Preservice Teachers' Perceptions of Mathematics Education in Urban Schools

Erica N. Walker

This article reports findings from a study of preservice mathematics teacher education students and their beliefs about and experiences with students in an urban high school. The preservice teacher education students participated as mentors to a group of peer tutors in a mathematics tutoring program. Data collected from questionnaires and interviews reveal that the mentors had varied perceptions of tutoring program participants' motivation, interest, and knowledge of mathematics. Mentors held varied perceptions of urban schools and what teaching mathematics in urban settings entails. Further, mentors reported that their work in the tutoring program had an impact on their strategies and plans for future mathematics teaching.

KEY WORDS: urban schools; mathematics education; preservice teachers.

Many educators have argued that perceptions of teaching are formed before prospective candidates enter preparation programs (Gilbert, 1997; Rushton, 2004). Further, teacher educators concerned with issues of social justice and improvement in urban education believe that teachers' percep-

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tions of urban students, schools, and learning have already been pre-formed before entering an urban classroom (Bell, 2002; Breitborde, 2002; Valli, 1995). Some have promoted extensive clinical experience for teacher candidates (Brindley & Emminger, 2000; Calderhead, 1988; Leland & Harste, 2005; Rushton, 2000), arguing also for informal 'exposure' to these environments, outside of the formalized student teaching experience, to ensure that candidates begin to understand more deeply issues related to teaching in urban environments (Breitborde, 2002; Groulx, 2001). Further, it is important to understand teachers' perceptions and expectations of students because these have been shown to affect how they enact instruction (Jamar & Pitts, 2005; Ladson-Billings, 1997), particularly in urban settings. While the research documents how novice teachers face challenges in urban schools, largely focusing on challenges related to cultural dissonance, it does not explicitly address how experience in urban environments during teacher education programs might shape preservice teachers' thinking about mathematics instruction in urban settings.

To address these issues, I developed a mathematics tutoring program at a New York City high school that included preservice teachers (as mentors), high achieving students (as tutors), and struggling students (as tutees). This article reports findings of a study using data collected from questionnaires completed by and interviews with the preservice teachers. It seeks to describe the candidates' perceptions of their experiences with urban high school students and, in turn, how these experiences and perceptions shaped their mathematics work with the high school students as well as their thinking about future mathematics teaching.

BACKGROUND

One critical issue facing urban schools is attracting and retaining effective and qualified teachers for underserved populations (Darling-Hammond, 2004; Leland & Harste, 2005). In many urban schools, educational neglect, in terms of resources, funding, and overcrowding (Kozol, 1991), contributes to an environment that may be difficult for the novice teacher to navigate. Indeed, ''newly hired teachers in urban settings drop out at nearly double the rate than do other new teachers'' (Groulx, 2001, p.62) because they often find themselves overwhelmed by the challenges of teaching in underfunded schools, the out-of-school issues adversely affecting their students' education, and a perceived lack of institutional, administrative, and parental support (Anyon, 1997; Gilbert, 1997). Clearly there is a need for teacher education programs to develop and support new teachers who plan to teach

in urban schools (Gilbert, 1997; Irvine, 2003; Kea & Bacon, 1999; Rushton, 2000, 2004).

For a variety of reasons, including the fact that the backgrounds of education students (who are predominantly White) are often incongruent with those of the urban students (who are predominantly of color) they are planning to teach (Bell, 2002; Kea & Bacon, 1999; Valli, 1995), there is a "prevalence of low teacher expectations for ethnic minorities and inner-city students" (Groulx, 2001, p. 61). Teacher education candidates may "make false assumptions about the quality of [urban] schools and of their students and families" (Breitborde, 2002, p.36). The stereotypes that teachers have about urban schools center around low student ability, student motivation, school safety, and lack of parental involvement (Gilbert, 1997). In a study of preservice teachers, Groulx (2001) found that the teachers "assumed that parent support would be lacking and/or that students would be undisciplined and unmotivated" (p.83). Bol and Berry (2005) found that teachers in a sample of National Council of Teachers of Mathematics (NCTM) members believed that a major factor in the achievement gap between white and non-Asian minority students was that "minority students' families did not support teachers or ensure children completed their school work or studying in mathematics" (p.38). They reported that poor families did not "valu[e] academic achievement or mak[e] education a priority" (p. 38). To combat these stereotypes, preservice teachers planning to teach in urban schools "need to acquire the background knowledge and skills necessary for handling cultural diversity" (Rushton, 2004, p. 63).

These perceptions of urban, poor, and/or minority students can contribute to how teachers structure learning opportunities in school (Bell, 2002; Jamar & Pitts, 2005). As Ladson-Billings (1997) and others have found, teachers who have low expectations of urban, and minority children adopt a "pedagogy of poverty", in which basic skills instruction is the norm. Gilbert (1997) found that prospective teachers felt that "a basic skills focus was forced by the way [urban] students behaved, by their 'attitude', and by the kind of content urban students needed" (p. 90). While "Anyon (1997) and others have warned of the dangers of limiting the education of children of poor and working class families to highly structured rote teaching and learning" (Breitborde, 2002, p.42), in urban schools teachers often use "mathematics instruction centered on basic skills and repetition, rather than instruction that provides [students] with opportunities to learn and exercise higher order thinking skills" (Walker, 2003, p. 18). Providing rigorous, high quality mathematics instruction for all students has become critically important to ensure that students will be able to participate in economic, career, and educational opportunities for which strong mathematical preparation is a prerequisite (Moses & Cobb, 2001). In mathematics,

especially, teachers in urban schools who have low expectations and stereotypes about urban students may feel that this basic and rote instruction is best, despite the advances in mathematics curricula and pedagogy as espoused by the NCTM (Jamar & Pitts, 2005; Ladson-Billings, 1997). Further, the need for high quality mathematics instruction is critical for students to be prepared for full access to educational, career, and economic opportunities.

Ninety percent of public school teachers are white and a third of urban students are of color, with students of color comprising the majority of public school students in major US cities (Bell, 2002). For White candidates planning to teach in urban schools, their starting teaching positions place them "in predominantly Black or culturally diverse settings–often for the first time in their lives" (Valli, 1995, p. 120). Many suggest that exposing teacher education candidates to a "wider world" (Breitborde, 2002, p.38; Leland & Harste, 2005) is important to alleviate low expectations and limiting pedagogy for students of color. As Groulx (2001) notes, "direct experience and sustained human contact are key elements of facilitating [the] multicultural understanding" (p. 64) of teachers. Further, it is suggested that multicultural education and issues of diversity should permeate teacher education programs as an ongoing, continuous theme rather than as a single topic of discussion with a class setting or a stand-alone course (Irvine, 2003; Leland & Harste, 2005).

As part of a peer tutoring program I developed, I involved preservice mathematics teacher education students because I wanted these students to have prolonged interactions with urban high school students in an informal setting outside of their normal student teaching experiences. In this way, the candidates could develop relationships with students that were less hierarchical than the standard teacher-learner interaction, and also be able to work closely with urban students who had demonstrated high achievement, which time would not necessarily permit in a student teaching situation. Within the peer tutoring program, the mathematics education students worked with both high achieving (the tutors) as well as low achieving urban high school students (the tutees). What they learned about problem solving, issues of race and class, and strategies for effective teaching would be relevant to their future experiences as teachers in urban schools. Indeed, "the attitudes of preservice teachers and their commitment to culturally relevant pedagogy will become crucial factors in many of their future students' chances for success in school" (Groulx, 2001, p. 60).

Thus, in this study, I was interested in understanding how teacher education students' perceptions of mathematics teaching and learning were affected by the experience of working with urban high school students, focusing on the following questions: What knowledge and beliefs do

preservice teachers have about urban high school students and their mathematics ability? What impact did participating in an urban tutoring program have on preservice teachers, their engagement with urban high school students, and their understanding of mathematics teaching and learning in urban settings?

METHOD

As part of a collaboration with teachers and administrators, I developed a mathematics peer tutoring program at Waring High School[1] in New York City. The peer tutors in the program were six high-achieving students (five Latino/a and one African-American) who had been selected by their teachers and principal to serve as tutors for their peers who were struggling with mathematics. Graduate students at a local university volunteered to participate as ''mentors'' to the high school student tutors for one day each week during the spring semester of 2006. As mentors, the graduate students were told only that they would serve as resources to the high school tutors if they needed help with a mathematics topic. If there were more tutees than the tutors could handle, mentors would help tutor as well. Nine mentors[2] participated in the tutoring program, which took place after school at Waring for 1.5 hours three days per week during the Spring semester. In the first month of the program, an average of 8–10 tutees attended each week. By the end of the program, an average of 20–30 students attended each week.

Waring is a small public high school located in East Harlem in New York City, serving approximately 300 students in grades 9 through 12. About 97% of the students attending Waring are Latino/a (56%) or Black (41%). The student body is predominantly female (60%), with about 70% of the students qualifying for free or reduced lunch. Most of the students attending Waring live in upper Manhattan, which is one of the least economically advantaged but most culturally rich areas of the city. The school is highly valued among neighborhood parents for its small size and dedicated teaching and administrative staff. About 80% of Waring's 20 teachers are fully certified; many (about 74%) have advanced degrees. About half of the teachers have spent more than two years teaching at Waring, but most have taught fewer than five years in total.

In mathematics, 68% of Waring's grade 12 students scored above a 55 (the range is 0 to 100) on the Regents examination, a required battery of assessments that New York students must take to graduate from high school; thus meeting basic graduation requirements. However, only 40% of the students met the requirements to earn the more prestigious Regents-endorsed diploma in 2004. The desire of Waring's administrators and teachers continues to be to improve students' academic achievement,

particularly in mathematics. Thus, I designed the peer tutoring program as one avenue to help effect improvement in mathematics.

Each day, the mentors and high school tutors were observed by research assistants, who observed tutoring interactions and took field notes. Data used in this study consisted of the field notes, which documented mentor-tutor, tutor-tutee, and mentor-tutee interactions during session observations; mentor responses on a questionnaire with twelve Likert scale items and six open ended questions; and interviews conducted with seven of the nine mentors. The questionnaire was completed by all nine mentors before the last tutoring session in May. Semi-structured interviews ranging from approximately 35–60 minutes were each conducted by one of two interviewers, the author or a research assistant. Interviews were audiotaped and then transcribed. In Appendix A, relevant questions from the questionnaire and interview protocol are listed.

All of the mentors were Masters students in mathematics education. Of the seven who completed interviews, five were White, and the other two mentors were African American and Asian American. Five were female and two were male; all have been given female pseudonyms to preserve their confidentiality.

Data were analyzed by computing means for selected questionnaire items related to mentors' perceptions of the tutoring program (Appendix). Field notes were reviewed for contextual information and to confirm mentors' recollections of specific interactions. The open-ended responses from the questionnaires were analyzed and interview transcripts were coded for themes related to urban education and issues of mathematics teaching and learning.

FINDINGS AND DISCUSSION

Preservice Teachers' Knowledge and Beliefs About Urban High Schools and Students

The mentors had varied perceptions of urban high schools and students. In describing the students at Waring, Lorraine noted that:

> I hadn't had urban [school] experiences before, but they were similar to where I was [working before] in central Texas where it was a poor slightly Hispanic community and it was various similarities where–they were not as–education was not their priority.

Lorraine's experiences with students of color (whether they attend rural or urban schools, whether they are "Hispanic" or African American) suggest to her that they have similar beliefs about education. Her hesitation may

suggest that it was difficult for her to articulate what she meant by "similar" and that she may be unaware of the different issues affecting urban and rural students of color.

Another mentor, Maria, expressed a seemingly 'color-blind' philosophy (Groulx, 2001; Valli, 1995) but did attribute differences between urban and suburban students to their home environments:

> I'm one of those people that believes that no matter where you go, you see the same things. The kids all act the same way. Things that I noticed that were different, it's just the type of homes that some of these children were coming from. It's a little bit more difficult…they didn't have the parental guidance that some students from suburban schools might have.

Elsewhere, Maria repeats her contention about urban students' parents and how teachers are needed to counteract a perceived lack of parental guidance, although she notes that there are some differences in resources available in urban schools:

> It could be more rewarding to work in a school like an urban school because like I said, a lot of these children, they don't really have that parental guidance that–you know. They don't have the same amount of supplies and technology that other schools may have. But I would just tell people that it's more rewarding to work with these children. And they really look up to us more. And they need us so. So we need to be there for them.

Maria's response is an example of what Groulx (2001) refers to as a "missionary" attitude, in that some teachers expect that they will "be helping disadvantaged children through teaching" (p. 79), and that they are needed to address perceived urban students' parental deficiencies.

Another mentor, Vera, was herself an alumna of an urban high school. This exchange with the interviewer is revealing in many ways:

> Interviewer: Okay. What would you tell your friends about urban high school students?

> Vera: Um, just that they're getting worse, that they just don't have the motivation anymore, well, maybe not worse, but, you just have to lower your expectations I guess…especially in our city, like we have great urban high schools, but it's just sad that students don't care, I think that's the worst thing I would tell people, that they just don't care and you wouldn't understand…like, they're getting a good education and they just, they won't show up to class. My friends would not believe that if I told them that students just won't show up to class on a regular basis.

Despite her statement earlier in the interview that "a lot of students are there [at tutoring]" Vera's perception is that urban high school students "just don't care". According to Vera, the students report that they don't go to class. Her perception that they are unmotivated leads to a statement that one should "lower expectations" of urban high school students. She concedes that some students are willing to hang around after school to get assistance with their work. When the interviewer presses her to differentiate between urban students in general and the Waring student tutees, the exchange continues:

Interviewer: How about the tutees? Were any of the tutees that you tutored, um, even if they were having problems in mathematics, did any of them seem motivated?

Vera: Um. Motivated in math? Never. [Laughs] But motivated to do well and graduate, I think so. I mean, I guess. I mean they wouldn't be there if not, but it seemed like every one just wanted to get by, you know?

Interviewer: Mm hmm.

Vera: And to some that'd be motivated, but, to me that's not being motivated.

Interviewer: Um, how did you know they just wanted to get by? Like, what did they say, what did they do that made you think that they…?

Vera: Well, the fact that they were there, you know…Sometimes they would see other people leave and I'd go to them and I'd go, "you can leave whenever you want but if you want to work out more problems…" and the fact that people said, "no let's do more problems" that shows that they care somewhat, so…

Interviewer: Um.

Vera: And they would stay until the end, 'til 5 or even 'til later than 5.

Interviewer: How often did people do that? Did tutees do that?

Vera: 'Til, that stayed for the whole time?

Interviewer: Mm hmm.

Vera: A lot, I'd say…it's just, the thing was sometimes if [the peer tutor] left early with her people, then, maybe some others would leave early, too…but I mean it happened pretty much that it went until five.

Interviewer: So, um, so they would request that they stayed, they would want to stay?

Vera: Yeah, well…they weren't like, 'yay, let's stay' but it's like, 'we have more problems to do; I really want to make sure I know this', so, I mean that was nice.

Despite Vera's contention that the students "just wanted to get by", her own evidence reveals that many students were committed to staying for the entire

duration of the tutoring session. In fact, Vera would approach students and remind them that they "could leave whenever you want", and the students would stay until 5, or "even 'til later than 5". Vera, like some of the teachers in Bell (2002), did not "acknowledge [that there were] contradictions within her own rhetoric" about these urban high school students (p. 240).

Abby and Michelle used the Waring tutoring program as an opportunity to reflect on what they, their friends and family, and society thought about urban students. Michelle spoke about Waring students:

> They're bright. They're smart. They're motivated and they're very deserving. We realize what urban students are up against. I am a product of an urban area…So people don't really believe that we can achieve and I would tell them straight up, there are many students from urban high schools who are doing extremely well…And I would tell them, any friend of mine, if they're gonna teach at an urban high school to give them a chance and not to have these pre-conceived notions of what they are, because we read that kind of literature in some of our classes.

Michelle directly challenges stereotypes about urban students in her first statement: that they are smart and motivated, and further, that they are "deserving". In this way, she may be addressing the sometimes implicit assumption that urban students receive less because they do not merit high quality resources (Anyon, 1997). Further, she confronts literature that she has read as part of her graduate work that serves, in her opinion, to reinforce stereotypes about urban students.

Abby talked about the pervasive media portrayals of urban students:

> It would be one of those things that, no, they are not painted with the same brush that, you know, Hollywood filmmakers paint them. They are individuals. Yes, there are some bad apples. There are bad apples in, you know, small towns in Colorado. They're [Waring students] in a society, they're in an area where, you know, it's tough for them. They do live on tough streets and they have to make tough decisions at younger ages. They still have hopes and dreams to move on just like all the other kids, whether it be in Connecticut, Michigan or Ohio, Hawaii, wherever. They still have, they still want to move beyond where they are now. That's what I felt. I would try to change that attitude about them.

Here, in some ways, Abby is challenging the existing narrative about urban students, emphasizing that while these students may live in 'tough areas', they are individuals who should not be painted with the 'same brush' as though they are all 'bad apples'. Later, Abby elaborates that her friends and family had reservations about her working in a Harlem school:

[W]hen I came down here, I was like yeah, I'm going to take a job in a Harlem school. Really, friends of mine back in Connecticut, and it sounds hoity toity, but they'd ask 'have you lost your mind, what are you doing going to Harlem to work? Are you nuts?'... I won't lie, it was a little nerve-wracking but it's one of those things where it's a neighborhood; you know, they have kids; and kids need to be taught; they have teachers…sometimes they get forgotten about, who knows. But I [first] felt like, when we go there the kids are going to be horrible and the teachers are going to have no clue what they're doing and it's just gonna be, just mayhem. It's nothing of the sort.

But, so, I was envisioning, just, I don't know… I see, a lot of people have seen, those urban high school movies that Hollywood puts out that kids are running around and drugs are all over, and guns, and that I didn't see. Who knows if it's there? Maybe, maybe not, who knows. But it was one of those things where, I was, I don't want to say pleasantly surprised. Maybe I was just snapped back to reality. No, these are kids, and they need to be taught just like all the other kids in the world. So it was a good thing. I saw people there that really wanted to work hard and really trying to better themselves, even though they're climbing a steeper hill than other kids in other districts in other states. They have a much tougher climb than others. And they're working hard at it.

Abby is noteworthy because her extensive experience in urban schools as part of this peer tutoring project and other projects available at her university has clearly affected her thinking about urban schools and urban students. In this way, her experiences provide support for the contention that extensive time and engagement in urban schools–outside of the student teaching experience–can be useful for teacher candidates (Breitborde, 2002; Groulx, 2001).

General Impressions of the Tutoring Program

The mentors' responses on a questionnaire comprising Likert scale items (1 = strongly disagree, 7 = strongly agree) reveal that they had positive perceptions of the peer tutoring program. The nine graduate student mentors strongly agreed that they were glad that they participated in the tutoring project (mean: 6.8). On other items pertaining to their experience in the project, they reported that they enjoyed going to the school every week (mean: 6.3), and that they would recommend participating in this project or one like it to other graduate students (mean 6.8). Generally, the mentors felt that their experiences would help them in their high school mathematics teaching (mean: 6.4).

The mentors were less positive, but still agreed with statements that the Waring tutees (mean: 5.2) and tutors (5.7) had been eager to participate, and that they (the mentors) had learned a lot about how students think about mathematics as a result of participating in the project (mean: 5.8). They strongly agreed that the Waring tutees learned a lot of mathematics from the TC mentors (6.2), and less strongly that the Waring tutees had learned a lot of math from their Waring tutors (5.7).

Several open ended questionnaire items gave mentors the opportunity to comment about their experiences further. When asked, ''what was the best thing about participating in this project?'', mentors often responded that they enjoyed seeing high school students work together and learn from each other:

> [The best thing was] seeing students take the initiative to get tutored/be tutored [of] their own free will; and seeing the student tutor & their tutee figure something out together (the ''Ah, I get it'' moment) [Vera]

> [The best thing was] working with the students, both tutors and tutees. Watching students tutor students helped me see what they have learned, how they perceive the material, and how they apply what they have learned. Also I saw how students made connections in helping to clarify another topic. [Lorraine]

Mentors were also asked to describe the worst thing about participating in the project. Some pointed out that ''in the beginning [of the semester] not a lot of students were willing to participate''. To address this, some Waring teachers began to offer extra credit to high school students who attended tutoring sessions. One mentor, Candace, commented that some students were ''[c]oming for extra credit or because they're friends with the tutors instead of coming of their own free will''. Others pointed out that occasionally ''[s]ome of the students have been a bit disruptive or unwelcoming of our help'' or ''were unmotivated''. These comments revealed that mentors often believed that students were solely coming to the program because of extrinsic factors (such as teachers offering extra credit if they participated) and that some students did not really want to be there and were disruptive as a result.

Perceptions of Students' Mathematics Knowledge, Motivation, and Interest

Echoing their responses on the questionnaire, during interviews the mentors revealed that they had varied perceptions of the Waring students' motivations for participating in the peer tutoring program. These perceptions in some ways affected how they interacted with students. Jane felt that

many students came to tutoring to get confirmation that they were doing mathematics problems correctly:

> For the most part they knew what they were doing, they just wanted someone to say, yes, that's right, that's the next step, way to go…A couple of times there were students who had missed a day or two and so they needed to learn the material they had missed. But most often, they knew what they were doing. They just wanted some, like, reinforcement.

Other mentors also saw this need for reinforcement, not just among the tutees but among the high school student tutors:

> In the beginning she [a student tutor] would work with someone (a tutee) but she was frequently referring to us to make sure she was right or that she was doing the right thing. [Candace]

This was reflected in how many mentors saw their role as being

> a motivator, and encourager, since most of the time that's what I was doing– encouraging students that they *did* know what they were doing. [Lorraine]

Other mentors had different perceptions of students' motivation and interest. For example, Candace commented "that it is a great high school but that students need a lot of motivation to do their work", while Abby noted that:

> [i]t was great to see how responsive they were and how eager they were to learn a little bit…The people who were there were really receptive and really open to learning new things. And even if I hadn't taught them something different they were excited about it. So I really enjoyed it…I learned a lot just from going and learned how well they could work with each other. And that, I guess, I was most surprised about.

The mentors often made decisions about how they tutored students based on what they saw as problems the tutees were having. For example, Jane's belief that students needed too much reinforcement led to a shift in how she tutored:

> I would say do this problem and check your answer and if you run into a problem, I'll talk to you. But it's stopped them from doing a step and then looking at me and saying is this right or what do we do next, what do we do

next. It kinda allowed them to go from beginning to end and just think it through and then they knew if they were right or wrong…I think the checking helped make them more self sufficient and not need me or someone else to be like yes, that's right, next step, good and all that.

Despite Jane's belief that the students knew what they were doing, she seemed to think that they were not interested in mathematics nor were they being challenged with the mathematics work given to them by their teachers:

They were not at all interested in doing anything but the homework, which makes sense. They wanted to get it done and get out of there. But anytime I was like, ''let's look at this problem'', they were like, ''I don't have to do that problem'', you know, why would they?

Jane's point seems to be coded in several ways. She thinks that the students are not interested in mathematics or learning more than they have to learn, as evidenced by her clauses 'which makes sense', and 'why would they'. Jane's point becomes clearer later in her interview when she says

They only do the minimum required of them; it's not much that's required of them. And it makes sense that they just want to get done and get out and [not do] much with the understanding.

Like Jane, Michelle commented on the standards held for Waring students. In speaking about the tutors:

As far as the math knowledge of the tutors, I would say that it was average. It was what a high school student at that age, at that particular school should know.

Both Michelle and Jane seem to think that the minimum is required of these students. Michelle's qualifying statement–''at that particular school''–seems to suggest that at another school one would expect a high school student at that age to know more. In Jane's interview it becomes clear that Jane thinks teachers (not necessarily those at Waring) don't expect much from urban students:

A lot of teachers I've seen in urban schools, I mean, they care about the kids but they are trying to do the minimum required as well, and there's not a lot of like energy or excitement from the students or the teachers.

Vera had a similar perspective:

> Some teachers really care about the students, and some teachers are so tired of everything and give up and they don't really have hope, you know. It's kind of sad but the learning of the students, I think, depends a lot on what kind of teacher they have and how motivated the teacher is and discipline and all that.

Despite their caring about the students, Jane's perception is that teachers are "doing the minimum" as a way of dealing with the perceived difficulty of teaching in urban schools. This is contrast to Delpit's (1995) notion of caring for students that occurs in tandem with rigorous instruction and high expectations. Other mentors expressed that teaching in urban schools is difficult and challenging; Abby noted that

> New York City has too many–New York City's public schools have too many problems for me to even try to list, I guess. And the teachers are trying hard…I feel like it's an uphill battle for them.

In most of Jane's tutoring interactions with students, it was clear that the focus was on how to do assigned homework problems. Very rarely did she teach new concepts or focus on problems or concepts that were not covered by the homework. Other mentors, Abby, for example, saw the tutoring program as an opportunity to share more mathematics knowledge, for students who might not have learned certain connected topics or who did not seem to recognize the beauty of mathematics:

> Whenever I work with them, whenever I work with students, I would always try to slip in something a little different that maybe was a different way of looking at something…[say] you're learning about triangles, this is something else about triangles you might not have known that you might not learn this year, but it's just a little nugget of information. They're always receptive. Also, we would, sometimes near the end of our tutoring, when kids are trying to wind up, we would start with some logic games, or different math games. The kids were interested in it, they enjoyed it. So, it was one of those things, it kinda made math fun. So the kids came in struggling with math but I hope by the end of this, they were really like, 'hey, math isn't always pocket protectors and protractors'. Maybe they'll want to continue.

Because of the overwhelming focus she thought Waring students had on homework, in her future teaching, Jane does not plan to focus on the procedural aspects of mathematics learning:

> I really feel more strongly now than I did before that doing a couple of problems but understanding the process is better than doing 30 problems and just getting the right answer….I felt like the couple of times that we [her students while student teaching] worked together and like, derived the volume or the area or whatever, they understood it better because they knew where the formulas were coming from. I felt that it worked better. And after Waring, only working on homework problems, I saw that [students] could do a whole page and still not really get what was going on conceptually at all.

Despite her prior student teaching experience with deriving concepts and formulas, Jane did not incorporate these same ideas in her tutoring although she thought it was important for students' mathematical learning for them to be exposed to and understand the concepts. She continued to focus on homework review.

Rethinking the Teacher-Learner Hierarchy

Some mentors talked explicitly about how their thinking about control and authority relationships between teachers and students had changed as a result of their participating in the program:

> I learned that the students can really like take charge. They don't always need an adult to be teaching them…you can give them some responsibility and they will succeed. [Maria]

> Kids have always collaborated when I was teaching before. But having that whole peer tutoring thing is important, where kids can actually help each other. Being a teacher, sometimes you want to control everything that's in your universe. It's your classroom and you want to have a say about everything that goes on. And sometimes when you–I know, I'm guilty of this all the time–when I see two kids talking in the back of the class, I assume it's about this weekend or what Bobby did yesterday afternoon. But sometimes it is just, he's trying to say, 'let me help you'. And that's something I need to really try to foster, and let go, because it is only helping people. [Abby]

Several mentors noted that seeing how tutors explained problems or concepts to tutees was illustrative. On the open ended questionnaire item asking what would be most helpful to mentors in their future high school teaching, Lorraine wrote:

> the methods used by the tutors are most likely the methods that are understood better by the students and hopefully, I, in turn, can use them in the classroom.

In her interview, Lorraine further noted that

> You don't always have to teach students from a lecturing perspective, you kind of get down to their level and work with them through problems and encourage them to use previous knowledge, problem-solving skills.

It was clear that some mentors developed strong teaching-learning relationships with tutors and tutees over time. Initially, at the start of the program, the mentors focused on helping students solve homework problems without engaging them in other aspects of mathematics. This remained the case for some mentors throughout the program (namely, Jane, Candace, Lorraine, and Vera), even when opportunities presented themselves for them to engage with the students on a deeper level. However, Abby, Michelle, and Maria, for example, sought to more deeply engage with students beyond the mathematics students were doing in class. Abby found this difficult initially:

> Well, when I first worked with him [John, a tutee], it was just down to business. This is the problem, I've got a question, let's do this. It was here's a problem, help me get to the answer, basically. You know, it was my first few days there, and maybe I wasn't in the…I was trying to get to know the students, maybe I wasn't in the mood to, not *in the mood*. I didn't feel comfortable enough trying to put new math thoughts. You know, they had a question, I had an answer. Maybe I was just trying to form a relationship. But as the semester went on, I felt that the tutees and the tutors and the mentors all started to form a relationship with each other that we felt, the tutees felt comfortable asking questions to anybody and they were also more comfortable taking answers in not so direct form. Sometimes, when kids come to tutoring they just have a question, I want the answer. Don't try to teach me anything new, or tell me what I did wrong, let's move on. Sometimes that's not the best way to, sometimes that's just filling the bucket of knowledge instead of lighting the fire of knowledge.

As the semester progressed, Abby found it easier to work with students and "light the fire of knowledge":

> I guess I'm saying I was still in the relationship forming stage and trying to see how far, maybe, I can push them. So,…especially with John, he seemed like a very receptive young man. He was very quiet at the beginning too. He wasn't much of a chitchatter. I'm not saying he was a motor mouth at the end but he seemed to come out of his shell more and more as the semester went on, especially with me... He seemed to become more lively as the semester, in that he would seek out help and he would, he was almost excited to come to the sessions, which was great.

Michelle's conversations with students centered on school-related topics:

I talked to them all the time. I asked them about their class work, I asked them about their quizzes and tests. You know, some would offer more information than others. But I would ask them you know what or how did the tutoring session help them. And they just said they got their homework done. I imagine that if they went home that they probably wouldn't get their homework done. So, most of the interactions dealt just with school, never anything else. But, most of the time it was just quizzes and tests and how are these sessions helping you.

Maria reported that she did mathematics with the high school student tutor when there was free time during tutoring sessions. On one occasion,

She [the tutor] didn't really need to tutor anybody so we had a little competition on the board…It was radicals, simplifying radicals. I think she was talking about it with her teacher that was there. And I said well let's have a competition and I chose some really hard ones and it was good, you know. She beat me once. She's definitely got it. She's got the motivation. It comes kinda natural to her. She enjoys math and I guess being there…It's impressive that she wanted to be there and help people.

CONCLUSION

"I guess when I came here what I thought and what I saw were two totally different things."

Mentors reported having very positive experiences with the high school tutors and tutees participating in the Waring High tutoring program. In some cases, it was clear that their thinking about urban schools and students had changed over time. In others, it was unclear if their thinking had changed, or whether or not the experience solidified their existing preconceptions of urban students and schools. A key limitation of the study is that mentors' perceptions of urban schools and students were not assessed at the start of the study.

One critical finding is that despite evidence to the contrary, several mentors had overwhelmingly negative perceptions of students' motivation. Some also expressed, without any evidence at all, that there was a lack of parental interest and investment in Waring students' education. Of most interest is that at least one mentor, despite her own evidence about positive examples of motivation and diligence, continued to express very negative portrayals of urban students. It may be that more time and more experiences are needed so that negative perceptions and stereotypes are critically examined instead of solidified. Given mentors' comments, it is clear that despite their experiences with motivated tutors and some motivated tutees, they still equate students' demographic backgrounds as being predictive of

students' engagement in school. Without thinking critically about teaching and learning in urban settings and undertaking deeper analysis of the curricular opportunities provided to urban students, it appears that teacher education candidates may still be locked into patterns of simplistic thinking about the motivations and interests of urban students. Jane's and others' observations that 'not much is expected or required' of urban students should be a signal to teacher education students to heighten their expectations and requirements of urban students when they become teachers.

We should continue to push prospective urban high school teachers to think deeply and critically about issues of motivation and how in-classroom settings can provide or do not provide reinforcement for high academic motivation (Irvine, 2003). Teachers should question why students are seemingly 'unmotivated'. Is it that the curriculum, which according to mentors' observations is not requiring much effort on the part of students, is boring to the students? When given challenging and interesting problems does students' interest in mathematics increase? In this article, I described briefly how two mentors used the tutoring sessions as opportunities to go beyond the in-class mathematics curriculum. It is particularly of interest to note that in both cases, the mentors commented about the students' motivation and eagerness to learn. Whether the mentors' providing enriching mathematics activities spurred students to be motivated and/or eager, or whether the students' expressed eagerness and motivation spurred mentors to provide mathematics activities is unclear, but this should be examined in future research.

Finally, it is clear that participating in the tutoring program had an impact on how these prospective teachers thought they would enact their teaching once they became mathematics teachers. That high school students can help each other, that teaching and learning do not have to be solely unidirectional, and that students can "take the lead" in instruction were some of the insights that the mentors shared in interviews. Being willing to relinquish 'control' in having students work together and learn from each other is very much in the spirit of the shift in mathematics pedagogy to become more collaborative rather than didactic (Canhmann & Remillard, 2002). In this sense, the program was quite successful at adjusting preservice teachers' thinking about teaching as being solely a lecture-based enterprise.

Being willing to reconcile competing narratives about urban students–"what I thought" and "what I saw"–is a critical part of becoming a successful urban teacher. That some mentors were able to address their own preconceived ideas and those that are promulgated in the media about urban students, their capacities, and their interests in learning is noteworthy. However, it is clear that for other students, the negative narrative about urban students may countermand their own positive experiences. In short, even when "what I thought" and "what I saw" are "totally different", what

prospective teachers "see" is revised to align with their negative thinking about urban schools. If this affects how they teach, and what they teach, to their urban students, this is a critical issue for teacher education programs to address. Continued work, focusing on instruction with urban students within and out of classrooms, may be part of the answer.

NOTES

1. The school name and all names of mentors and tutors are pseudonyms.
2. Three of the nine mentors were research assistants also. Two of these (Vera and Michelle) were interviewed.

ACKNOWLEDGMENTS

APPENDIX A

Questionnaire

1. For the following questions (a-l) please choose a number between 1 (strongly disagree) and 7 (strongly agree).

a. I am glad that I participated in this project.	1 2 3 4 5 6 7
b. The Waring tutees have been eager to participate.	1 2 3 4 5 6 7
c. The Waring tutees learned a lot of mathematics from their Waring tutors.	1 2 3 4 5 6 7
d. The Waring tutees learned a lot of mathematics from the mentors/research assistants.	1 2 3 4 5 6 7
e. I have learned a lot about how students think about mathematics as a result of my participation in this project.	1 2 3 4 5 6 7
f. I feel this experience will help me in my high school mathematics teaching.	1 2 3 4 5 6 7
g. I have learned a lot about urban high school students as a result of this project.	1 2 3 4 5 6 7
h. The Waring student tutors understand math very well.	1 2 3 4 5 6 7
i. The Waring student tutors have been eager to participate.	1 2 3 4 5 6 7

j. The Waring teachers have been supportive of the project.   1 2 3 4 5 6 7
k. I enjoyed going to the school every week.   1 2 3 4 5 6 7
l. I would recommend participating in this in this project or   1 2 3 4 5 6 7
   one like it to other graduate students.
2. What was the best thing about participating in this Project?
3. What was the worst thing about participating in this Project?
4. From this experience, what things will be most helpful to
   you in preparing to become a high school mathematics teacher?

Interview Protocol

Questions for Mentors

- Describe your experience as a mentor at the Waring school.
- What have you learned from your experience at the Waring school.
- What were some of the challenges? Explain.
- How did you *deal with/handle* any challenges? Please provide an example.
- Has your experience as a mentor at the Waring school affected your perception of teaching? In what ways? Describe.
- What has been your experience with urban high school students before participating in the Peer Tutoring project? Did you learn anything new about urban high school students from working with these students? What would you tell your friends about urban high school students? Fellow teachers? Your parents?

Regarding the Peer Tutors

- What have you observed about the mathematical knowledge of the Waring peer tutors? Explain.
- What changes or growth have you observed in their math knowledge? How can you tell? Please give an example.
- What changes or growth have you observed in their tutoring? Explain. Please provide an example.

Regarding the Tutees

- What have you observed about the mathematical knowledge of the tutees? Explain.

- What changes or growth have you observed in their math knowledge? How can you tell? Please give an example.
- What kinds of mistakes were most common?
- How did you or the peer tutors help the tutees understand and/or correct their mistakes?
- Provide a specific example.

What other comments would you like to make about the program?

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