

## Evolution of (Urban) Mathematics Teachers' Identity

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*In this article, the authors examine teacher identity development to understand more completely the intellectual and pedagogical demands of the profession. Drawing on interviews, observations, and reflections of two alternatively certified mathematics teachers, and contextualizing these data with surveys from 157 teachers in the same certification program cohort, the authors examine how identities evolved over the course of the teachers' first year of teaching. These identities are explored in relation to the teachers' knowledge of mathematics, their mathematics teaching, and their relationships to urban youth.*

**KEYWORDS:** alternative certification; mathematics teacher identity; mathematics teacher education

The research reported in this article is part of a large-scale study on alternatively certified mathematics teachers in New York City conducted by MetroMath – The Center for Mathematics in America's Cities.<sup>1</sup> Here we examine how the identities of two alternatively certified mathematics teachers are influenced by conflicts they encounter over the course of their first year of teaching in an urban environment. The teachers in this study—Mathematics Teaching Fellows (MTF)—entered the teaching profession through the New York City Teaching Fellows Program (NYCTFP), the largest alternative certification program in the United States.

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<sup>1</sup> For complete details of MetroMath see <http://www.metromath.org/>.

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Established in 2000, the NYCTFP was designed to provide certified teachers for “hard-to-staff” New York City schools. Hard-to-staff schools are defined as schools that have high teacher turnover due to job dissatisfaction and school staffing actions (Ingersoll, 2000). The NYCTFP has provided teachers for New York City public schools in the high-need areas of mathematics, science, bilingual education, and special education. At the time of this study, over 25% of all New York City mathematics teachers entered the profession through this program (New York City Teaching Fellows, 2010).

Undoubtedly, MTF are having a significant influence on the education of New York City students. Understanding more clearly how these teachers might begin to develop their pedagogical and mathematical knowledge provides useful information for both preparation and mentoring programs and professional development designed to support these teachers.

## **Theoretical Perspective**

Examining identity development among teachers is one way in which aspects of the knowledge base for teaching mathematics might be understood in a more nuanced manner. Because identity is not only shaped by the knowledge and skills one acquires but also shapes the very knowledge and skills one seeks to develop (Battey & Franke, 2008), we frame our study by first examining teacher identity development more broadly. We then turn to considerations of mathematics teacher identity development and the development of teacher identity as it pertains specifically to teaching urban youth.

### *Teacher Identity Development*

Gee (2000) provides an analysis of identity development that allows us to see the possibility of various aspects of identity operating concurrently. Important to our study, these include: (a) Institution-identity (a position) authorized by authorities within institutions, (b) Discourse-identity (an individual trait) recognized in the discourse/dialogue of/with “rational” individuals, and (c) Affinity-identity (experiences) shared in the practice of “affinity groups” (p. 100). Gee views Discourse-identity as being the most salient, while Affinity-identity as increasingly being an important perspective in Western society. Gee contends, however, that all views of identity can operate concurrently as a person (such as a teacher) lives within a particular context.

Gee’s (2000) views of identity assisted us in exploring what might happen as the identities of MTF develop within the classroom. The MTF are supplied with Institutional-identities as teachers. Nonetheless, if students do not recognize as “valid” the Discourse-identities that the teacher develops within the classroom

the Institutional-identities bestowed by the school system most likely are undermined. A lack of Affinity-identity may in turn also undermine the Institutional-identities bestowed by the school system. Kohl (1991) discusses this situation in his book *I Won't Learn From You: The Role of Assent in Learning*. We believe that undermined identities of sorts might be a result of limited shared experiences between students and MTF. This limited shared experiences often makes it difficult for the fellow to establish an affinity group that is inclusive of herself (or himself) and her students, thus inhibiting the development of an Affinity-identity within the context of the classroom. This lack of Affinity-identity, which in part is a result of varying Discourse-identities between teacher and at least some students, might then undermine the Institutional-identity of the MTF. In this situation, issues of power most likely come to the fore. Can the power of the institutionally sanctioned teacher identity prevail against a Discourse-identity that is not sanctioned, or possibly even rejected, by the students in the middle school classroom?

Complementing the work of Gee (2000) is the work of Holland, Lachiotte, Skinner, and Cain (1998). They argue that identity develops within the *figured worlds* in which one participates. Identity therefore is situated (or contextual) and socially dependent (or relational) and cannot be appreciated apart from its social context. The notion of figured worlds and the movement of the MTF among the various worlds they inhabit (e.g., classroom, school, university, home, community, etc.) is a useful one for considering the development of their identities as urban mathematics teachers. The figured world that most centrally interests us is the mathematics classrooms of the MTF and their identities as teachers within that particular context. The MTF participate in other figured worlds, which relate to and inform the identity/identities they develop as classroom teachers of mathematics. They have identities within the NYCTFP itself as well as concurrent identities as graduate students in the figured world of universities, where they aim to connect the theory and practice of teaching as they work as teachers of record in New York City schools.

Building on the work of Gee (2000) and Holland and colleagues (1998), we look at identity as a relational construct. In our study, more individualistic notions of self have been replaced by an understanding that identity is situated and relational. A person has multiple concurrent identities, for example mother, teacher, researcher, wife (or partner), and so forth. A particular identity in this sense (such as that of a teacher) develops within a particular situational context (such as that of a classroom) and in relation to others (such as students) operating within that context. Furthermore, the "stocks of knowledge at hand" (Schutz, 1967) upon which teachers draw include their own educational experiences and the way in which they learned mathematics in those educational settings. These various life

experiences of an individual are available to her as she moves from context to context.

Here in our attempts to more deeply understand the MTF identity development, we turn to MTF narratives. The role of narrative as a vehicle for understanding identity has an important lineage that can be traced through the work of Bruner (1987), who claims that an individual's identity is exposed in the course of storytelling, and, more recently, through the work of Sfard and Prusak (2005), who claim that narrative *is* identity. We draw on MTF narratives by using written reflections and interviews to trace the development of their identities as mathematics teachers in the urban context of New York City. Furthermore, through observations, we examine how these identities play out in the context of the classroom.

### *Mathematics Teacher Identity Development*

What knowledge is necessary to support the development of a situated classroom identity that might be leveraged to support successful achievement in mathematics for urban students of mathematics? Mathematics content knowledge is vital. Ball and colleagues (e.g., Ball & Bass, 2000) have identified a subset of mathematics content knowledge that they term Mathematical Knowledge for Teaching (MKT). They argue that MKT is crucial in becoming a successful teacher of mathematics. We believe that the fellows' development of MKT is one that supports (or whose lack of it undermines) the development of an identity as a mathematics teacher (Meagher & Brantlinger, 2011).

Furthermore, pedagogical content knowledge is equally important. One might define mathematics pedagogy as teachers possessing the ability to impart knowledge while becoming facilitators of students' learning (NCTM, 1991). Teachers must select appropriate mathematical tasks to support learning, promote classroom discourse to deepen understanding, monitor student thinking and adjust instruction, and help students connect new concepts to prior knowledge.

Scholarship by Van Zoest and Bohl (2005) proves useful in thinking about the various components that may be at play in mathematics teacher identity development. They developed a framework that takes into account "the knowledge, skills, and understanding that teachers carry with them from one context to the next" (p. 316). Van Zoest and Bohl refer to this knowledge as "cache of capacity," and for our purposes the framework provides the important feature of connecting content as well as pedagogical knowledge for teaching. But we must also consider how teachers draw on their own personal experiences with learning mathematics—stocks of knowledge at hand (Schutz, 1967)—as they negotiate this work.

*Identity Development as Teachers of Urban Youth*

Ladson-Billings (1995) has suggested that in addition to being mathematically substantive, teaching must be culturally competent. Accordingly, one of the necessary characteristics for teaching is the ability to support cultural competence in students. When the teacher comes from a community that is different from the community of the students, there is work to be done. Teachers need to not only understand the lived experience of the students but also build on the strengths students bring to the classroom. Important work has been done in looking at identity development that attends to issues of students as well as issues of content both in science and mathematics (e.g., Enyedy, Goldberg, & Welsh, 2006; Van Zoest & Bohl, 2005). This research suggests that classrooms and schools must be contextualized within the communities they serve if teachers are to understand the complexities involved in teaching students who come from communities in which they are under (or miss) informed.

In sum, the literature leads us to conclude that to be successful mathematics teachers of urban youth, teachers must develop multiple expertise in knowledge of mathematical content, pedagogy for teaching mathematics, and knowledge of students. Therefore, we ask: How and to what extent teachers might develop their mathematics teacher identities by concurrently developing mathematical knowledge for teaching, knowledge of mathematics pedagogy, and knowledge of students and the communities in which they teach? We also ask: How teachers might draw on their experiences (preservice training, in-service support, previous schooling) in forming their identities, and in what ways they resolve (or not) conflicts among past learning and present experiences?

## Methods

As we analyze the development and evolution of the identities of two alternatively certified mathematics teachers during their first year of teaching, we draw on several sources of data gathered as part of the larger MetroMath study previously mentioned. First we contextualize the development of our participants by drawing a large-grain portrait of teacher identity through considering surveys administered to all teachers in their MTF cohort at the beginning and end of the first year of teaching. Then, we use extensive case study data to provide a nuanced view of the developing identities of our two participants during their first year of teaching. The case study data sources include lengthy pre- and post-first year interviews, videotaped classroom observations, field notes, post-observation interviews, and written lesson reflections.

*Participants*

Our two participants, Kate and Kelly (pseudonyms), were both White women in their first year of teaching mathematics in middle schools in New York City. They each concurrently attended similar graduate programs (Master of Arts for Teaching) at different universities. These programs were specifically designed in a collaborative effort among the New York City Department of Education, the New York State Education Department, and the local universities to educate and support MTF during their first 2 years of teaching.

Kate was 30 years of age at the start of her first year of teaching. She had attended a magnet high school in a large Eastern city. In this respect, Kate is like 36% of the 106 people in her cohort who responded to this question saying they had gone to an urban high school (50% had attended suburban high schools, 8% rural high schools, and 7% attended high schools abroad). After high school, she had attended an elite, Eastern liberal-arts college where she majored in International Relations. Her college mathematics background consisted of one year of calculus. After completing college, Kate lived in Africa while working for an international service organization. Following this service, she worked for several years for an educational publisher editing mathematics textbooks.

Kelly was 25 years of age when she started teaching. She had attended a rural high school in the Midwest. After high school, Kelly had attended a large, top-ranked, Eastern university where she majored in International Politics and Religion. Kelly had taken and passed AP Calculus in high school; her college level mathematics consisted of one statistics course. Kelly had a Master of Arts degree in Islamic Studies from a prominent Canadian university. She had lived abroad before becoming an MTF.

*School Contexts*

Kate worked in a small middle school of approximately 300 students (middle schools in New York can be as large as 1,000 or more students). The student body was 37% White, 33% Latino/a, 23% African American, 6% Asian, and 1% Native American; 42% of the students were eligible for free or reduced-priced school lunch and 4% of the students were considered to have Limited English Proficiency (these figures are for the 2006-07 school year, Kate's first year of teaching, and vary little from the previous 2 years). The school did not receive Title I funding and had met Adequate Yearly Progress (AYP) for all students and for all targeted sub-groups in both English Language Arts and Mathematics in 2007-08. The New York State Education Department rated the school in "Good Standing," the highest rating a school can receive from the state, which rates all

public schools not receiving Title I funding<sup>2</sup> (New York State Education Department, n.d.).

Kelly worked in a middle school of approximately 800 students, and one with a higher level of student need. The student body was 56% Latino/a, 42% African American, 1% Asian, and 1% Native American; 93% of students were eligible for free or reduced-priced school lunch and 16% of the students were considered to have Limited English Proficiency (again, these figures are for the 2006-07 school year, and vary little from the previous 2 years). The school did not meet all its goals for AYP in 2007-08. Although all students met AYP in Mathematics, they did not in English Language Arts. The Federal Government has rated the school as “Restructuring Year 2,” the lowest rating a school can receive from the Federal Government, which rates all schools receiving Title I funding (New York State Education Department, n.d.).

### *Survey Data and Analysis*

Informing our work is survey data that includes pre- and post-responses from approximately 157 of the first year MTF<sup>3</sup> that made up Kate’s and Kelly’s cohort. These surveys consisted of both Likert-like and open-ended questions related to mathematics teaching and learning, urban teaching, self-efficacy as a mathematics teacher, views on mathematics procedures and concepts, and mathematics learning and student readiness. Here we focus on the survey questions that related to identity.

Responses to the survey were analyzed using a mixed method approach. For the Likert-like items, descriptive statistics were used to explain the responses. Open-ended items were coded using the framework from Van Zoest and Bohl (2005) described below.

### *Case Study Data and Analysis*

Nine MTF agreed to be participants for in-depth case studies as a part of the larger MetroMath study. As noted, we present results from Kate and Kelly, two teachers who were in their first year of teaching and whose data corpus was suffi-

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<sup>2</sup> This school does not have the “typical” characteristics of student underachievement too often found in hard to staff schools. Although, at the onset of the NYCTFP, fellows were placed in hard to staff schools, as the program has evolved fellows now find their own jobs; many do not begin their teaching careers in hard to staff schools.

<sup>3</sup> Not all respondents who completed the survey answered each question. The number of respondents per Likert-like question varied from a low of 151 to a high of 163. For some of the other questions, responses were even fewer. In those cases, we will state the number of responses on which the presentation of the data is based.

ciently complete. Case study data for Kate and Kelly, including videotaped lessons and field notes, lesson reflections, and teacher interviews, were initially analyzed using a closed-coding scheme framed by Van Zoest and Bohl's (2005) mathematics teacher identity framework. Data from each source were coded for instances that fit into the framework domains: (a) content/curriculum domain, (b) pedagogy domain, or (c) professional participation domain. At the same time, data were coded as belonging either to one of what is designated in the framework as Aspects of Self-in-Mind ([a] knowledge or [b] beliefs, commitments, intentions) or Aspects of Self-in-Community. The latter includes three dimensions of competence: (a) mutuality of engagement, (b) accountability to an enterprise, or (c) negotiability of a repertoire as well as perceptions of self and others. Close examination of the coded data indicated that much of the identity development of Kate and Kelly during their first year of teaching involved the negotiation of conflicts.

In the discussion below, we identify the salient conflicts that shaped their identity development and provide narratives for Kate and Kelly. We begin the discussion by drawing on survey data to provide an overview of some of the characteristics as well as beliefs and attitudes of the cohort of MTF examined. We do so to demonstrate the extent to which Kate and Kelly are typical members of their cohort. We then present in more detail the particular ways in which the identities of Kate and Kelly developed during their first year of teaching.

## Survey Results

An analysis of the data shows that many MTF are from middle-class backgrounds, suburban schools, and are graduates of elite colleges (prestigious private colleges or large, top-ranked research universities). Of the 105 members of the cohort who indicated their undergraduate institution, 64% graduated from elite colleges or universities. In this respect, Kate and Kelly are typical of their cohort, both having graduated from these types of schools. In addition, the majority of MTF did not major in mathematics or a mathematics related field. Of the 80 members of the cohort who indicated their major, just 10 (or 13%) majored in mathematics; another 22 (or 28%) majored in a field related to mathematics such as accounting, finance, or engineering. The majority, 60%, majored in a liberal arts or science field. Again, Kate and Kelly are typical of this majority in that they are among this group with limited learning experiences in college-level mathematics.

In reflecting on their first year of teaching mathematics, the majority of MTF were confident in their ability to teach mathematics (79% agreed or strongly agreed with the statement: I currently feel confident in my ability to teach mathematics effectively; 89% agreed or strongly agreed with the statement: I think I eventually can become an exemplary urban mathematics teacher; 98% agreed or

strongly agreed with the statement: I will be able to improve my mathematics teaching ability). Both Kate and Kelly are among these respondents.

Looking ahead to future plans, the majority of MTF were positive about teaching (82% agreed or strongly agreed with the statement: I think a teaching career will continue to engage and challenge me; 84% agreed or strongly agreed with the statement: If I had to do it all over, in view of my present knowledge, I would decide to become a teacher again). Despite these positive attitudes toward teaching, both Kate and Kelly agreed with the majority of their cohort (80% of respondents) saying that they found teaching stressful. Although both agree that they would become teachers, if they had it to do over again, Kate agreed that teaching would continue to engage and challenge her, while Kelly strongly disagreed that it would.

When asked about their long term career plans 59% of the MTF indicated that they would continue to teach (41% in New York City and 18% outside of New York City); 13% responded that they would work in a job related to education; 10% said they would attend graduate school; and 18% said they had no plans as yet. Again, Kate and Kelly were fairly representative of their cohort. Kate planned to continue teaching in New York City, while Kelly expected to move out of the City after 2 years with an ultimate goal of teaching at the college level. And yet again, Kate and Kelly were fairly representative of their cohort. Both planned to continue teaching in New York City or elsewhere.

## Case Study Results

Not unexpectedly, Kate and Kelly negotiated several conflicts during their first year of teaching. Here we focus on three conflicts that emerged from our data analysis. The first involved the tension between understanding mathematics and the implications that this understanding had on their mathematical knowledge for teaching. The second revolved around mathematics instruction including which forms of instruction best suited the developmental needs of their students. And the third centered on how Kate and Kelly related to their students and the families of their students. We take each conflict in turn and examine the development of Kate and Kelly as they negotiated these conflicts.

### *Conflict #1: Knowledge of Mathematics and of Mathematics for Teaching*

There was a difference between the ways in which Kate and Kelly described learning mathematics and the ways in which they were expected to teach mathematics by the New York City Department of Education (NYCDOE). From their descriptions of their own schooling, they learned mathematics as a discrete set of procedures and skills presented by teachers and memorized and practiced by stu-

dents. They were asked, however, to teach in an environment that looked at mathematics as a connected set of concepts, skills, and problem solving (America's Choice™, n.d.), and to use a "Comprehensive Approach to Balanced Mathematics" (CABM), a curriculum model adopted by the NYCDOE in 2003. At the heart of CABM was a model of instruction called the Workshop Model (New York City Department of Education, 2003).<sup>4</sup> Exacerbating this conflict was the limited depth of their knowledge of mathematics. As we will see, Kate and Kelly negotiated this conflict in significantly different ways.

*Attitude toward mathematics.* In Kelly and Kate's MTF cohort, the range of completed mathematics coursework varied from no college-level coursework in mathematics to master's degrees in the discipline. While Kelly's formal background in mathematics was on the lower end of the spectrum, she entered the program professing that she not only liked mathematics but also that she was a strong student of mathematics. Kelly had been accelerated in elementary school mathematics; in sixth grade she was placed with a small group of students who taught themselves sixth- and seventh-grade mathematics with little teacher support. When Kelly reached seventh grade, she studied algebra allowing her to complete AP Calculus in high school. Upon entering college, Kelly received credit for AP Calculus and used a course in statistics to complete her undergraduate mathematics requirements.

Kelly had the opportunity to study mathematics further during her first year of teaching. Yet she found the mathematics course of little value and had difficulty understanding the material:

Every single class period [the professor] would start out with the basics. ...And then he would go to some complex, weird extrapolation of what he'd started on and for the next hour and a half no one had a clue what he was doing. (Post-first year Interview, 2007)

This lack of understanding led Kelly to revise her ideas about mathematics: "I don't really like math. Never have really liked it" (Post-first year Interview, 2007). Her survey responses echoed these comments. She strongly disagreed that teaching mathematics would be a lifelong career and disagreed with the statement: "I plan to continue to study math."

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<sup>4</sup> Quoting from the New York City DOE CABM for Grade 7: "The curriculum balances structured learning, direct instruction, and creative problem-solving. Student discovery plays as significant a role in the learning process as does teacher-directed instruction. ...There is a balance of basic skills and conceptual understanding; students build new mathematical ideas and at the same time practice needed procedures" (p. 3). The Workshop Model used in CABM outlines an instructional agenda that included a 7- to 10-minute mini-lesson of direct instruction, 20 minutes of group work, and 10 minutes of sharing results.

Kate had a similar background in school mathematics, having taken only Calculus I as an undergraduate. Nonetheless, she chose to study more mathematics and completed two additional college-level courses before she entered the NYCTF summer pre-service program. At the end of her first year of teaching, Kate was still eager to learn more mathematics. In discussing her graduate program and areas in which she still wanted support, Kate responded, "I pretty much want advanced math classes" (Post-first year Interview, 2007).

So here we see two first year teachers with similar school-based formations in mathematics but who at the end of their first year of teaching have quite different orientations toward and confidence in their knowledge of mathematics. Moreover, Kate and Kelly have devoted differing energy to the improvement of that knowledge and have differing views of the knowledge they would seek to develop.

*Understanding the mathematics they teach.* Both Kate and Kelly had been successful (i.e., received good grades) in school mathematics. Yet even though they were teaching at the middle school level, they did not have a deep understanding of the concepts they were teaching. Kate was nonetheless enthusiastic about the prospect of developing this conceptual knowledge base for teaching:

This time we literally made a paper plate as a unit circle and drew everything on there and figured out why. Really the content just reinforced all the different ways to see every kind of mathematical concepts, stuff I'd never thought about before. (Pre-first year Interview, 2006)

Additionally, Kate clearly saw the link between mathematical knowledge and mathematical knowledge for teaching. She saw that understanding student thinking was intimately linked with knowing mathematics. When asked what she felt were characteristics of effective mathematics teachers in urban settings, Kate mentioned the need to know mathematics:

I think you really have to get the math. They want so many math teachers. They get all these people who don't really have much of a math background, and you can't teach math if you don't know what's going on, because the kids come up with the most bizarre ways to explain the way they think about different problems, and nine times out of ten it makes complete sense. (Post-first year Interview, 2007)

Kelly, on the other hand, did not share the desire to learn more mathematics, even though she recognized that her traditional background could limit her ability to use different methods to solve problems:

The way that my teachers taught me these things is really different than how we learned them in these [university methods courses], so it was really interesting to see the different [methods]. I just memorized things. Our [methods] professors are telling

us it's not really about the formula, give them a calculator or both, or give them the formula. And I'm—wait a minute, that was all I learned, how to memorize the formula and plug it in. (Pre-first year Interview, 2006)

On one particular occasion, Kelly expressed her concerns about these differences by focusing on the mathematics at the superficial level of terminology. When asked if she knew mathematics well enough to teach it, Kelly somewhat hesitantly responded:

I think I know it. I know it if I can review it right before I teach it. But, as I'm learning, a lot of the technical terms for things were not the same for what they call it here and what they called it in [my home state]. So when [my professor] said we were going to add and subtract mixed numbers with grouping. Now I had never in my life heard of grouping. I didn't know what grouping meant and I assumed I had done it somewhere along the line but I had no idea. (Pre-first year Interview, 2006)

At the end of the year, when asked the same question as Kate about the effective characteristics of urban mathematics teachers, unlike Kate, Kelly did not mention that knowledge of mathematics was important.

#### *Conflict #2: Mathematics Instruction*

Both Kate and Kelly worked in middle schools that, in line with directives from the NYCDOE, used the CABM and Workshop Model (previously described) for teaching mathematics. Given their background in learning mathematics via traditional mathematics pedagogy, it is not surprising that both encountered some conflict around the idea of teaching mathematics using CABM. It was a different way to look at the teaching and learning of mathematics from what Kate and Kelly had experienced as learners, and at times they questioned whether these new methods they were encountering best served their students. And yet, they both found something enticing and intriguing about the idea of student-centered learning and discovery pedagogy.

Initially, Kelly expressed reservations about implementing the Workshop Model:

So I have to present [the material] first, then they're supposed to work alone for five or ten minutes and then do something in a group. I don't understand how I can go through a whole Workshop Model in 43 minutes—instruction, independent work, and group work. (Pre-first year Interview, 2006)

Although Kelly expressed concerns about implementing the Workshop Model on a daily basis, by the end of the year she could see that a routine such as the Workshop Model provides might have promoted better classroom behavior:

I get bored very easily with routines, like doing the same thing every day. But I found that if I changed things up, then the students' behavior went nuts because they weren't used to that. ...Coming in with the same thing every day, [the students] know what's going to happen and it does happen. I had less issues with their behavior. ...And I liked [the Workshop Model] a lot because it doesn't put a lot of emphasis and time—a lot of time to the teacher driven part because I'm not going to hold their attention with examples for more than a few minutes. They would rather talk it out with their neighbor than listen to me. (Post-first year Interview, 2007)

But even after a year of teaching, Kelly could not articulate how she believed mathematics should be taught in this urban environment: “I don't really know because I haven't seen—I mean I haven't watched any other teachers in my building. I guess it's just what I think would work. ...We haven't taken a class on it” (Post First-Year Interview, 2007).

One area where Kelly felt she had improved over the course of the year was in the delivery of her lessons. Planning had been a major focus of her preservice program. After the first few months of teaching, however, during which she had devoted several hours each week outside of school to planning, she decided to set aside only one hour in the morning before school to plan. “I thought we [teachers] would spend a lot more time doing things like lesson planning when in fact I did not. That was more of a thing that I did in the morning when I got there” (Post-first year Interview, 2007). By Thanksgiving, Kelly had decided that if she was going to survive the year, she needed more control over her schedule outside of school:

So, I did all of my prep in the morning because by the end of the day, I didn't care. ...I didn't stay ever afterwards. ...This is my revelation. I don't know if it's good or bad. ...[Initially] I was planning for the whole week on Sunday for a couple of hours, but none of my classes ever got done what I wanted. (Post-first year Interview, 2007)

By the end of the year Kelly found herself not only to be more confident but also better able to read how the lesson was progressing and adapt if necessary:

I didn't feel like I needed it written down word for word, but I was also more responsive of how it was going in class. I think at the beginning of the year I chugged along on my lesson plan regardless. And after a while, I could read their expressions more and they were more willing to say, “I don't get this.” (Post-first year Interview, 2007)

While making connections between the mathematics taught and real-world applications is one of the many goals of CABM, it seemed to be the only one that Kelly focused on. Before she began her classroom teaching, she voiced concerns as she realized that her limited and largely procedural knowledge of mathematics was interfering with her ability to access real world contexts:

So when I'm trying to think...how am I supposed to make them want to...learn imaginary numbers? ...Well, I've got [the other fellows] raising their hands about codes with the CIA. I have no idea because I learned the formula. (Pre-first year Interview, 2006)

Kelly repeatedly voiced similar concerns about what it would take to engage her students in doing mathematics problems that were related to their lives and experiences. At the end of her first year of teaching, Kelly underscored the importance from a motivational perspective of including material drawn from the students' lives:

The lessons that I had that were most successful and my students paid attention the most when I could somehow manage to relate what we were doing to their life. When I did something with money and sales and going to the store and you had a certain amount of money in your checking account and you wanted to buy this and that. ...So, I think effective teachers will find ways to make the material applicable and resonating in their students lives so that they actually see a reason to learn it. (Post-first year Interview, 2007)

Yet during this first year of teaching, Kelly rarely drew on real-world contexts and there was no evidence that she developed investigations when teaching mathematics. Instead, she too often resorted to teaching lessons that were more procedural in nature.

As we saw previously, Kate was favorably disposed to using methods consistent with CABM and focused on engaging with discovery pedagogy in her classroom. Yet, throughout the year we see the tension between teaching mathematics in an engaging way and reverting to the more familiar traditional pedagogy she had experienced as a student. Toward the end of a lesson early in the year, for example, when a student verbally expressed a rule for  $a^c \times b^c$  stating that the equivalent expression was  $(a \times b)^c$ , Kate responded, "That is the rule!" After a short pause, Kate asked, "Why does it work? How do we write it out in variables?" Although this question could easily have supported some investigation and discovery by the students, Kate (evidently, prompted by time constraints) waited only a few seconds and receiving no immediate response said, "I'll just tell you because we're running out of time" (Observation, 9/06).

In a reflection later in the fall, Kate defended her decision to focus at least periodically on repeated drill and practice of a skill:

Almost everyone can factor and expand a bit, which is very reassuring [because] I have spent so much time going over it. They are sick to death of it I'm sure, but I don't care. I'm still going to keep doing the distributive property problem of the day for as long as it takes. (Reflection, 12/06)

Nonetheless, in that same reflection she looked ahead with excitement (although also with a certain sense of anxiety due to classroom management issues) to a unit that she felt would be able to involve more discovery learning:

We are all so excited to be done with algebra for a bit and I think they'll really like the geometry unit. It's so much more crafty though, and I'm a bit worried about classroom management when most of every period is them making stuff and doing the whole discovery exploratory thing. We'll see. Maybe they'll surprise me. (Reflection 12/06)

Some of her concerns about managing the discovery classroom were apparently born out, as just a month later Kate expressed distaste for discovery learning:

I hate doing discovery lessons because you notice my room is a mess...discovery mathematics and this whole like new way. ...I would love to put a formula on the board and give them 25 problems to do—that's the way I learned it. (Post-observation Interview 1/07)

In the same interview, however, Kate expressed amazement at how well a portion of the lesson had played out: "That whole making the net thing was actually amazing—I can't believe it worked out so well today. They've never been able to do that before" (Post observation Interview 1/05/07). Shortly after this interview, and after a lesson linked to Valentine's Day that had developed particularly well (on estimating areas and finding areas of irregular shapes), Kate gave a strong endorsement of discovery learning saying:

I want to spend more time doing problems like the heart problem, ones that get the kids really involved in loving a problem that is complex but accessible, where they have to use all different kinds of math (like with the heart problem—geometry, algebra, measurement, proportions) to find a solution. These can take a lot of class time, but I think the students learn more math than sitting there, listening to me and then doing practice problems about something they hardly understand. It is easier if they are given ways to make connections to what they already know and they sort of need bigger problems, not just one-step drills. (Reflection, 2/07)

In spite of successful lessons such as the heart problem that used discovery pedagogy, Kate expressed in a reflection in June some frustration with the insistence by the school administration that she adhere to the Workshop Model. She said that she liked to have more control in the classroom and so she often limited the amount of classroom discussion. In an interview after the completion of her first year of teaching, it is apparent that Kate still felt that a certain amount of drill and practice served her students well. When asked how her image of teaching had

changed since the beginning of the year (when she was enthusiastic about discovery learning), Kate responded:

I think at the beginning of the year I felt like the whole just like practice problems rote learning thing was really out of fashion and not that valuable now. I mean I know that it worked for me. ...And I think that I felt guilty about doing that this year, like "Open to page 328 and do 1 through 30," but I think it's actually very valuable for them and I don't feel ashamed of it anymore. ...I think you just have to balance it. I mean some things work better for different topics and you just have to do all of it all the time kind of, instead of picking one thing. (Post-first year Interview, 2007)

So we see that although Kelly was able to verbalize the need for relating mathematics lessons to students' lives, she was unable to follow through in her lessons. Kate continued to be much more responsive to using the CABM model, although she too felt she needed at times in her classroom to use a pedagogy that focused more on the learning of procedures.

### *Conflict #3: Teaching Urban Youth*

Along with the content issues involved in teaching mathematics, there are also relational issues that come into play in classrooms that are equally important to achieving success in teaching (Grossman & McDonald, 2008). While knowing mathematics content and pedagogy is crucial for being an effective teacher of mathematics, knowing the students whom one teaches is also crucial to being a successful teacher of mathematics (Ball, Lubienski, & Mewborn, 2001; National Research Council, 2001). There are two aspects of teaching mathematics to urban youth in which Kate and Kelly exhibit conflicts during their first year of teaching: Are the urban youth they are teaching capable of engaging in conceptually challenging mathematics? And how do teachers relate to the students (and their families) as people who bring rich experiences and resources to the classroom?

*Beliefs in students as capable learners.* The conflict Kate and Kelly exhibited around their beliefs in their students as capable learners was two pronged. On the one hand, they held some deficit views of students and/or their families (for a more complete discussion of the deficit views held by the Kate's and Kelly's MFT cohort, see Brantlinger, Cooley, & Brantlinger, 2010). But on the other hand, they recognized that, at times, their students' exhibited clear understanding of grade-level content knowledge and the ability to engage in problem solving. Having a belief and recognition of students as capable learners however, did not lead either teacher to incorporate student-based knowledge into mathematics lessons.

Initially, Kelly talked about motivating students by connecting what they were learning to real-life applications and worried that her mathematics background was not strong enough to incorporate applications into her lessons. How-

ever, when the opportunity arose (a basic statistics lesson reviewing mean, median, and mode), Kelly neglected to add even one example that might relate to the lives of the students in her class. She reflected on her lesson and justified her lack of planning for student engagement:

I was kind of bored with the material so I can only imagine what the students thought. I think I achieved my objective; however, I would like to make it more interesting as time goes by. ...I will focus on more creative lessons when I have the basics [classroom procedures] under control. ...I have been getting advice from colleagues that these students are really motivated so I need to make sure they are challenged. Yet, I just found that while [reviewing] the homework they [easily gave] up when the questions were not that difficult, they gave up without trying. (Reflection, 9/06)

As the year proceeded, Kelly continued to use classroom management issues as a justification for limiting her lessons to a short teacher directed mini-lesson with the remainder of the class period used for students working together on skill-building problem sets. While she considered offering more inquiry-based lessons or providing a focus on applications, Kelly did not take opportunities to incorporate any of these strategies into lessons. In her post-first year interview, Kelly indicated that her students were reluctant to explore and problem solve independently:

If they could not get it, they wanted me to be over there to help them, show them how to do it "right now." [They] can't make mistakes. They don't like to get anything wrong in class. Struggling to figure it out on their own is not something that they like to do. (Post-first year Interview, 2007)

From the start of the school year, Kate had a more positive view than Kelly of her students' capabilities. She was also dedicated to supporting them to develop confidence in doing mathematics as she saw a lack of confidence, rather than a lack of ability, as hampering her students' achievement. When, during an interview following a classroom observation early in the fall semester, the researcher commented, "You keep telling the class they can do the given assignments." Kate responded by stating:

A lot of my students get stuck on not knowing how to do something immediately. I'm trying to help them understand that they can figure stuff out; give them the confidence they need to figure out the tough problems. ...I remind them constantly that they do know and I know they know. (Post Observation interview 10/06)

Nonetheless, Kate appeared to lack confidence in her students' abilities as capable learners in other respects, "They don't have the vocabulary or the ability to think about it well enough to discuss it afterwards" (Reflection, 1/07). She be-

lieved that following a structured/procedural approach to mathematics might address these deficits and support them in becoming confident learners of mathematics: "They can solve a word problem by writing an equation and then following the set of rules. As long as they follow these rules, they can do anything they want, and they can solve any problem" (Reflection, 12/06). Yet in spite of her repeated advocacy for the need to use this procedural approach, she was also aware of the benefits that could be had by students engaging in inquiry activities in the classroom. On one occasion when the students successfully engaged in discovery learning, Kate was impressed and surprised by what they accomplished. And at the end of the year, Kate spoke positively about her students saying again that it was a lack of academic confidence rather than a lack of competence that negatively influenced her students' performance:

I'd really like it if my students were able to look at a math problem, decide what they need to do to solve it, and figure out how to use what they know to find the answer. They don't seem to have a lot of faith in what they already know, which is a lot. Total lack of confidence. (Post-first year Interview, 2007)

*Relating to students.* Both teachers demonstrated the ability to relate to each student as an individual to support student learning. But because of her middle-class upbringing, and the more modest socio-economic status of many of her students, a social distance (Ladson-Billings, 1997) existed between Kelly and her students. Social distancing was not the case for Kate, however. Her conflict with relating to students was more centrally concerned with a personal distance she sought between herself as a teacher and her students. Here we elaborate on the two different ways that Kate and Kelly were conflicted in their relationships to their students. Additionally, we will see that while both Kate and Kelly may have understood that incorporating home and community knowledge in the classroom could be motivating for students, they demonstrated little ability or effort to do so. Even when lessons appeared to be ripe for making connections from students' own lives to mathematics (such as in the statistics problem previously discussed) it was rarely done. The views that Kate and Kelly had of students and families as lacking a rich and valuable knowledge base did influence their thinking about what was possible for their students to accomplish mathematically.

*Negotiating social or personal distance.* Kelly had been told in her interview with the NYCTFP that being raised in upper-middle-class, rural America would influence her ability to connect with her students, but she did not find that to be the case. At the end of her first year, she said:

Like when you go to these interviews with the teaching fellows, they kept pointing that out [the social distance], so I didn't know how it would manifest itself, but somehow [they seemed to be saying that it] was going to be difficult for me to connect with my students and maybe they wouldn't like me because of this or that. ...I

wouldn't understand where they're coming from. But they're just kids. It really didn't actually—I guess as long as you're an empathetic person and you listen to their problems, they're just kids. And it didn't really matter that much because I was capable of listening and understanding about what was going on in their lives. And I don't think they really cared where I came from. (Post-first year Interview, 2007)

On an individual basis Kelly had a respectable rapport with students. This respectable rapport was evident in a lesson observation where an African American student sitting in the back of the room did not move to participate in group work after the mini lesson. He was quiet, but visibly uninterested in the class and looked somewhat upset. Rather than reprimand the student in front of his classmates, Kelly went over and spoke quietly with the young man, making him laugh. He eventually moved and started to participate with his group (Observation, 12/07).

Additionally, Kelly had experiences she brought with her to teaching that may have supported her in bridging any predicted social distance between herself and her students. She had been an exchange student in the same South American country that many of her students' families came from. Because of this exchange program she spoke some Spanish. She also had lived in the Middle East and spoke Arabic. Her ability to speak Arabic provided an opportunity to talk about cultural differences and, along with her ability in Spanish, might have helped to position her as someone with multicultural understandings:

It was interesting and the only time we had like a real serious discussion was one of my students in my homeroom speaks Arabic. He's Muslim. And I heard him—I asked him in Arabic something because I saw his name. And then a couple of the students started laughing and were like, "Oh, so you're a terrorist too?" So, I was—so, we talked a little bit about Arabic and Islam, which [I studied in college], so we talked about that for a while. (Post-first year Survey, Summer 2007)

But Kelly also expressed opinions about the nationalities of her Latino/a students indicating that perhaps she did not have a fine-tuned sense of the importance of students' cultural identities:

The biggest deal was between students, a student making stupid jokes and stupid comments to one another about their own cultures, which is something we dealt with all year and never really got dealt with, never got handled. ...They had names for everybody depending on where they came from. And, of course, that upset about half the people in the classroom. And they would yell that out in the middle of class. ... There were differences between the Dominican Republic and Haiti and I'm Dominican and you're a Mexican. I am Guatemalan and you're Mexican. And they would just make fun of each other. No real point to it and they're similar anyways. (Post-first year Interview, Summer 2007)

Clearly, for the students, there were differences in identity between being Mexican and Guatemalan, for example. Although to Kelly the cultures and languages may have seemed too similar to be the basis for ridicule and arguments, this perspective of similarity was not the case for the students, however.

Kelly's lack of planning and limited mathematics background also may have influenced her ability to connect with her students. In a lesson on the laws of exponents, which she assumed would be a review, Kelly stumbled in her response to a problem on order of operations,  $-2^2$ , indicating that one would evaluate it as the expression  $-2 * -2$  resulting in 4 (instead of the correct evaluation of  $[-1][2^2] = -4$ ). This inaccurate result was questioned by the students and led to a series of vague, inaccurate, or, at best, imprecise responses on Kelly's part through the remainder of the lesson. It was clear by the end that Kelly was frustrated and the students were confused. But rather than recognizing her mistake, she reflected on her lesson in the following way:

Their teacher from last year told me they had already mastered all the laws of exponents and I think she may have been exaggerating or they all forgot, because it took much longer than I imagined. Also I have a hard time understanding their questions because I think most of the time they want to trick the teacher and I rarely understand what they are getting at. ...I am trying to teach them that they may not understand the minute it comes out of my mouth but through practice and examples it will come to them. This is a constant struggle. (Reflection, 10/06)

Thus, although Kelly never saw the social distance as an issue, she failed to see that her Latino/a students saw themselves as different from each other, in this way exhibiting that there did exist some social distance between her and her students. Furthermore, she did not trust the students enough in their abilities to question her content knowledge or to allow them to engage in inquiry-based learning.

Kate's conflict around her students takes a different form from that of Kelly. As we will see, Kate does not believe that social distance between her and her students is an issue. Her identity as a teacher, however, compels her to try to maintain somewhat of a personal distance from them in the interest of being "professional." She is concerned about being perceived by her students as not sufficiently strict. Although Kate is conflicted about the nature of her relationships with students, she does not experience the same enacted social distance between herself and her students as Kelly appears to. In fact, Kate sees more similarities than differences between herself and her students:

I think we're really similar. I mean the school that I went to was a public school. It was a magnet school. It was really, I mean it was tracked and sort of segregated, was sort of dangerous, but it still had a really good reputation. I mean I can like see in my students like which one I would be and who my friends would be. I don't think

they're that different at all. They're pretty much the same. Some of them seem more mature than anybody I knew at that age. (Post-first year Interview, 2007)

Kate's desire was to have a somewhat impersonal relationship with her students. She wanted to remain somewhat of an unknown entity to her students so that she could maintain a personal or professional distance that she perceived was difficult for her to do. This desire led her purposefully to withhold personal information from her students:

I mean I feel like they were all so different, like they're all from so many different places...and they didn't really know where I was coming from because I didn't want to share it with them. (Post-first year Interview, 2007)

Kate, however, wanted to employ a pedagogy of caring for her students (Noddings, 1984). She saw herself as someone who both related well to students and let them know she cared:

I think I get how to work with kids and how to like really listen to them. ...I was able to really connect with them and I think some teachers can't. I mean they know that I care. They knew that I really, really wanted them to do well, they knew that I loved math and they knew that I expected them to work their hardest. And what else can you really want, you know? (Post-first year Interview, 2007)

Kate demonstrated this pedagogy of caring and camaraderie to her students in many ways. She was very expressive in her class discussions with students using such words as "great" and "fantastic." She smiled often. After the heart problem (previously discussed), Kate congratulated her students on a great job: "So, first thing I want to do is talk for a moment about the heart problem we did on Wednesday. That was fantastic" (Observation, 2/07). While working on perimeter and area problems, she demonstrated not only enthusiasm for the students' work but also made a connection among the work the students were doing, saying: "Ooh – okay – nice. So you're pretty much doing the same thing but different order as to how you are thinking about the problem. Fantastic." (Observation, 3/07) Nonetheless, she did not want to be perceived as too caring. At the beginning of her teaching, she had acknowledged that she had this persona with students:

I seem to convey this, "I care about you. I'm supportive," like you-can-come-to-me openness, which is really, really useful in a lot of ways in life. It's great as a camp counselor, but it's not great as a teacher all the time. I really have to figure out how to not project that all the time. I'm also a little too expressive. I need to have a little bit more of a mask. (Pre-first year Interview, 2006)

When asked at the end of her first year, how her students perceived her, Kate replied:

They loved me. They thought I was really nice. I mean not the kinds of things you want your students to think of you. I want them to be scared of me, like they are of Ms. Christianson [pseudonym]. You know, I want them to be happy to see me but be kind of like mentally checking to make sure they're like not chewing gum when I see them. And it's not like that. I feel like I'm more like mom. So I'm going to work on being scarier this year. (Post-first year Interview, 2007)

Negotiating personal distance, as Kate perceives it, continued to be a work in progress. She began and ended the year wanting to project an image that one can imagine might call commanding respect. While she cared for her students and was enthusiastic and effusive in the classroom setting, she was uncomfortable that at times she passed over a boundary of professionalism that she wished to establish and maintain.

*Are parents the problem?* Both Kate and Kelly saw a difference between the parents of their students and the families in which they had grown up with regards to the reaction of parents to failure in mathematics. In Kelly's case, not only did her parents have high expectations of her achievement in mathematics but also they encouraged her to accelerate in mathematics. She found her students' parents did not necessarily hold these same expectations. As she put it:

Actually, I found it interesting that at the parent-teacher conferences, quite often parents would say things [about] their kids like, "Oh, it's all right they're not doing good at math. I was never good at math." ...And if you're getting messages at home that it's okay to not be good at math or it's okay because it's hard, then it's easy for them to accept so-so grades when they could be doing better. (Post-First year Interview, 2007)

I think the biggest problem for my students is their parents, because probably at least half of the parents who came to talk to me on parent-teacher night tell me that they hate math. They don't understand math. They can't help their kids with math because they don't get it. (Post-First year Interview, 2007)

Yet Kelly found herself holding mixed feeling about parent involvement in their child's education. She tried to call parents when students were in danger of failing or were causing trouble in her classroom; however, she rarely actually talked with parents when she called—most calls resulted in messages left on answering machines. While it was easy to blame parents for lack of interest in their children's education, she also recognized that many were doing the best they could:

I mean we didn't see very many of the families [during parent conferences]. The support and involvement by the families wasn't that much. ...But that's not fair to say that they weren't supportive because a lot of them just had so many jobs that they were working all the time and couldn't make it up to school. So, I want to think

that they were just as supportive of education, but I don't know. We just never really interacted that much with the families. (Post-First year Interview, 2007)

Kate had sounded a similar strain, also indicating that the onus for success lay with the parents, that there were instances where the teacher did not have the tools to influence learning given the conditions at home: "The kids who get no support [at home] struggle in school. Their parents don't help them and the kids are a mess and are too disorganized to get stuff done on their own. And their teachers can't help them all" (Post-observation interview, 2/07). However, in spite of this view of parents, Kate reflected at the end of her first year of teaching that she had been able to develop relationships with some of her students' families and an understanding of their lives. The development of these relationships, Kate credited to her involvement with the parents even when that involvement began due to behavior problems in the classroom:

So most of the kids whose parents I talk to a lot were kids who were more of a pain in the butt unfortunately, but whenever I had to make those phone calls I also made myself make a couple of happy phone calls, just to call and tell them [their child] was doing well. So I tried to keep in touch." (Post-first Year Interview)

So we see that both Kelly and Kate experienced conflicting views regarding the relationships that they had with their students and their students' families as well as the influence that these relationships (or lack thereof) have on the students learning. Kelly was the most conflicted about family support, identifying it as limited and problematic, but also understanding the dilemma low-income parents faced as they struggled to provide food and shelter for their families. Kate was less sympathetic toward the parents of her students, but recognized the importance of sharing positive as well as negative feedback with parents in an attempt to build relationships.

Clearly, there were relational issues that influenced Kate's and Kelly's effectiveness as first year teachers. While both felt there was little social distance between them and their students, Kelly made limited use of her diverse experiences and knowledge of Latino/a students to make her class more engaging or to help address ethnic rivalries. Kate, on the other hand, although identifying with her students, sought to maintain a professional distance from them, believing this would improve her ability to manage her classroom.

## **Discussion**

We know that identity is not only shaped by the knowledge and skills we acquire but also shapes the very knowledge and skills we seek to develop (Battley & Franke, 2008). Educational policymakers, mathematicians, and mathematics

teacher educators agree that teachers need sufficiently deep content and pedagogical knowledge to teach mathematics for understanding (Ball et al., 2001; Hiebert & Carpenter, 1992; Ma, 1999; National Council of Teachers of Mathematics, 2000; New York State Department of Education, 2010). There is little agreement, however, on what knowledge, skills, and dispositions make up this deep content and pedagogical knowledge. Kate and Kelly clearly did well in the mathematics courses they completed prior to entering the NYCTFP and successfully passed state content knowledge requirements to teach secondary mathematics. Nonetheless, both teachers experienced difficulty in resolving conflicts between the mathematical knowledge needed for teaching and their past learning and present experiences in mathematics.

Both Kate and Kelly are in many ways typical members of their MTF cohort and thus provide pertinent examples for thinking about teacher preparation for not only the NYCTFs but also for alternatively certified teachers of mathematics more broadly. Although they are similar to many other members of their cohort, and to each other, the ways in which they developed throughout their first year of teaching are different, leading to different trajectories of identity as teachers of mathematics in an urban context. The orientations that Kate and Kelly had toward mathematics as a discipline and toward the teaching of mathematics significantly affected the development of their identities as mathematics teachers. In the discussion that follows, we first discuss the orientation of Kate and Kelly toward mathematics, then toward the teaching of mathematics, and finally consider issues they encountered as teachers of urban youth. We conclude with implications for policy, practice, and research.

The orientation of Kate and Kelly toward mathematics influenced their identity development as teachers of mathematics. Although they began the NYCTFP with similar school-based formations in mathematics and both initially said they “liked” mathematics, their relationship to the discipline of mathematics diverged during the first year. Kate recognized before entering the program that she needed to learn more mathematics, perhaps because she lacked confidence in her ability or perhaps because she had an interest in mathematics. At the end of her first year, Kate remained enthusiastic about the subject looking forward to studying further advanced mathematics. It may be that Kate’s belief that she would continue to be challenged and engaged by being a mathematics teacher is tied to her enthusiasm for mathematics.

Kelly also began the NYCTFP with a positive attitude toward her abilities in mathematics. But by the end of her first year of teaching, she was not positive about mathematics as a discipline, saying simply that she did not like mathematics. Kelly had experiences in the university mathematics courses she was taking in her graduate program that might be construed as discouraging. She was not easily able to grasp the content of her mathematics courses and did not find it particular-

ly useful. She ended the year not mentioning that knowledge of mathematics would be a characteristic of an effective urban mathematics teacher. To have a positive identity as a teacher of mathematics it would seem clear that an affinity for or interest in the subject would be necessary. We see here that Kate alone remains positive about her orientation toward mathematics during her first year of teaching and with her plans to study further mathematics is on a trajectory toward having a more fully developed identity as a mathematics teacher.

The orientation of our participants toward teaching mathematics is also consequential for their identity development as teachers of mathematics. Given that both Kate and Kelly had been schooled by teachers using a more traditional pedagogy, they both turned away (Kelly) or longed at times to turn away (Kate) from the CABM classroom and toward a more procedurally oriented one. Complicating their points of view on the teaching of mathematics was the issue of classroom control. While seeing some of the positive benefits of discovery/inquiry-based learning, connections to real-world applications, and a student-centered classroom both Kate and Kelly also found the environment in which this played out difficult to manage, both in terms of student behavior and in terms of time management.

From the beginning of the school year, Kate was enthusiastic about what she called the “new way” of teaching mathematics. And although she experienced a conflict between the CABM philosophy and traditional pedagogy she remained aware of some of the positive aspects, especially in the area of discovery learning. However, she was also conflicted about the CABM because she wanted to have more control over the classroom conversation and because she wanted time used more efficiently. While Kate perceived she would have more control with a traditional pedagogy, she did not always resort to it, but rather continued to struggle at resolving the conflict between discovery and traditional pedagogy.

Kelly on the other hand, began the year not understanding how she would be able to implement the CABM and its Workshop Model. While she recognized conceptually the importance of relating mathematics to students' lives, she rarely drew on contexts familiar to students in her teaching. In Kelly's case, her lack of confidence in using CABM meant that she turned to a more procedural model of teaching. Another reason that Kelly may have turned to this teaching model is that she spent so little time on planning, abandoning after teaching for only a few months any out-of-school planning. This limited planning minimized the amount of time she devoted to thinking about how the strategies advocated in CABM and the structure of the Workshop Model might be incorporated into her lessons. In essence, Kelly did not confront the conflict between the CABM philosophy and traditional teaching. Classroom control was difficult for her and a focus on classroom control rather than on instruction pervaded her thinking.

Kate's and Kelly's identities as teachers of urban youth also developed in different ways as the year progressed. While Kate struggled with how to teach her

students and felt that their parents did not provide enough support, she believed they could learn mathematics. She longed for more balance to teach in a manner more consistent with her philosophy, believing that practice would help her students develop the confidence they needed to be successful in school.

Kelly, on the other hand, who was able to establish a respectable rapport with her students on an individual basis, had trouble connecting with the class as a whole. She never mastered the ability to engage the class in whole-group discussions about mathematics, but could have rich discussions about Islam and Arabic when the opportunity presented itself. When a mathematics lesson did promote good student questions, Kelly's limited mathematics background and/or planning led her to believe that students were trying "trick" her by asking questions she did not understand and could not answer.

Unlike Kate, Kelly did not place blame entirely on the parents for lack of support of their children's education. She recognized that these parents were often working hard to provide basic needs for their children and may not have had the time, or felt they did not have the language skills to return a phone call or attend a Parents Night. To use Gee's (2000) terms, although both Kate and Kelly have had Institutional-identities as mathematics teachers bestowed on them by the NYCTFP and the NYCDOE, only Kate has adopted a Discourse-identity aligning herself with other competent doers and teachers of mathematics. This adoption has put Kate on a trajectory toward an Affinity-identity as a member of a practicing group of mathematics teachers. Kelly, to some extent, at least due to her rejection of mathematics as interesting and accessible to her personally, continues to walk around the edges of the profession, not really moving in the same way as Kate toward becoming a full member of the mathematics teaching profession.

### **Implications for Policy, Practice, and Research**

Alternative certification policymakers and teacher developers need to understand how the limited backgrounds alternatively certified teachers can influence their identity development. While insisting that alternatively certified mathematics teachers hold a major in the discipline is unreasonable, simply requiring them to complete equivalent mathematics major courses as part of their preparation may not be in the best interest of the teacher or the children whom they teach. Alternatively certified teachers should be provided the opportunity to study mathematics that is directly connected to the content they teach. These connections must be explicit and not left to the teacher to build. Therefore, instructors of mathematics courses must have knowledge of secondary school curricula and an understanding of how adolescents learn. They should model discovery pedagogy as they deepen the teachers' content knowledge and ability to teach for under-

standing, giving teachers the opportunity to experience both discovery and inquiry learning.

Along with enacting an unfamiliar pedagogy, alternatively certified teachers also are asked to teach in schools different from those they attended. This difference often results in a lack of understanding how student-centered models of instruction can be implemented in the urban classroom and how nontraditional pedagogy such as discovery learning can actually enhance student learning. Because alternatively certified teachers have little opportunity to practice their craft with accomplished master teachers prior to becoming a teacher of record, they need substantial support in their classrooms to develop the skills not only to manage discovery learning classrooms but also to plan and implement standards-based instructional strategies (Foote, Brantlinger, Hadar, Smith, & Gonzalez, 2011). Early in their first year of teaching, alternatively certified teachers should engage in professional development activities in their school environments that focus explicitly on developing the knowledge, skills, and dispositions to implement instructional strategies like those identified by CABM.

Alternatively certified teachers of urban youth, especially those whose own backgrounds do not provide them with a basis for understanding the culture of urban schools, must learn to foster student persistence and confidence in their ability to do mathematics. They can do so by carefully planning classroom activities that give their students opportunities for success while providing challenging and meaningful work. They can also help their students and their students' parents to understand the importance of mathematics in preparing for future employment. To do so, the alternatively certified teacher must have a positive disposition toward the discipline and an understanding of how mathematics is applied.

Further research is needed on what types of preservice experiences and first-year professional development can support new teachers in improving their mathematics content knowledge and implementing instructional models such as CABM (models with which they too often have had little experience as learners). A teacher's first year has a significant impact on the trajectory of her identity. It is particularly important that alternatively certified teachers have positive, educative experiences to support growth in mathematics content knowledge, mathematics knowledge for teaching, and knowledge of urban youth. Not only are these experiences beneficial for the teacher but also it has been found that retention of teachers increases with more positive mentoring and positive educational experiences (National Commission on Teaching and America's Future, 2005). Furthermore, a positive disposition or orientation to mathematics as a discipline figures prominently in our discussion of why one new teacher is on a trajectory toward building an identity as a mathematics teacher and the other is not. Future research could be directed at examining how this disposition can be identified so that teachers who possess this orientation can be recruited to work in urban environments.

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