majority of the teachers (seven of nine) focused to a significant degree on how to support their students in understanding mathematical ideas. Indeed, in a strategizing session at a summer session at the end of year 2, teachers wrote up the following goals for principals' understanding of mathematics teaching:

- Sensitize to what math teaching and learning is or should be
- Portfolios to talk with principals, the focus on examples of student reasoning and understanding. Principal should come to understand and value focus on issues of student reasoning.
- Principals come to see value in making students reasoning visible
- Communicate mathematical goals of the curriculum

Discussions about the goals of mathematics teaching were relatively frequent and often occurred after the teachers had (as students) completed a novel statistics activity. Following such

mathematical activity, the discussion often shifted to thinking about how students might develop similar understandings. Activities of this type appeared to problematize many teachers' current conceptions of what it meant to know and understand mathematics. Additionally, teachers conducted individual clinical interviews with students in the middle of the second year which also proved important in problematizing the goals of mathematics instruction. In these interviews, teachers asked students questions about fractions, and attempted to analyze what students understood about fractions (rather than simply determining if the students “got it” or didn’t). The teachers appear to have found this activity particularly revealing as their findings challenged their assumptions about what their students were learning from their instruction. The full significance of this activity was indicated by the teachers' frequent references to the student interviews in later sessions when they were thinking about the differences between learning procedures and understanding central mathematical ideas.

Students' capabilities. The second aspect of the normative affinity identity for teaching concerns the way the teachers conceptualized students' capabilities. Early in the collaboration, students were often characterized dichotomously, as either having ability or not, or of being motivated or not. Indeed, during the first year of the professional development meetings, the teachers frequently cited students' ability (or lack thereof) as a chief challenge in their teaching (61% of exchanges that were unclassified in year 1; 14 of 23 unclassified exchanges). However, over time, the teachers began to talk about the reasons for students' understandings or misunderstandings, and to indicate that failure to learn did not necessarily indicate a lack of mathematical ability. In this way, deficit language about students was gradually displaced by talk about *why* students thought or performed in particular ways. Specifically, in year 2, the percent

of exchanges that characterized students' ability in absolutist terms decreased dramatically (11% of unclassified exchanges in year 2; 3 of 24 exchanges).

As a consequence of this development, the normative affinity identity began to include a consideration of the reasons behind students' success and failure. This was especially apparent when the teachers discussed video-recordings of their own or other's efforts to enact a statistics activity in the classroom, and when they responded to accounts related by group members about events that had occurred in their classrooms (27% of exchanges referencing the affinity group; 14 of 52 exchanges). This transition was not immediate, nor was it entirely stable (as previously mentioned, teachers continued to reference students' inherent ability throughout both years). Teachers' initial explanations for *why* students might have engaged in an activity as they did focused on the structure of the activity (3 exchanges in February of year 1). Slightly later, teachers began to talk about how to support students in understanding the intent of a lesson (1 exchange in February of year 1; 3 exchanges in June of year 1). Finally, in year 2, teachers began to explicitly discuss students' potential for change (1 exchange in October of year 2, 1 exchange in January of year 2).

As an example, in one of the two exchanges from year 2, the teachers discussed the challenges they faced in achieving their mathematical goals with their students:

T7: I think that is the hardest part with [my students] right now, T5. And with mine I was very, very frustrated, except with one class, I was very frustrated, because they just did not want to think. They wanted me to tell them what they were supposed to be coming up with and do it.

T1: Because they are so used to it.

T7: Yes.

T1: They expect us to do it.

T7: And if I can get them to think...

R4: But they are not born that way, right?

T1: No.

T7: No.

R4: They have learned it.

T7: Yeah, they have learned it.

T1: They have learned it.

T7: Yeah, my third grader [son] is not like that. (Year 2, October)

T7's complaint that her students did not want to think is reminiscent of prior exchanges in which the teachers had talk about student ability in absolutist terms. However, T7's characterization was immediately amended by another teacher who proposed that students did not want to think because they were unaccustomed to being asked to do so. This revised account was readily accepted by T7, indicating that the idea that students could learn to "think" was becoming taken-as-shared in the group.

The utterance by R4, "But they are not born that way, right?" is representative of the ways in which members of the researcher team intentionally attempted to reframe or reorient a conversation. The fact that the teachers took up this idea is further evidence that this way of thinking was becoming normative. In earlier sessions, similar reframings by researchers were typically not incorporated into the conversation by the teachers.

Teacher collaboration. As previously noted, the issue of collaboration was a frequent topic of conversation in the professional development sessions. However, the view of collaboration that was constituted as normative in the group evolved over the first two years and differed from that of institutional authorities. In their discussions, teachers began to explicitly discuss the value of collaboration when preparing to teach, and in particular for responding to student thinking (10% of exchanges; 5 of 52). The shift from talking about the importance of working together in general, to these more elaborated conversations, first occurred after the teachers read an article on Japanese Lesson Study and watched videos from the TIMSS study (Hiebert et al., 2005) of contrasting geometry lessons in the United States and Japan. In the

course of these activities, the teachers appeared to become more attuned to the value of collaborating in order to support instructional improvement.

Most of the teachers described how much they learned from collaborating with others when given the opportunity. In particular, collaboration was discussed as a way of supporting the development of instructional practice by focusing on student thinking and reasoning (rather than merely addressing state standards). For example, the following exchange occurred early in year 2 after the teachers had an opportunity (designed by the researchers) to co-plan a teaching session, and then observe a teacher as he enacted the designed lesson. The other teachers had observed the lesson and spoken with the students as they analyzed data using computer tools.

- T3: I think the question earlier in the day of what was the math objective or learning in the lesson and how to assess it, focused me on what I hardly ever focus on before I plan. That component, what is the math idea that needs to come across?
- R4: It's very different from teaching in this country, that's why it's so hard.
- T3: I like very much the idea of us planning together, it gives us more time to strategize, plan minute by minute, think of key driving questions, have more discussion.
- R4: That would have been helpful to do more?
- T3: Yes, in that way it's kind of scripted for us, it takes a level of us off...I can make notes about whether something worked or not. It didn't feel like I cut the launch short because it felt to me like comments were on target. But clearly, that's not what's going on often...
- T7: It was so helpful to have someone else teaching my kids for a time; I could watch them, and concentrate on what they were doing.
- T9: Yes, that's so helpful.
- T7: Like when T6 came in and taught, I could watch my kids, it was much easier. It almost takes having someone else in there to give you feedback. (Year 2, November)

This exchange (one of five about the value of collaboration) suggests not only that teachers valued collaborating, but that they were coming to regard it as an important aspect of being an effective teacher. In a session at the end of year 2 that focused on strategies for bringing about changes in institutional settings, the teachers explicitly stated that they wanted principals to come to see the “importance of collaboration to support a focus on student reasoning.” They hypothesized that if their principals could observe how productive such

sessions can be, they would begin to appreciate the value of collaboration and would consider including time for common planning in mathematics teachers' schedules. Taken as a whole, these conversations and activities indicate that the normative affinity identity for teaching involved working with peers in order to strengthen the focus on student thinking in subsequent instruction.

The emergence of different ways of characterizing high-quality teaching and students' capabilities indicates that, in their discussions, the members of the teaching group had begun to hold each other accountable for instructional practices that differed from those recognized as high quality by institutional authorities. It is important to clarify that affinity groups do not have to form in opposition to an established perspective. This group of teachers could have developed a normative identity that was consistent with the expectations of institutional authorities. Our analysis documents not merely that the teacher group developed an affinity identity, but that the nature of that identity was significantly different from, and at times in conflict with, the normative identity for mathematics teaching of the institution. In the next section, we detail the extent to which the teachers complied with, resisted, or identified with the normative identities for teaching that were constituted by the institution and the affinity group.

Personal Identity

As we have illustrated, the process of documenting the normative identity established in a particular institutional or group setting focuses on expectations about what constitutes effective mathematics teaching. In the preceding section, we presented evidence of two different sets of expectations for high-quality teaching: good teaching as recognized by institutional authorities, and as recognized within the affinity group. The documentation of the two normative identities constitutes a basis for making claims about the nature of contexts in which the teachers were participating. The teachers' engagement in these contexts and, in particular, the extent to which

they were developing a sense of affiliation with the normative identities of the institution and the teacher group, is central to our analysis of the *personal* identities the teachers were developing.

Table 2 summarizes the nature of the two normative identities, and the kinds of personal identities that the teachers were developing in relation to these normative identities.

Table 2.
Percent of Exchanges Classified According to the Identities Constituted in the Teacher Group

| | Obligations of the Normative <i>Institutional Identity</i> | | | Obligations of the Normative <i>Affinity Identity</i> | | |
|----------------------------|---|---------------------------|---------------------------|--|----------------------|-----------------------------|
| | Generic | | | Content of mathematics | Student potential | Collaborate for planning |
| | Aligning with standards | Aspects of Instruction | Teaching independently | | | |
| Personal Identities | 72% | 0% | 86% | 0% | 0% | 0% |
| Comply | 14% | 100% | 14% | 32% | 33% | 0% |
| Identify | 14% | 0% | 0% | 68% | 67% | 100% |

In the sections that follow we discuss a single common personal identity because there appeared to be little variation among the teachers in the extent to which they affiliated with the normative institutional and affinity identities. It may seem surprising that all teachers were developing similar affiliations with two contrasting normative identities for teaching. However, the emergence of such coherence is less surprising when we note that this was a specialized professional development group in which continued participation was voluntary.

Complying with and Resisting the Normative Institutional Identity

The teachers expressed considerable dissatisfaction with the normative identity for teaching constituted in their schools. There were few instances in which a teacher spoke of explicitly disregarding the expectations of institutional authorities in their classroom practice, and thus of overt resistance. However, the teachers repeatedly critiqued many of their school leaders' expectations, indicating that these expectations were obligations-for-others rather than obligations-for-oneself. Specifically, 86% of the exchanges that pertained to the institutional

context indicated either resistance or compliance, with only 9% of exchanges indicating identification. This finding does not indicate a lack of agency on the teachers' part, but instead provides evidence of the ways in which they believed they could legitimately express their agency. The teachers were able to exercise considerable agency with respect to the institution, as indicated by the fact that they began to develop strategies for challenging and attempting to change principals' expectations about what constituted high-quality mathematics teaching. Importantly, the proposed changes were aligned with the normative affinity identity for teaching that was constituted within the group.

Resisting institutional expectations for what students need to learn. When the teachers talked about the standards to which they were held accountable by institutional authorities, they usually voiced frustration. Of the 21 exchanges coded as being about institutional accountability, 15 (72%) were instances of resisting. Specifically, many teachers stated that institutional authorities' expectations for classroom practice were incompatible with supporting students' understanding of mathematical ideas. In addition, they expressed frustration that compliance with institutional authorities' expectations interfered with their ability to address instructional goals that they believed to be valuable. For example, T5's utterance in an exchange reported above indicates such frustration clearly:

T5: ...And I understand the need to teach thinking and reasoning. And this is definitely an avenue for thinking and reasoning. This is an avenue for them to become geniuses. But this is some seriously powerful stuff, but again, I guess I am argumentative too, but the harsh reality is, if our schools can structure our course offerings that would expose kids to having to think, to take the pressure off having to cover for a test, to create a course that allows risk taking and room for error and room for debate on why they think their answer is valid. Then our thinking would definitely improve, but unfortunately the people who need to hear this are not here. The reality of a course may never ever be created.

Taken together, the 15 identified exchanges suggest that although teachers understood the institutional view of good teaching, they did not identify with it. Instead, they felt that many of the institutionally-sanctioned goals for mathematics instruction (viewed as numerous separate objectives) and the associated tests—key artifacts in assessing teacher quality—were not aligned with the vision they were developing of good teaching.

Challenging the institutional focus on generic features of teaching. When discussing the institutional view of high-quality teaching (the normative institutional identity for teaching), the teachers expressed frustration with the school administrators' focus on content coverage and classroom control as primary indicators of high-quality instruction. This provides evidence about the personal identities they were developing; all eight of the exchanges that referenced generic features of teaching were instances of complying. Specifically, teachers talked about school leaders' views of good teaching either not supporting their attempts to teach differently (6 exchanges) or constraining their ability to enact the teaching practices that they valued (2 exchanges). Although it was clear that the teachers saw value in the expectation that they keep their classrooms under control, they also claimed that high-quality mathematics teaching involved more than this. For example, the following excerpt occurred in the winter of year 1 during a discussion that followed viewing a video-recording of another teacher's instruction.

I just want to piggyback on what T2 was saying. I was telling R4 that when you were saying that you would give a kid a half an hour to get a kid to discuss something that you asked them. I agree with that totally, but when I was talking to R4, I said well my principal would say, you are not covering all your topics. I agree, I want kids to explain things, but administrators would say, when they come in to observe your class, and I have had several to observe my class, they say you are taking too long on this. You should ask them, maybe wait two or three minutes and then move on. So sometimes you can't get into that deep discussion because of time limits, because of behavior...

In the exchange below, another teacher was even more explicit in dismissing these expectations for teaching. This exchange that took place at the end of year 2 when the group was discussing plans for attempting to influence the institutional context in which they worked:

- T2: You know, if our principals don't buy into [a new vision of teaching] and see a need for it, it's going to be hard to get the other teachers motivated to teach in this way. I don't know if the principals are really behind it—they have tunnel vision.
- T7: I know. My principal just looks at the surface and appearance of things, like the work displayed in the classroom. They talk a good game. But you know, there are many teachers who talk a good game but don't do squat.
- T2: Well basically, principals are not instructional leaders; they don't really know what we're doing. Their focus is on doing things like ordering the janitors and dealing with issues of discipline with students.

The eight exchanges suggest that although the teachers did not actively resist institutional expectations for content coverage, they were complying rather than identifying and did not always believe that the administrators' expectations were reasonable.

Good teaching requires collaboration. The teachers resisted the institutional vision of teaching as an independent activity. This resistance is evident in the value that they came to attribute to collaboration, and in teachers' discussions of the time that was available for them to work with colleagues. 86% of teacher utterances that related to the role of collaboration in the institutional context were instances of resisting; 14% were instances of complying. Members of the teacher group noted that both the amount of time available for collaboration was insufficient, and the way that time was structured was inadequate.

Taken as a whole, the obligations that comprise the normative institutional identity were, for the most part, obligations that teachers attempted to satisfy for the sake of others, rather than for themselves. This indicates that members of the teacher group did not identify with their school leaders' expectations for high quality teaching. In contrast, the teachers were, for the most part, coming to identify with the vision of teaching that was constituted within the affinity group.

Identifying and Complying with the Normative Affinity Identity

We should again note that the professional development group was organized by a team of researchers who had an agenda for the teachers' learning. It was therefore possible that the teachers might not have identified the norms for good teaching established within the group, but were rather agreeing because of a perceived need to agree with the researchers. However, there is strong evidence that this was not the case. One of the most robust pieces of evidence that the teachers were coming to identify with the normative affinity identity can be seen in their attempt, in the summer session at the end of year 2, to strategize ways to influence the institutional context in which they were working so that it would be better aligned with the vision of high-quality teaching emerging within the group. They did this of their own volition, staying to discuss strategies long after the work session was scheduled to end. In particular, the teachers' efforts to change institutional expectations and resources rather than to try to redirect the professional development sessions strongly indicates that the obligations inherent in the vision of high-quality mathematics teaching that was emerging in the teacher group were becoming obligations-for-oneself for the teachers.

Understanding student thinking. As we have noted, one aspect of the normative affinity identity involved supporting students' understanding of mathematical ideas as well as their learning of facts and procedures. The teachers did not appear to experience this aspect of high-quality instruction as an additional constraint with which they felt pressured to comply. Instead, there were indications that it was becoming an obligation-for-oneself for the teachers. Of the 19 exchanges that referenced students' reasoning, 6 (32%) were classified as instances of complying and 13 (68%) were classified as instances of identifying. The following exchange, which took place in the winter of the second year, illustrates the evidence for this claim. In this exchange,

which occurred as teachers were reviewing student work, the teachers were concerned about identifying indicators of mathematical understanding.

- T2: I learned that 6th graders do not have handle on statistics yet, because I didn't see them using any kind of numerical calculations.
- T7: I disagree with you T2. This is my lowest class, and every single one of them did a numerical calculation. And I would say that your kids, those kids right there have a better grasp of stats than these (gesturing to own papers) do.
- T2: Why?
- T7: Because [your students] understand, now, my focus in the data creation, and I did a really good job this time with the data creation. [My students] all understood that there were 30 kids, who were all very different. There's no "average" kid that watches TV. But even though they could all do mean, median, mode, they didn't do that, very few thought about that. And we talked about what is too much for a long time, [my students] got it, they understood, they decided what a good amount of TV watching was, and said that anything under 5 was good amount. But they didn't take it one step further, you know?
- T2: You said you wanted to know how the kids were thinking, but does the thinking include opinions?
- R4: Give us an example of an opinion,
- T2: This one here, they have four categories: looser, nothing to do, normal, little weird
- T3: Yeah! [raises arms in celebration]
- T9: Did they put the range on those?
- T2: Yes [gives ranges]

These 13 identifying exchanges suggest that the obligation of attending to student understanding was becoming an obligation for oneself for the teachers. It is unlikely that exchanges such as that reported above would have occurred if the teachers were interested only in ensuring that students learned facts and procedures. In the course of the exchange, there was an extended discussion about the nature of students' understanding, and an attempt to try to establish connections between instructional practice (doing a good job of introducing the data students were to analyze) and students' performance. Although this evidence is not as strong as an explicit statement of a belief (such as, "I think it's really important to understand the different ways that students think about the concept"), the exchanges provide consistent evidence that aspects of the normative affinity identity were becoming obligations-for-oneself for the teachers.

Students' capabilities as learners. The teachers also appeared to come to identify with a vision of teaching that involved supporting *all* students' learning. Specifically, over the course of the two years, members of the teacher group appeared to develop personal identities for teaching that involved understanding *why* students act as they do in the classroom, and more specifically, how to support the development of all students' mathematical reasoning. 67% of utterances involved identifying with the view of students as capable of learning, and trying to organize classroom instruction accordingly. As an illustration, the following exchange took place after the teachers had observed another teacher's lesson. The teachers were discussing one student in particular, who had made an error when asked to determine seven numbers whose average was 1.39; her first step had been to divide 1.39 by seven.

T3: So to question your questioning technique, you were trying to say to her, 'why are you thinking that way?' when she was wrong.

T1: I am trying to understand what she was thinking to make her even do it. And they should have the opportunity to explain it to me and get me to understand.

T7: So if you could have put 19 cents on each bag and said, ok, find the average. Then maybe she would have seen...

T1: That was what I was trying to get to, but yeah

T7: Then maybe she would have seen, oh! The total is 1.39.

T1: Exactly, but she didn't have the opportunity to at least look at it for what it was worth, and maybe make some adjustments after she realized she was totaling wrong.

This exchange, one of six of this type, indicates a commitment to understanding students' reasoning, even when it is incorrect, in order to support students' learning. This example, in which teachers attempted to understand a students' thinking without prompting, again suggests that this aspect of the normative identity was becoming an obligation for oneself for the teachers.

Teaching as a collaborative activity. As we have documented, an additional aspect of the normative affinity identity involved the value placed on collaboration within the teacher group. This aspect of the affinity identity appeared to emerge as the teachers co-planned and co-taught statistics lessons. The researchers initiated this development by engaging them in activities that

involved collaboration and by highlighting the learning opportunities that arose for the teachers in the course of these collaborations. The teachers all appeared to experience their collaboration in the professional development sessions as valuable, and there was every indication that they were coming to identify with the vision of teaching as a collaborative, knowledge-generating activity. Specifically, all five exchanges in which reference was made to collaboration within the affinity group were instances of teachers identifying rather than merely complying. As previously indicated, these instances all occurred during the second year of the professional development meetings. The following representative example occurred at the end of the second year while the teachers were explicitly talking about planning for instruction:

- T3: I have another generalization—I think that working with specialists and colleagues is a really positive thing. In those situations, planning time does not include the traditional idea of making photocopies. Instead it's time to sit down and have professional conversations. We need to get out of the box that planning is making photocopies, and to having *these* type of conversations.
- T7: If everyone plans together at the same time, it would be less stressful.
- T6: I guess that's true, but also doing that involves using your time more wisely.
- R3: So is it isolation?
- T2: We are very isolated!

The five exchanges suggest that teachers were identifying with the vision of effective teaching as involving collaboration: collaboration as defined within the group was becoming an obligation-for-oneself. This is apparent in the teachers' talk about themselves in relation to collaboration (“we need to get out of the box”), and in advocating for of the opportunity to engage in collaborative planning.

There was a significant contrast between the normative institutional identity and the normative affinity identity by the end of the second year of our work with the teachers. This difference is not particularly surprising as the conditions that brought the professional development group together were quite different from the conditions in which school

administrators worked. Specifically, continued participation in the professional development sessions was (primarily) voluntary, and the researchers guided the development of a vision of high-quality teaching that differed from that to which school administrators were held accountable by district leaders. Furthermore, school leaders had not received any formal support in developing their practices as effective instructional leaders. However, there was no guarantee that the teachers would resolve the tension between the two normative identities by affiliating with one rather than the other.

Discussion

In this article, we have presented an analysis of how a group of teachers become motivated to change their classroom practice, and have indicated what this change in motivation looked like. This analysis makes several contributions to our existing understanding of teacher learning and the process of supporting it. Theoretically, our analysis has integrated two conceptualizations of identity, and elaborated those conceptualizations for the purpose of analyzing teachers' learning. Pragmatically, this paper serves to deepen our understanding of the initial conditions for teachers to improve their practice—determining that the effort required is worthwhile. These contributions will be discussed below.

It is important to note the potential limitations to this study however, particularly with respect to our focus on talk amongst teachers in the professional development sessions rather than teachers' practice in classrooms. Any process of data reduction or organization is an inherently analytic decision, and thus influences the analysis and findings that emerge (Ochs, 1979). In this case, relying on teachers' conversations in professional development sessions privileges what they a) think about their practice (rather than what we can observe about their practice), and b) their interpretation of their practice (rather than our interpretation of their

practice). This limits our ability to discuss the extent to which teachers' talk about their practice was aligned with their observable classroom practice. As we have noted, the teachers' practice did align with their talk by year five of our collaboration (Visnovska, 2009), but we did not examine the potential for alignment in the first two years. It is therefore possible that we missed important connections between teachers' talk and their practice.

In addition, by focusing on collective discussion (rather than individual interviews), we highlight what teachers talk about together, rather than what they talk about alone with an interviewer. Clearly the group context, with multiple teachers and several researchers, influenced the content of teachers' talk. However, it is not clear that interviews are preferable to the group context because one-on-one interviews are also subject to the same kinds of social interaction and positioning issues as group conversations. Thus, in both cases, it is essential to consider the norms and expectations that shape the interactions. We find it useful to view analytic decisions as involving tradeoffs: although we cannot talk about the alignment between teacher talk and teacher practice during the first two years, we can talk about normative identities, the extent to which the teacher affiliated them, and the ways in which teachers held each other accountable. This latter focus enabled us to relate the teachers' developing motivations to change their practices to the school settings in which they worked and to their participation in the professional development sessions.

In terms of the contributions of the paper, with respect to theory, we have drawn on two treatments of identity, both of which attend to the social constitution of meaning and values. First, we built on our own work (Cobb, Gresalfi, & Hodge, 2009) by distinguishing between a *normative* identity that concerns what it means to be competent *in a particular context*, and a *personal* identity that concerns the extent to which teachers affiliate with that normative identity.

Second, we drew on the work of Gee (2001) by distinguishing between different forms of normative identity based on the contexts in which they are constituted. In our analysis, we documented the normative *institutional* identity for high-quality teaching constituted in the teachers' schools and the normative *affinity* identity constituted in the professional development group. We then analyzed the personal identities the teachers were developing with respect to these two different normative identities by documenting the extent to which the obligations that comprise these normative identities were obligations-for-others or obligations-for-oneself.

We found it necessary to examine the notions of institutional and affinity identity in some depth, in the process elaborating two issues that Gee did not examine in detail. The first has to do with how positions or roles are defined in an institution and the second relates to the relationship between institutional and affinity identity. With respect to the definition of positions, Gee focused primarily on the formal, institutionally defined responsibilities of roles (such as “professor” or “janitor”) that occupants are expected to fulfill by carrying out particular kinds of activities. From this perspective, the institutional role of “teacher” is defined as a set of activities that teachers would be expected to carry out. However, as Spillane, Hallett, and Diamond (2000) noted, positional roles do not carry expectations solely through their title, but instead come to have specific local meanings as authorities in a particular institutional context recognize aspects of practices and not others as indicators of competence. In this regard, our analysis clarifies that the meaning of the role of teacher is negotiated on the job as school leaders recognize aspects such as covering content objectives as indicators of high-quality instruction.

Second, Gee (2001) stressed that different aspects of identity are interrelated, but did not discuss how these interrelations occurred. Based on our analysis of the teacher group, it seems clear that normative institutional and affinity identities can be in conflict with each other.

Conflicts of this type do not appear to be unusual—the literature is replete with cases in which efforts to improve classroom practice have clashed with institutional expectations (Darling-Hammond & McLaughlin, 1995, Fennema et al., 1996; Franke & Kazemi, 2001; Gamoran et al., 2003; Kazemi, 2004; Schifter, 1995). However, teachers do not necessarily resolve such conflicts by identifying with the vision of high-quality instruction promoted by professional developers. The case on which we have focused is therefore useful in clarifying how teachers might become motivated to change their practice by coming to identify with the vision of high-quality mathematics teaching constituted in the professional development sessions.

Pragmatically, the analysis contributes to our growing understanding of the process of supporting instructional improvement by clarifying how teachers may come to decide that the effort required to improve their practice is worthwhile. Although previous work has documented the importance of understanding teachers' identities as a means of reconceptualizing what it means to teach mathematics (Battey & Franke, 2008; Enyedy, Goldberg, & Welsh, 2006), few previous analyses have examined the process of reconciling two conflicting visions of teaching. The teachers with whom we collaborated changed the way they viewed the institutional setting in which they worked as they became motivated to change their practice. By the end of the two years, they saw themselves as having greater expertise about teaching mathematics than did their principals, which led to the institutional vision of high-quality instruction increasingly coming to lack legitimacy as it was not aligned with many of the practices that the teachers had come to value. As a consequence, the teachers attempted to change their institutional context in ways that would support the vision of teaching with which they had come to identify.

In the case we discuss, the teachers' identification with the normative affinity identity appeared to be an initial condition for the improvements they subsequently made in their

instructional practices during the following three years of the collaboration (Visnovska, 2009). There is reason to believe that this might be the case more generally. Although it is not always clear that teachers are “acting who they say they are” (Enyedy, Goldberg, & Welsh, 2006, p. 71), there is a reasonably strong relationship between the visions of effective instruction with which teachers identify and their own classroom practices. As Battey and Franke (2008) stated: “identity is in itself a tool that mediates action...identity mediates what makes its way into the classroom by how consistent or inconsistent the new practices are with how they think about teaching content” (p.129). Thus it seems likely that coming to identify with a new vision of teaching is an important first step towards the more ambitious changes required if one is going to actually alter and improve their classroom practice, as observed in the teachers in this professional development group (Visnovska, 2009).

We contend that documenting both the different normative identities for mathematics teaching that are constituted in the different contexts in which teachers participate, and the extent to which teachers value those identities, is crucial in clarifying challenges in professional development and understanding why particular designs of supporting teachers' learning are effective or not. Successful professional development initiatives do more than improve teachers' skills or content knowledge; they also support teachers in deciding that deciding how they teach mathematics is worthwhile (Cobb et al., 2003; Kazemi & Franke, 2004; Franke et al., 2001; Warren-Little, 1993). This study contributes to instructional improvement by indicating the importance of attending to competing normative identities for teaching, and thus of recognizing when they constitute the sub-text of teachers' concerns and interests. It is difficult to support teachers in refining, strengthening, or modifying their ideas about effective instruction unless one understands the contexts in which their ideas and what they take to be problematic make sense.

RUNNING HEAD: IDENTITIES FOR MATHEMATICS TEACHING

Analyses that attempt to document teachers' changing visions of high-quality teaching while attending to the institutional contexts in which they work have the potential to inform design decisions that focus more directly on teachers' own emerging understandings and values.

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