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Learning to Teach Mathematics in Urban High Schools: Untangling the Threads of Interwoven Narratives

Haiwen Chu
Graduate Center
City University of New York

Laurie H. Rubel
Brooklyn College
City University of New York

In this article, the authors explore learning about equity pedagogy in mathematics by focusing on the experiences of a teacher and teacher educator within the Centering the Teaching of Mathematics on Urban Youth *project. One teacher's story is interwoven as a counterpoint and specific trajectory within the broader narrative provided by the teacher educator. Key themes addressed include the nature of teaching mathematics, identity and position, and developing culturally relevant mathematics pedagogy. The authors' goal is not to report on the effects of a mathematics teacher professional development program per se, but rather to open the conversation, between teacher and teacher educator, to a broader audience.*

KEYWORDS: culturally relevant pedagogy, mathematics education, teacher professional development, urban education

Since the publication of its *Principles and Standards of School Mathematics* (2000), the National Council of Teachers of Mathematics (NCTM) has widely disseminated its message of "mathematics for all," stressing the need for equity in mathematics education. Leaving aside the elusiveness of a definition of equity, what does it look like to zoom in, from the landscape of national priorities to a small learning community of mathematics teachers, and then to the trajectory of an individual member of that community? In this article, we provide a pedagogical framework about equity in mathematics education and describe a multiyear professional development project organized around this framework, ultimately reaching the scale of a single teacher.

Research literature about professional development typically offers readers conceptual frameworks, analyses, and summative results. The voices of practicing teachers who participate in the professional development are often absent, or are present in fragmented ways that do not capture the formative nature of growth.

HAIWEN CHU was a high school teacher of mathematics in New York City for 7 years and is currently a doctoral candidate in Urban Education Policy at the City University New York Graduate Center, 365 Fifth Avenue, New York, NY 10016; email: achu@gc.cuny.edu. His research lies at the intersection of mathematics education and multilingual education, particularly, for Latina/o and immigrant students.

LAURIE H. RUBEL is an associate professor in the School of Education at Brooklyn College of the City University of New York, 2900 Bedford Avenue, Brooklyn, NY 11210; email: LRubel@brooklyn.cuny.edu. Her research focuses on mathematics teacher education and professional development in an urban schools context.

Therefore, here, in an attempt to capture the formative nature of growth for teacher and teacher educator alike, we interweave our voices—a teacher educator/researcher and a high school mathematics teacher—as part of our collaboration in a multi-year professional development project. (Details of the professional development project are described elsewhere; see Rubel, 2010.)

For reading ease, the change in voice (i.e., who is speaking) is noted with different fonts: Laurie Rubel, the teacher educator/research and project organizer, presents her narrative in Times New Roman font; Haiwen Chu, the high school mathematics teacher and participant in the project, presents his narrative in Arial font. This two-font format enables us to be in conversation with the reader as we tell a story of teacher and teacher educator learning, a conversation in which we react, disagree, elaborate, confirm, qualify, instantiate, and generalize. As we represent the back-and-forth nature of the conversation, Laurie, the teacher educator, connects her conversation to existing literature and to the anticipated learning outcomes of the professional development project. She reflects not only on Haiwen's experiences but also on the intended learning outcomes of the professional development project. Haiwen, the mathematics teacher, provides his personal reflections in less formal, more conversational language.

Our goal here is not to report on the effects of a mathematics teacher professional development program. Instead, we seek to open our conversation to a broader audience. At one level, our descriptions of and reflections about our collaborative work demonstrate the synergistic potential of teacher education, research, and practice. More specifically, this conversation, in narrative form, is about mathematics educators—a teacher educator and high school mathematics teachers—working together to develop equity pedagogy. We open our narrative with brief introductions to contextualize ourselves and our work. Next, we outline the theoretical framework guiding our teacher learning community and broadly describe our collaborative activities. As we share our respective narratives, we untangle the threads of our individual stories as they interweave over time, around our learning, as mathematics teachers and teacher educators, about equity pedagogy in mathematics.

Brief Introductions

I am a second-generation American woman in my early 40s. I hold the privileges of being a United States citizen with a Ph.D. who "passes" as a white woman. Other aspects of my identity have given me a disposition to notice and be reflective about "otherness," not only of my own but also of those around me, especially in relation to societal power structures. My academic research focuses on learning how to work with mathematics teachers to develop their abilities to do the same. I developed the *Centering the Teaching of Mathematics on Urban*

Youth (CTMUY) project as a way to collaborate with mathematics teachers in urban high schools.

I am in my late twenties and a child of immigration. My parents came to the United States from Taiwan to complete graduate degrees. I grew up in Miami, where I attended an ethnically and socioeconomically diverse honors program housed within a larger school that was majority Black, consisting primarily of Caribbean and Haitian students. We later moved to the midwest, and I had to readjust in my last 2 years of high school to what I would come to call "the final frontier of White flight." I went to an elite college and majored in mathematics. After college, I moved to New York City and began an alternative teacher certification program. Just 3 months later, I was the mathematics teacher of record in an alternative, transfer high school. I completed a master's degree in mathematics education in the evenings and was a high school teacher for 7 years. I changed schools twice, eventually finding a home in a high school for newly arrived immigrant students, a school at which my ability to speak Mandarin Chinese and Spanish was put to good use.

Learning to Teach Mathematics in Urban Schools

When I began my work as a mathematics teacher educator and researcher in New York City, most of my students, like Haiwen, were in their first and second years of teaching. As part of an alternative teacher certification program, my students were completing their teacher preparation and certification coursework at night and during the summers. Their "student teaching" experience consisted of being full-time teachers of record, mostly in schools located in highly under-served, urban neighborhoods with "students of color" from various communities. The teachers, and I along with them, came to know the challenges of teaching in so-called "hard-to-staff" schools, all in the context of the No Child Left Behind Act and the near-hysteria about performance on standardized tests.

As my first cohort of students neared completion of their graduate work, many of them expressed eagerness to continue to study together with the goal of improving their practice. I was intrigued by the framework of culturally relevant pedagogy, described as instruction that emphasizes students' academic success, encourages the development of cultural competence, and facilitates the students' development of critical consciousness (Ladson-Billings, 1995). I read examples of culturally relevant pedagogy in elementary and middle school mathematics teaching (e.g., Gutstein, Lipman, Hernandez, & de los Reyes, 1997; Gutstein, 2003; Matthews, 2003; Vithal, 2003) and began thinking about how to build on this work with high school teachers. I mapped Ladson-Billings' framework onto

the subject area of mathematics and arrived at a framework of culturally relevant mathematics pedagogy (CureMap), which consists of three inter-related tiers.

Culturally Relevant Mathematics Pedagogy (CureMap)

CureMap's central, or first, tier is teaching mathematics for conceptual understanding. This orientation to teaching mathematics prioritizes the connections between mathematical concepts, procedures, and facts (Hiebert & Carpenter, 1992), instead of focusing strictly on skills and procedures. We can also think of teaching for understanding in terms of the sociocultural view of understanding, implying engaging in sense making of problematic situations (Wenger, 1998). Thus, not only must the curriculum support an emphasis on the connections between mathematical ideas but also classroom social and sociomathematical norms (Cobb, Yackel & McClain, 2000) must facilitate opportunities for students to participate in mathematical sense making.

The second tier of CureMap is the inclusion of relevant or meaningful real-world contexts as a regular aspect of mathematics instruction (Moses & Cobb, 2001; Silver, Smith, & Nelson, 1995), or, as Tate (2005) suggests, instruction should be "centered" on students' experiences. One form of "centering" is contextualizing the lesson's mathematical task in aspects of students' everyday experiences, such as traveling by public transportation (Moses & Cobb, 2001), or other aspects of local, neighborhood life. Alternately, the mathematical task might remain in abstract terms, but the representation used to solve the problem might be one that builds on students' experiences. We can also view centering in terms of opportunities for students to participate in mathematics. While the lesson may not make explicit connections between the mathematics at hand and students' lives, centering on students implicates the creation of classroom norms and participation structures that invite and sustain student participation, so that students are central participants in the development of mathematical understanding.

The third tier of CureMap challenges teachers to develop students' critical consciousness. One approach to developing students' critical consciousness in mathematics is to foster critical thinking *with* mathematics, which corresponds with the teaching mathematics for social justice literature (cf., Gutstein, 2003; Turner, 2003). Teachers can create classroom investigations that address local or societal issues of power or fairness as objects of mathematical analysis. For instance, mathematics can be used to precisely quantify unequal distribution of resources (Staples, 2005). We can also view the development of students' critical consciousness in terms of thinking critically *about* mathematics (Skovsmose, 1994). For instance, students can be given the opportunity to think critically about who creates mathematics and for what purposes; this shift in perspective inverts the more typical power dynamic between mathematics and students.

The "Cultural" in Culturally Relevant

The "cultural" in culturally relevant mathematics pedagogy extends across all three of its tiers and has tremendous implications for teacher education. First, teachers should be aware of how students participate in their multiple communities and out-of-school activities to create classroom social and sociomathematical norms and participation structures that support students' development of mathematical understanding. Second, teachers' knowledge of students' out-of-school experiences is the basis of their selection of meaningful and relevant contexts for mathematization. And third, teachers need to be connected enough with students' experiences in order to identify relevant themes or topics that might then be analyzed or described with mathematics. CureMap takes as a starting point that teachers need mathematical knowledge and mathematical knowledge for teaching. CureMap, however, also challenges teachers to build knowledge about their students and their students' communities.

Sometimes when I think about the word "cultural," I'm not sure if it means everything or nothing. As a mathematics teacher, I typically use "culture" to refer to "classroom culture." Implicitly, the connotation is positive, with the ideal classroom culture being one where students work independently and also cooperate with one another. In this sense, a teacher is responsible for creating and sustaining classroom culture. It is much more difficult for me to look beyond my classroom, beyond my own locus of control, and into students' experiences outside of my classroom and the school. When I was a novice teacher, I was focused on establishing classroom culture. I did not think deeply about how students' lived experiences and culture could inform my instructional practices, offer me contexts for mathematization, or provide openings to discuss social justice.

Centering the Teaching of Mathematics on Urban Youth (CTMUY)

I created a professional development program for high school teachers, with culturally relevant mathematics pedagogy as the guiding framework. My guiding philosophy for this program was that it would be a collaborative program for teachers, outside of their schools, in which we would explore the three tiers of CureMap and support one another in our learning. Thirteen teachers, from 10 different schools, participated in a range of CTMUY activities in the 2005–2007 school years. A central component of CTMUY was the 5-day summer institute, which took place in each of the summers of 2005 and 2006. (Details about the content of the summer institutes can be found in Rubel, in press.)

All of the participants became teachers through the same alternative certification program, all but two were younger than 30 years of age, and all had

been teaching for fewer than 5 years. The group, however, was diverse across an array of other salient categories. Five of the teachers were women, and eight were men. Only one of the 13 teachers was raised in New York City; 10 were transplants to New York City from various regions across the United States and two were raised outside of the United States. Six of the teachers self-identified as White, three as Afro-Caribbean, two as Asian, and two as African American. They also had diverse experiences with mathematics: seven had undergraduate degrees in mathematics (or the credit equivalent) to be certified by New York State to teach in grades 7–12 and, because of more limited mathematics coursework, six were certified only to teach in grades 5–9.

We were teachers at a range of schools, across different neighborhoods in the same city, with very different student communities, and, although we had all attended the same graduate program, few among us had visited each others' classrooms or schools. We shared mutual respect at a distance and a foundation of experiences in our first 2 years of juggling teaching with coursework that could be alternately too demanding and too simplistic. As a group, we also had stronger backgrounds in mathematics than most other mathematics teachers I knew. Rarely would I ever "do mathematics" with other teachers at my school, but, with this group, we built our relationships through mathematics. I began participating in the project as a way to stay in touch with classmates, fellow teachers I had known from my very first days of teaching.

In the school years between summer institutes, we held monthly meetings on weeknights. These meetings were often held at my home, over dinner that I prepared for the teachers. Later in the project, the teachers took turns hosting the meetings, also over dinner. Eating together, we discussed our work, struggles, successes, stories, and hopes in an atmosphere of companionship and camaraderie.

I found it helpful to listen to and talk with teachers I respected and knew well at a good distance from my day-to-day routine. We had to distill our experiences into a series of snapshots, to tell and re-tell our stories about teaching. We would come straight from school, but could also leave school behind, even as we were talking about it. The regularity of our meetings, in each others' homes and over dinner, gave us space and an open structure. We publicly proclaimed ourselves failures and simultaneously gave abundant evidence of steady progress through small successes. We took turns crying over the magnitude of the problems we were trying to solve, and laughing at the same old jokes and stories.

As part of the research associated with the project, I conducted interviews with individual participating teachers and regularly visited their schools to observe their teaching and their students' learning. These school visits typically

included pre- and post-observation discussions. This format enabled me to develop one-on-one working relationships with each of the teachers, and provided me with first-hand knowledge of their schools, their interactions with students, and the neighborhood contexts of their schools. In the 2005–2006 school year, I visited Haiwen at his school six times and during the 2006–2007 school year, another four times.

My most satisfying experiences of reflection as a teacher have come right after Laurie's visits to my classroom. Her feedback, in those intense sessions right after class, is helpful, not just because of her knack for providing useful advice but also her understanding of the mathematics at hand. The critique of my work as a teacher is both general and specific: suggesting, for example, in lessons that are structured with an inductive approach that I should first give students a glimpse of the "big picture" rather than having the pieces unfold in a way that might make sense only to me. Unlike observations by others, these visits and debriefings feel non-evaluative. We talk not just about the mathematics and the teaching but also about what she sees going on among the students in the classroom.

The "Relevant" in Culturally Relevant

One way that we explored the notion of "relevance" in CTMUY was to use mathematics to describe and analyze societal themes from a perspective of social justice (Gutstein, 2006; Gutstein & Peterson, 2005). For example, in one summer institute, we examined data about death penalty rates for murder convictions, disaggregated by race of defendant and also by race of victim (Yates, Moore, & McCabe, 1999). Looking at the data in this way generates an example of Simpson's Paradox: a higher percentage of convicted Whites, overall, received the death penalty than convicted Blacks. A paradox emerges if the numbers are further disaggregated according to race of the victim as well. The death penalty rate for convicted Blacks is greater in the case of Black victims and the death penalty rate for convicted Blacks is also greater in the case of White victims. I brought this investigation and others to the teachers as an example of how ideas in the high school mathematics curriculum (in this case, Simpson's Paradox) could be contextualized in issues of social justice that implicate issues of race and power. However, in this particular example, the context pertains to the United States justice system and might only be relevant to students in general rather than personal terms.

As one of my first attempts to design a meaningful project for my students, I created a project about taxation systems. I based this curricular unit on a single factoid: in 1944, the top marginal income tax rate in the United States was 94%. Through the 1970s, this top rate was still as high as 70%. It was not until the Reagan administration that the marginal rate

for the top bracket dropped to 28%. There is plenty of mathematics here. Because income brackets are taxed at different rates, the tax paid is a piecewise linear function of income, and the effective rate is a piecewise rational function. Mathematics and connections to social justice were there, but the students were left out. My students do not pay income taxes, and the hypothetical incomes they researched for years before they were even born were anything but "relevant." The project had became an elaborate exercise set in an alien context, and it flopped.

"Relevance" can also be viewed in highly localized terms, at the scale of students' daily lives or the local experiences of their families and communities. Knowing how students participate in their multiple, local communities (extended family, church, basketball team, summer youth jobs, etc.) can help teachers to create classroom norms that support the forms and depths of student participation necessary for developing mathematical understanding. We also need to know enough about our students to be able to select meaningful and relevant mathematics problem contexts and to identify meaningful issues or themes that can be analyzed or described with mathematics. The urban context poses a challenge in terms of learning about relevance because urban high schools typically serve a great diversity of students in terms of their race, ethnicity, culture, socioeconomic class, and home language. The CTMUY teachers, including the "teachers of color," were outsiders to communities where they taught, further complicating this notion of learning about relevance.

My students' ethnic and linguistic diversity, in addition to their emergence from adolescence into young adulthood, make it difficult for me to address the broad spectrum of their interests with contexts in my mathematics curriculum. The two largest groups of students at my school are Spanish speakers, from a wide range of Latin American countries, and Chinese students who speak Mandarin in addition to other home dialects. There are smaller groups of students whose first languages are Bangla, Polish, or Tibetan, and five or fewer students whose first languages are Thai, Vietnamese, West African languages, Farsi, or Haitian Creole. Not only do my ninth- and tenth-grade students come from different countries and languages but also they live in a range of local neighborhoods. Even if I had asked or known then the names of the specific neighborhoods from around the city that they came from, I wouldn't have been able to locate those places on a map, or imagine the students' paths from home to school with public transportation. Also, because the school is located in an industrial area, I'm not "local" to the school area either.

Community Walks

Because CureMap necessitates that teachers accumulate knowledge about their students, the CTMUY professional development offered teachers various tools with which to begin or continue this process. One activity was a community walk, which I also describe in Rubel (2010) and Rubel (in press). My goals for the community walk and associated discussions were twofold. First, a physical neighborhood can function as a context for a variety of mathematical investigations. By physically exploring a neighborhood, teachers can discover information about that place and its residents and practice posing mathematical questions that pertain to those discoveries. Second, the community walk is a tool that can help expose teachers to aspects of their students' lives. Examining a neighborhood in terms of the resources it offers to its residents and the challenges it poses to its residents can enable teachers to better identify students' community resources, funds of knowledge (Moll, Amanti, Neff, & González, 1992) and out of school activities, all of which could contribute toward the goal of culturally relevant teaching of mathematics.

In one iteration of the community walk, in the summer of 2005, teachers were grouped in pairs, and each pair was assigned a street map of a distinct, nearby Census tract. Depending on its population density, a city's Census tracts are typically small in area (8–10 blocks) and all of its streets can be readily explored in 2 hours. These particular Census tracts surround our urban campus, and contain a combination of residential and commerical spaces, with a primarily low-income, Afro-Carribean resident population. None of the participating teachers lived or taught in this particular neighborhood. We shared our findings and also explored a variety of electronic resources that contain information linked to those Census tracts. The rationale of this activity was for teachers to become familiar with the process of doing a mini-ethnography about a neighborhood and to learn how to supplement a physical experience in a space with a variety of quantitative information about that space. I was struck by how the teachers avoided talking with people as a way to learn about this area and also by how they "played it safe" in terms of where they visited or what they chose to focus on.

My experience of that neighborhood, up until that first community walk, was practically a bee-line from the subway station to the education building. I literally had never gone on the "other side of the tracks." I hadn't thought about the neighborhood in terms of its residents as a place that people lived or as a neighborhood separate from the university. Yet, when a colleague and I went on our walk through the tract defined not by those who lived there but by the Census Bureau, we did not leave our mathematical habits behind. We were very precise in terms of quantifying everything we saw. And what we saw were things, not processes: objects rooted in place, not practices or people moving through space and over

time. We counted houses, floors of houses, windows, trees, and businesses. In doing so, we were likely thinking about the types of things that we would be able to have our students count. In a sense, perhaps we were jumping ahead to our roles as mathematics teachers, rather than acting as observers immersed in this setting. It was habitual for us as mathematics teachers to quantify, rather than describe. We used our eyes to see and our hands to record, but did not interact with or talk to anyone along the way.

We returned to the community walk activity a year later, in the summer of 2006. This time, each pair of teachers was directed to a single Census tract, but each pair was asked to adopt one of the following data collection strategies: (a) choose a specific location within the tract, remain silent in that location, and observe the people and activities in that location; (b) select a specific theme and walk through the tract looking for data that might connect to that theme; or (c) gather information by interacting with people in the tract. Remembering the teachers' avoidance of exploring issues of race and class in the previous year, this time, I also participated in the walk and shared my experiences with the group. Another facilitator and I identified establishments within this Census tract that seemed to cater to a low-income community: a pawn shop, a check-cashing store, a rent-to-own furniture outlet, and an off-track betting branch. Given that we both knew little about these businesses, this represented an opportunity to try to understand how these stores operate, as well as to discover who seems to frequent these particular stores, to gain an understanding of their role in this particular neighborhood. Although these and other businesses oriented toward a low-income population were in prominent locations in this Census tract, on both iterations of the walk, all of the participating teachers avoided entering unfamiliar territory.

A colleague and I decided to do a "community sit:" Instead of walking around the Census tract, we would sit in silence in the public library within the tract and observe the people and activity there. We arrived before it opened and were surprised that there was such a long line outside. When the doors opened, everyone rushed in and signed up for computers with Internet access. There were not enough computers, so some kids would intently watch other kids until their turn came. With the Snapple machines, the social networking on websites that I had never heard of, people of several different generations, the ways that the actual books were in the periphery, and the open arrangement of the space all in one large room, I realized that "going to the library" was an activity that I had not really tried to understand beyond my own experience. Looking back on how we ended up in the library and not some other place, I realize now that a library was still in our zone of comfort, and still a place where we could just "hang out," to observe without being observed. I'm glad we went to the

library because it was public and not a space where people went to get some business done and then leave. I may have learned more had we pushed past our boundaries, but I still think that understanding how youth approach libraries could inform how to make classrooms more open spaces for students to learn on their own while also interacting with others.

In the 2005–2007 school years, I noted that the impact of the community walk experience seemed to be limited to the teachers' developing curricular projects using contexts of local data and local maps (see Rubel, 2010 and Rubel, Chu, & Shookhoff, in press, for description of some of these projects). Haiwen and other participating teachers created highly creative projects in which students used maps, or physical, quantifiable aspects of neighborhoods, as ways to explore mathematical concepts such as one- and two-variable statistics, ratio, scale, and proportion. These curricular innovations were products of our collaboration and demonstrated that the participating teachers had created new types of opportunities for students in terms of these mapping projects. However, the essential goal of the community walk activities was for teachers to replicate or adapt the community walk activity as a way to learn about their students. The teachers were not doing community walks in their own school contexts as a means of learning about their students' worlds.

After the first community walk, I developed a project for students that directed them to research Census data about their own neighborhoods to produce a neighborhood profile. Students then went out individually on community walks to identify and measure their own variables for developing a "scale of importance" for places significant to them. I was trying to make the curriculum unit student centered, while also giving me a sense of students' perspectives. They then represented these data as cartograms that remapped their neighborhoods. What they found important could include factors left out by the Census profile, such as the number of Spanish speakers or the number of young people who frequent specific places, such as stores and libraries. What I learned, beyond how to better design the curriculum for the next iteration, was how little I knew about where my students live and how they spend their time outside of school. In some cases, students also expressed how they don't visit many of the places near where they live; they did not necessarily identify with their officially designated Census tract.

Because we teach students for two consecutive years, teachers at my school would often revise and repeat a unit only in alternate years, and so I did not immediately re-design the community mapping project. I also felt that students would connect better with a project explicitly centered on their home countries. This time, my students first examined cartograms on Internet sites (i.e., www.worldmapper.org), which Laurie had shown us in

CTMUY. Then, we restricted our focus to countries represented by students in each class. Each group was comprised of three students from different countries to research a statistic of interest. Students used these data to make large world maps scaling each country according to their variable of interest, while trying to preserve the shapes and relative positions of the countries. After completing the big world map in their groups, each student recentered and rescaled the map so that his or her country would be at the center and have an area of one square inch, a new unit for measuring the world. This act of unitizing scaffolded comparisons relative to their home country—it became natural to talk of countries with 1.5 times the population, for instance. We used these maps to try to see connections between variables, such as literacy rates and airports to cellphones and poverty rates. Together, the maps formed an "Atlas of Origins." One of their large maps, comparing the literacy rates in a variety of countries such as Pakistan, Nepal, Vietnam, Mexico, and El Salvador, is shown in Figure 1.

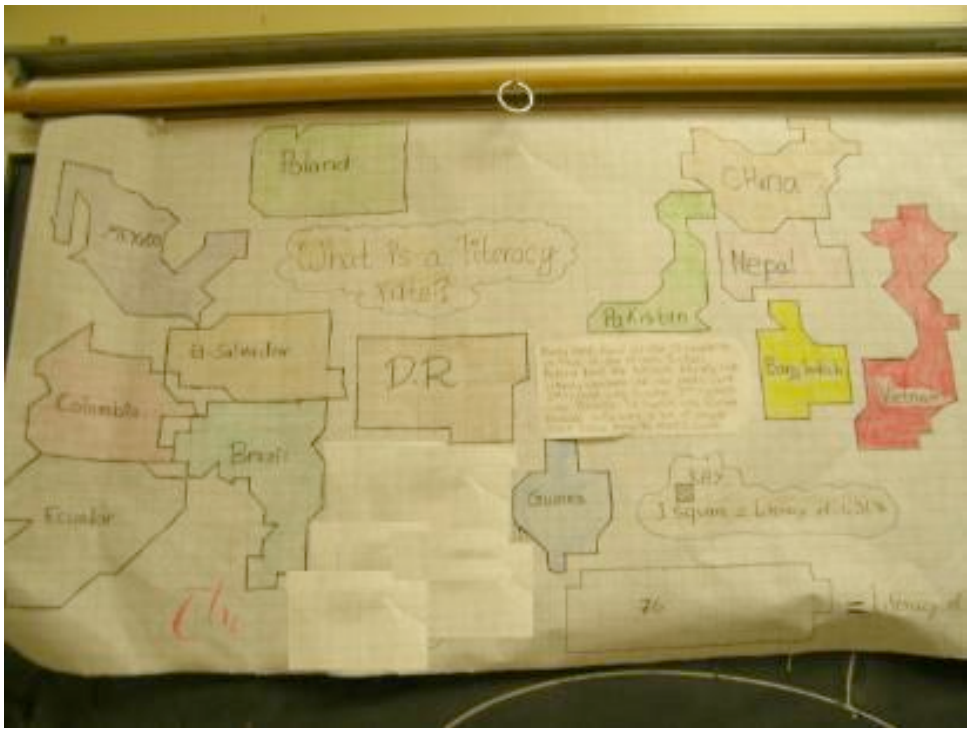

Figure 1. Atlas of Origins.

In this case, it was especially interesting to hear some of my students' resistance—"My country's not at the center!" "That's not what it

looks like!" At the same time, the available statistics, such as gross domestic product or poverty rates, condense a great deal of information—and often suffering—into a tidy figure that we then turned into neat, little, colorful polygons. I felt hardly qualified to tackle all of these complicated issues in my mathematics class.

Haiwen drew upon his own knowledge of mathematics to create and implement projects that related to local or global maps and corresponding descriptive data. In doing so, he, along with many of the other participating teachers, was indeed working on aspects of teaching for understanding as well as using relevant contexts for mathematization. At the same time, the participating teachers did not seem to recognize the potential impact of getting to know the cultural contexts of their students and their students' communities. As one of the project advisors reminded us, "How we know our students and their families and the community, the better we do, the easier it is, and that doesn't make it easy but the easier it is to try and figure out how to mathematize people's social reality and build from there" (E. Gutstein, personal communication, August 25, 2006).

There are several explanations as to why the task of learning about students was challenging for this group of teachers. Gaining a deeper knowledge of this neighborhood and their students' neighborhoods would require that teachers negotiate multiple "border crossings" (Anzaldúa, 1987). For example, teachers belong to a different generation than their students and know more school mathematics than their students. The teachers were raised and schooled in different geographical regions than their students, live in different parts of the city, and, in most cases, speak different home languages and dialects than their students. As a result, and perhaps most important, they experience a different racial-ethnic and social class reality than their students. These different racial realities clearly play an important role in shaping how mathematics might be relevant, both for whom and for what purposes, and also present challenges to teachers in terms of their openness to try to learn about their students' experiences.

Although I started my teaching career in schools that were more homogeneously Black and Latina/o, my current school is truly "diverse." My school is diverse in that its students represent different nationalities, languages, and cultures, and not in the way that diversity is oftentimes used as a euphemism for just "different" from the White mainstream. Yet, I've found that, in all of the schools in which I've taught, I have rarely met other teachers who are willing to talk about race and class as they play out in schools themselves. As one of the few teachers of color in a school for students of color, I find myself multiply conscious: not only what it is like to be "other" but also how teachers think of and talk about those who are other. The barriers I feel are not visible, but palpable, especially when crossed. My students assume that I am also an immi-

grant, even though, as a Chinese American whose parents immigrated from Taiwan, I assert to them that I am American. I see no contradiction in this assertion. I know that others often think I'm just Chinese, not seeing the layers of experience that come from being Taiwanese and born in the United States. Yet, this persistent misperception has reinforced my self-consciousness. Race is not something we can put aside, even when we try. I sometimes find myself restraining my enthusiasm for mathematics because I worry that I will end up perpetuating my students' racialized notions of mathematical competence.

A second interpretation of the difficulty for teachers in learning about their students' communities relates to dual challenges posed by urban diversity. In cities, even a single school neighborhood is likely to have a web of different racial, ethnic, or culture communities. For instance, one of the associated schools has an overwhelming majority Latina/o student population. While the use of the term "Latina/o" may suggest a homogenous student population, there is great variation at this school in the length of time students and their families have spent in the United States. Some of the students are recent immigrants, and other students are second-, third-, or fourth-generation American. In addition, students and their families might come from Puerto Rico, the Dominican Republic, Ecuador, and Mexico as well as other Spanish speaking countries. Diversity is geographically and densely layered such that any physical boundaries between communities are fluid and/or difficult to identify. These characteristics of urban diversity complicate learning about students because of the multiple cultural communities at play. Furthermore, these characteristics of urban diversity also complicate the pedagogical goal of using mathematics to analyze relevant social or political themes—relevant to whom? In project meetings, some teachers indicated that focusing only on abstract mathematics, and not also on developing students' critical consciousness with or about that mathematics, was a convenient way to avoid confrontation or negotiation of local, racially, and culturally charged tensions or conflicts.

Although I share the experience of being "other" with my students, I don't automatically gain insight into their multiple identifications. It's taken me time to learn how my students aren't just Latina/o, but from Mexico, and not just from Mexico but Puebla, and not just from Puebla but Huaquechula. At the same time, I have also learned to resist the myth of the single origin: other students I've taught are Iraqi, but lived in Turkey or The Netherlands before coming to the United States. Students' origins are thus as personal, local, and multiple as their present lives, and this complexity is multiplied by the number of students I teach. Layered on top of those older loyalties are the new places students are navigating, which are often narrow swatches according to regular daily rhythms. These are

not things that we as teachers could understand by looking at a map. It has taken me a long time settling into this city to develop a sense of my students' worlds. Often, I don't know what questions to pose to students to surface any of these issues. And so I am often reticent or silent when I could be bringing up issues that might then lead to deeper conversations about social justice. But my hesitation is thoughtful, perhaps in contrast with the self-imposed blindnesses of some fellow teachers, who declare: "I try not to read what's on their t-shirts."

"The Great Misunderstanding"

As my work with this group of teachers drew to a close, I labored over how to clarify with them the distinction between creating curriculum for students that contextualizes mathematics in local geography or local data and teachers using community walks or other tools to learn about their students, their families, and their communities. Earlier that year, I made this distinction in an academic presentation, sharing it with mathematics education research colleagues. Although I was positioning my project as a teacher–researcher collaboration, I found myself, instead, adopting a stance of a researcher who reports findings *about* teachers. I needed to share these ideas with the participating teachers as well. So in one of our monthly meetings, I noted to the teachers that they seemed comfortable with the first interpretation but seemed hesitant, or even resistant, to tinkering with the second. In interviews and later meetings, the participating teachers referred to this moment as "the bomb" or "the great misunderstanding."

The story I tell about that evening goes something like this: It's a dark Tuesday evening in the middle of mid-winter break. We gather at one teacher's apartment over dinner. We are the "old guard" of fifth-year teachers, with Laurie, our former professor. Our assembled feast grows cold as we go over slides for a presentation on the mapping project I am going to give in a few days. Our feedback gets stuck between our summer institutes and the actual curriculum we subsequently implemented. Laurie interjects—My point in having you go on community walks was not necessarily to have you make projects for your students. What I was hoping was that you would go out into your students' neighborhoods and use walks like these to get a better sense of their lives. That walk might not turn into a project, but it might just help you to better understand your students.

We object, variously: we're classroom teachers, that's our job; who has time to go out into the neighborhood?; I already know a lot about my kids; what you're saying is what we already do as good teachers; where is the rigor and the generalizability?; hey, I just moved to my kids' neighborhood; I spend plenty of time with my students and they tell me all

about their lives; sure, I have been to my students' communities; it's hard enough just being in the classroom.

I had wrestled for months about how to give the group of teachers this feedback. These teachers, who had been star students in my graduate mathematics education courses, were accustomed to my support and applause. They always enjoyed mathematical challenges and seemed genuinely committed to a lifetime of becoming better teachers, but this was a difficult moment in that the subtext of my message was that there was something, something that I felt was very important, that they did not yet seem willing to try to understand. I was the first to leave that particular meeting, and I knew that they would continue discussing my feedback and need to process my message. It was a difficult trip home for me that night; I worried that I had damaged my working relationships with the group and even more importantly, I was struck by how strenuously some of them objected to the notion of spending dedicated time to deeply get to know one's students.

After Laurie leaves, we linger a while longer. We wrestle with why all of this sounds like news to us. Some of us fixate on generalizability: if we were to, as Laurie suggests, shadow a single student for an entire day to see what that student's experience of school is like, what would we then be able to say about all of the students? Some worry that it would be unscientific to generalize from our observed experience of one student to all students. Some of us see the advantage of going to other teachers' classes, but when we do so, we focus on the teacher's practices and don't seem to assume the students' perspective and experience in those classes. Laurie has been very specific over the years: she told us how she learned about her own students on camping trips with them, or how she better understood the participation patterns of classes after she attended a church service with a student. Maybe we misunderstood what Laurie was asking us to do because we were going in with a different primary objective and intention: we had all done non-mathematical activities with our students, but perhaps we hadn't done these things from the explicit perspective of learning about students. I think I interpreted the community walk activities in terms of my primary roles as a teacher of mathematics, albeit a progressive, project-based, and inquiry-driven teacher. I don't think that I viewed myself as a teacher of young adults. I hadn't realized how I had already generalized about my students, without having done the work of observation and participation with them in a range of activities, including mathematics.

Strangely, even though the message to get to know one's students had been a constant theme in CTMUY over the years, it felt to me as if the teachers were hearing me that night for the very first time. Why had they not heard me before? One reason might be my non-didactic teaching style. I pose problematic situations

for people to make sense of—in mathematics or about teaching. Even in the face of resistance from my students, I do not present *the* solution or *the* strategy; I am mostly interested in people sharing all of the possible approaches and working together to compare these approaches in terms of their efficiency, ease, or elegance. I approach teacher education in the same way. I am slow to prescribe to a teacher exactly what to do; instead, I can try to provide experiences for them that prompt reflection about their students, about mathematics, or about teaching. Ultimately, there are many choices for them in terms of how they use new knowledge to inform their practice. Although this non-didactic pedagogical approach to teacher education facilitated an atmosphere of collaboration in this phase of CTMUY, clearly, in this case, there was a need for me to provide more direction.

A second contributing factor could be the day-to-day working reality for this group of new teachers. They had an immediate need to develop curricular projects for their students, and our work together on the topic of urban communities sparked many ideas for them in this direction. These curricular projects focused on their students and likely facilitated new opportunities for students to build mathematical understanding. In contrast, getting to know one's students and the circumstances of their lives, is an extended process that might not have immediate or obvious connections to teaching mathematics. Teaching teachers to value knowledge about students and their communities is challenging given that the connections between this knowledge and one's teaching practice are, perhaps, harder to pinpoint.

After some time elapsed, with more conversations and meetings to process the great misunderstanding, I noted that the feedback I had provided seemed to function as a catalyst for teacher learning. High school mathematics teachers often view teaching as the process of transmitting their own knowledge of mathematics to others (McLaughlin & Talbert, 2001). With this view of teaching, it is understandable that the teachers initially responded to the community walk activities by focusing on the mathematics content and trying to find creative ways to connect that mathematics to their students' worlds. In some cases, they did so in very literal terms by using local maps. However, after the great misunderstanding and ensuing conversations, some of the teachers demonstrated that they had moved to a new way of thinking about what it means to be a culturally relevant mathematics teacher. In addition to developing mathematics curricula, they began to recognize the importance of learning about their students and their students' families and communities. For instance, one teacher quickly created an action plan to "shadow" one of his students, through the school day and into after-school activities. The experience of learning about one student in this way was so rich for him that he continues to do this activity once a year. Similarly, in a group meeting about six weeks after the great misunderstanding, Haiwen described a shift in his

view about teaching, to a teacher as a builder of relationships with students, and among students, about mathematics (Lampert, 2003).

I still think in terms of knowing things about the world that I might develop with the students rather than knowing things about the students. Even "centeredness," I've taken in my work as "let's make it about you" rather than "let's find out about you." I mean, that's the question, right? Where am I getting my knowledge? I don't know. It is in classroom settings, it's from sources other than going to their communities. It's the difference between being and doing. I mean, you're asking us to really—we're comfortable with doing things, writing lessons, teaching them. But to really be, in a different way, is hard. I failed to realize that being culturally relevant was not possession of some body of knowledge, but rather is a matter of relating to students, being involved with them, and engaging them.

I now see how I had assumed that projects were a good enough point of departure, and that I knew what real-world problems mattered to my students. I had also assumed that problems were the right place to begin. I realized that I need to learn a lot more about my students, their neighborhoods and communities, and what they value, first. I don't live or spend much time with my students outside of school, or know, literally, where they are coming from: both each morning or before they came to this country. Creating safe spaces in our classrooms for difference is not enough: we must push ourselves out of our zones of comfort and into the places our students live. It takes long, slow work to get to know our students and their lives. Curriculum and projects are just one step, and maybe not even the first.

Final Thoughts

In writing this article together—that is, in telling our stories together—we have begun to untangle some of the threads of our thinking about teaching and learning. Collaborating with teachers about culturally relevant mathematics pedagogy in urban high schools consists of two interrelated strands. Teachers need to know how to "find the mathematics" from the high school curriculum in urban contexts, like the transportation systems, the architecture, or the arrangement of housing and resources. Teachers also need to know their students well enough to organize instruction to maximize students' participation or to be able to identify contexts of potential relevance. In other words, working with teachers on culturally relevant mathematics pedagogy cannot just focus on how to create curricula that contextualize school mathematics in experiences that are relevant to one's students. Alongside this effort must be an effort to teach teachers about the

importance of building relationships with their students and about learning about their students as a necessary part of this process.

I have changed my focus. I realize that mathematics is so much a part of who I am and how I view my role that I need to work explicitly to find other ways of relating to and connecting with students. These ways include learning how to talk to students, how to listen to them, how to ask the right questions, and then how to listen to them some more. Although my inclination is still to insert mathematics into every conversation, I now restrain myself. I have come to see mathematics teaching, in addition to being cognitive and academic, as highly personal and social. Building relationships with students only occurs over time and is deeply connected to teaching them mathematics. I have come to enjoy developing those relationships and learning from my students just as much as I enjoy teaching and doing mathematics. And as with mathematics, part of the joy of learning about students is finding out how much more there always is to learn.

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