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Embracing *Nepantla*: Rethinking "Knowledge" and its Use in Mathematics Teaching

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Date of publication: February 24th, 2012

To cite this article: Gutiérrez, R. (2012). Embracing *Nepantla*: Rethinking "Knowledge" and its Use in Mathematics Teaching. *REDIMAT - Journal of Research in Mathematics Education*, 1 (1), 29-56. doi: 10.4471/redimat.2012.02

To link this article: <http://dx.doi.org/10.4471/redimat.2012.02>

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Embracing Nepantla: Rethinking "Knowledge" and its Use in Mathematics Teaching

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Abstract

Although educational researchers are moving beyond purely psychological and cognitive models of learning to consider the ways in which mathematics teaching might reach a more diverse student population, this work remains in its infancy, and the concept of “knowledge” is rarely questioned. This paper begins with the idea that mathematics education has much to gain from perspectives in Latin@ studies. I draw on the work of Gloria Anzaldúa, specifically her concepts of “conocimiento” and “Nepantla” to bring a more holistic/connected perspective to the “knowledge” teachers may need for teaching and highlight how it might align with broader definitions of mathematics. I also offer examples from a partnership with a Chicago high school to show how pre-service teachers move through cycles of knowledge construction. Implications for teacher education, and teacher recruitment are discussed.

Keywords: Nepantla, Knowledge, Mathematics Teaching, Latin@s.

While many educational researchers see “educational quality” as largely synonymous with rising test scores, I focus my attention more broadly. A quality mathematics education goes beyond a focus on “dominant” mathematics -- the mathematics that credentials people for well paying jobs in society, that is required in standardized assessments, and that privileges a Western stance (Gutiérrez, R., 2000; 2002a; in press; Gutiérrez & Dixon-Román, 2010). Because equity ultimately is related to the distribution of power, a quality mathematics education also must include a focus on “critical” (Frankenstein, 1990; Greer, Mukhopadhyay, Powell, & Nelson-Barber, 2009; Gutiérrez, R., 2010; Gutstein, 2006; Mukhopadhyay & Greer, 2001; Skovsmose & Valero, 2001; Skovsmose, 2011) and “community” perspectives on mathematics (Martin, 2006; 2007) that acknowledge the human activity of mathematics (D’Ambrosio, 2006; Ascher, 2002)—that it is constantly being (re)made by people in negotiation with each other and their surroundings. Although this broader view of mathematics is gaining ground, most researchers/educators continue to frame equity from a deficit perspective—we need to get more people of differing walks of life to do mathematics so that they can reap the social and economic benefits of participating in society, not because their participation will somehow change the nature of mathematics as a discipline or our relationship with (each other on) this planet. Yet, until we are able to see that *mathematics needs people* as much as *people need mathematics* (Gutiérrez, 2002a; 2008; 2010), we risk tinkering with education in a way that fails to address power issues or true transformation in society.

For most white and middle class people, a focus on dominant mathematics means we assume they will walk the very path that their ancestors did and will need only that mathematics to make sense of the world around them or to have fulfilling lives (unlikely in the 21st century). For most women, the working class, and people of color, a focus on dominant mathematics means that engaging in school mathematics largely requires becoming someone else. And while all learning ultimately assumes we will grow, some students are offered a greater opportunity to maintain parts of their cultural identity while growing in, and contributing to, the field of mathematics.

The kind of mathematics that I envision would allow students to feel “I’m doing this mathematics in *my* language, using algorithms from *my* home culture, answering questions that are of importance to me, and serving the needs of *my* community.”

This broader and more humanistic conception of mathematics requires teaching that moves beyond the ability to perform well on standardized tests or measures of conceptual knowledge. Such teaching encourages students to develop a positive sense of themselves as mathematical and cultural learners (e.g., Boaler, 2002; Martin, 2009) as well as to make sense of their surroundings using mathematics (Gutstein, 2003; 2006; Frankenstein, 1994; 1997; 2009; D’Ambrosio, 2006). This approach requires that we reconsider some of the taken-for-granted concepts used in mathematics education. One such concept is “knowledge.”

Knowledge for teaching in the 21st Century

Most conceptions of “knowledge” for teaching incorporate three areas: 1) content knowledge, 2) pedagogical knowledge, and, to a lesser extent, 3) knowledge of students. [See Figure 1] This ranked order exists not just among researchers, but also among teacher candidates. For example, secondary pre-service math teachers think of themselves primarily as “teachers of math” not “teachers of students.” Most teacher educators can attest to the fact that addressing issues of equity in mathematics often is met with resistance from pre-service teachers or is viewed as something one can tack on, after the mathematics is learned.

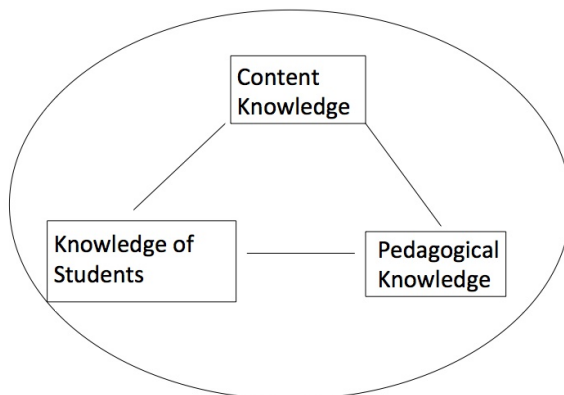


Figure 1 Traditional Conceptions of Teacher Knowledge

The question then arises: *How might we conceive of “knowledge for teaching” in ways that honor a broader conception of both a) mathematics and b) student diversity in society?*

For the most part, knowledge is seen as something that one accumulates and then applies to the teaching setting². A prominent example of this is the fact that we tend to write about teacher beliefs and teacher dispositions as something separate from knowledge (Thompson, 1992; Ernest, 1994). Even those who acknowledge a sociocultural perspective on learning and therefore see knowledge as constructed in negotiation with others in a community of practice (Wenger, 1999; Cobb & Yackel, 1998) often fail to take into consideration identity politics or issues of power (Gutiérrez, 2010). Most models of mathematics teacher education that aim to develop effective teachers of marginalized students (e.g., low performers, English language learners, students of color, working class students), rely on strategies that underscore the need for a mainly white, middle-class female population to understand the schooling experiences of “others” (see for example Darling-Hammond & Bransford, 2005). Beyond developing a “deep and profound understanding of mathematics” (Ma, 1999), we ask pre-service teachers to read about these students and their schooling experiences (e.g., Nieto, 1999), to be familiar with the effective strategies of specific teachers in their local contexts (Boaler, 2002; Gutstein et al., 1997; Gutstein, 2003; 2005; Silver & Stein, 1998; Khisty & Viego, 1999; Ladson-Billings, 1995; Gutiérrez, R., 1999a, 2000, 2002; Reyes, Scribner, & Scribner, 1999; Strutchens et al., 2011), to survey the communities in which they live so as to access their out-of-school mathematical practices (deAbreu & Cline, 2007; Nasir, N., 2007; Cinzia, 2005) or “funds of knowledge” (Civil & Kahn, 2001; Civil and Andrade, 2002; Civil, Planas, & Quintos, 2005; Diez-Palomar et al., 2008; Gonzalez et al., 2001; Turner, et al., 2011); all very important goals in a humanizing pedagogy.

However, without sensitive and expert teacher educators, these strategies run the risk of: 1) promoting a kind of “static” and/or “essentialized” notion of what it means to “know” something or 2) failing to connect this “knowing” with specific action in the classroom—e.g., “Given this new information, what do I do on an

an everyday basis in my math classroom?” The latest trend in trying to quantify the mathematical knowledge for teaching (Hill, Rowan, & Ball, 2005) and defining “quality teaching” based on student achievement (Barnett & Amrein-Beardsley 2011) reflect the emphasis on a universalistic sense of “knowing.” What seems to be missing in most research in mathematics teacher education is a genuine connection with students that acknowledges hybrid identities (Pieterse, 2004; Gutierrez, Baquedano-Lopez, & Tejada, 1999; Boaler, 2002), multiple realities (Anzaldúa, 1987), and the critical/human nature of mathematics (D’Ambrosio, 2006; Gutiérrez, R., 2002; 2007). A model of knowledge needed for equity teaching in the 21st century would involve a focus on not just content knowledge, pedagogical knowledge, and knowledge of students, it would involve *political knowledge*: negotiating the world of high stakes testing and standardization, connecting with and explaining mathematics to community members and district officials, and buffering oneself, reinventing, or subverting the system in order to be an advocate for one’s students (Gutiérrez, 1999b; 2007; in preparation). [See Figure 2]

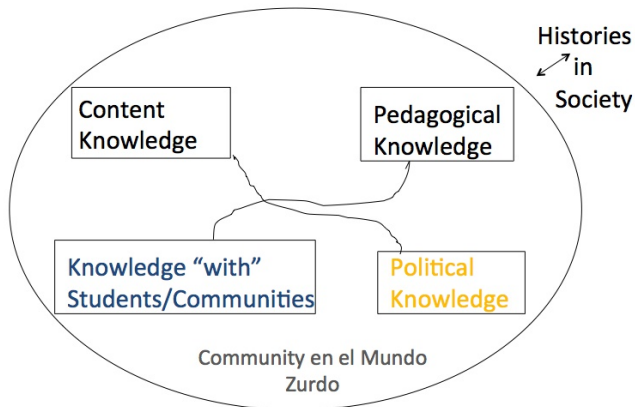


Figure 2 Political Conocimiento for Teaching Mathematics

Conocimiento, Nepantla, & Desconocimiento

I draw upon the writings of Gloria Anzaldúa (Anzaldúa, 1987; 1990; 2000; Anzaldúa & Keating, 2002; Keating, 2005) in order to

reinvigorate the way we frame knowledge. Anzaldúa introduces two terms that I find useful: *conocimiento* and *Nepantla*. *Conocimiento* is a Spanish word that literally translates to “knowledge.” Yet, just as the word *educación*³ carries meaning far beyond what is understood to be “education” in English, *conocimiento* has meaning that is missed with a mere translation. In Spanish, there are two ways to “know.” The verb “saber” means to know something, as in you know how much 2 plus 2 is, or how to get to the grocery store from here. The verb “conocer” means to know *someone* or to be familiar with *something* (e.g., a restaurant), as in you have met or had an experience with another person or thing. In English, our inability to distinguish between knowing *something* and knowing *someone* does not allow us to highlight the aspect of “connections with others” as part of knowledge. Rather, knowledge tends to be seen as the product of a disembodied act. And, human connections are relegated to the area of “beliefs” (Ernest, 1989; Nesper, 1987; Pajares, 1992; Pepin, 1997) “attitudes” (e.g., Koehler & Grouws, 1992; Lubienski, 2000; McGinnis et al., 1997), or “conceptions” (Thompson, 1992; Bergioli & McClosky, 2006; Kastberg & D’Ambrosio, 2006). A focus on *conocimiento* offers the opportunity to highlight this connected/embodied way of “knowing.” That is, teachers need knowledge “with” (not “of”) students/communities in order to be effective.

Anzaldúa’s use of *conocimiento* carries multiple meanings: “connection with others,” “in solidarity,” “being receptive to others” “that aspect of consciousness urging you to act on the knowledge gained” or developing what she would call “outlawed” knowledges (ways of knowing that are not accepted or not recognized). These multiple meanings are represented in the way she writes the term “nos/otras.” Spanish speakers recognize that the word “nosotras” is the feminized version⁴ of the word “we” or “us.” Yet, the slash that Anzaldúa inserts calls our attention to the fact that two perspectives are present. The “nos” can stand alone to mean “us,” as in *Danos la pelota* (Give us the ball). And, “otras” literally means “others.” So, while *nosotras* (as a single word) might imply converging one’s experience under some larger concept of “unity” or “all students” (e.g., NCTM, 2000) that strips us of our voices or unique needs, *nos/otras* with the slash in the middle allows us to see ourselves along side of others,

connected, yet recognizing our differences.

The concept of *conocimiento* leads Anzaldúa to construct *Nepantla* or the space that represents “el lugar no lugar” (neither here nor there), what has been thought of as the “third space,” “between worlds, between realities, between systems of knowledge” (Anzaldúa, 1990; 2000; Keating, 2005). As a lesbian Chicana writer, she draws on her painful experiences in grappling with what it feels like to both always and never belong somewhere (accepted neither by white feminists nor the Chicano community that typically outcasts gays/lesbians). She draws strength from this indigenous stance, seeing it as something that helps her as a mestiza (mixed race) endure. For Anzaldúa, it is from this place that we birth new perspectives on reality, new knowledges. It is this ability to exist in *Nepantla* (the uncomfortable space where there is no solid ground, that has no official recognition) that has contributed to the expansion of new ways of asking questions, new theories, and more interdisciplinary approaches to understanding the world around us. Scholars of color, the working class, speakers of languages other than English, lesbians/gays/transgender peoples face daily the challenge of living with constant tensions (e.g., of belonging and not belonging, of being highly visible and invisible at the same time). When one lives with this constant tension, there tends to be a greater awareness and *conocimiento con* (familiarity with) uncertainty. Knowing that everything is conditional, that we may need to pull out another hat to wear at any moment, we are tentative with our ways of viewing the world. We develop the ability to see a different (possible) future than the one that is before us--often as a way to reconcile our conflicting voices within the many spaces in which we live.

For Anzaldúa, we participate in a cycle of *conocimiento* (our framing of the world and consciousness) and *Nepantla* (“neither here nor there”/multiple realities) [See Figure 3]. In fact, being able to recognize multiple realities is what generates new knowledge. So, in essence, we are dependent upon others as we construct new *conocimiento* because it requires interaction with our surroundings and communication of that framing with others—recognition of both the “nos” and the “otras” in nos/otras. Should we decide we do not want to recognize the “other,” we can erase the slash in the word and resort back to a previous framing of the world based only on our own view

(nosotras)⁵. This closed or ignorant stance *desconocimiento*⁶ involves an active state of “distancing” or “refusing to know.” So, within the cycle, reaching *Nepantla* does not ensure that a new *conocimiento* (knowledge) will be constructed. In fact, *Nepantla* might be thought of as a necessary but insufficient condition for new knowledge.

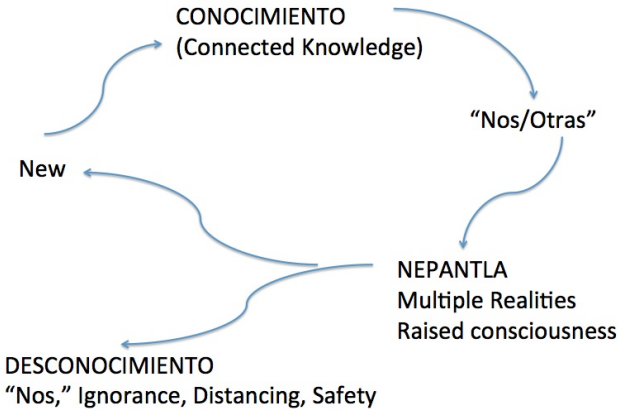


Figure 3 The Path of Conocimiento

So, how might this new concept of knowledge help mathematics educators? First, it offers a way to frame knowledge that honors the messy process whereby pre-service teachers come to greater awareness with both their own mathematical experiences and that of other peoples’ ways of experiencing mathematics⁷. That is, it does not suggest that when white females have knowledge of diverse cultures/languages, they can be mapped onto a universalistic view of mathematics. Rather most pre-service teachers are more likely to go through phases of *Nepantla*, whereby they come to see their own perspective along side of others’ but in a way that does not suggest they must become the “other,” nor that the “other” must become them (collapsing under a “nosotras” umbrella). It means being able to recognize and value that space because it leads to a new framing of mathematics for the pre-service teachers. For example, being able to see that Latin@ students might choose to use Spanish in doing problems (regardless of their fluency in English) or that such students show greater engagement in exploring problems grounded in their communities may arise greater awareness in pre-service teachers as to how contexts or issues of identity influence their own framings of the

world with mathematics.

Similarly, in mathematics teaching, a focus on *conocimiento/Nepantla* offers a way to acknowledge students' ways of making meaning (Valero, Kilpatrick, Hoyles, & Skovsmose, 2005) in mathematics, regardless of whether those meanings are "forbidden knowledges" or not socially sanctioned as mathematical. That is, teachers might look for their students to express their *conocimiento* in terms of what is the "nos" that they see/experience and what is the "otras." What previously would be considered knowledge of dominant school mathematics might now be viewed as *conocimiento* with the history (written record) of socially sanctioned mathematicians. This would be seen as one aspect of mathematical "knowledge," but not all of it. Other parts would include necessarily being able to see oneself (the "nos") —e.g., one's own understandings of concepts, one's identity. In considering the development of new *conocimiento*, it also means being able to recognize states of *Nepantla*. So, in looking to understand what students "know," we might ask them to identify two views at the same time (perhaps valuing their own view and also that of another, even more abstract view, or view of a classmate) and the way(s) in which this state of *Nepantla* led to a new *conocimiento* or framing of their world with mathematics. For example, a student might suggest that not all lines are straight. This is possible in Non-Euclidian geometry, though the student may not be able to articulate it. Moreover, students may challenge the notion that "equal" means giving everyone the same size slice of pizza at a birthday party. When some guests are 6 year olds and some are adults, they may require equivalent proportions not equal sizes. Equal, here, as a mathematical concept would entail ratios and proportions, would depend upon the meaning for why one is doing mathematics, and offer possible implications for sociopolitical awareness with respect to the distribution of resources. As such, the solution that everyone gets the same amount of pizza and that everyone does not receive the same amount of pizza could be seen as two different but equally viable points of view. The specific context does not resolve the tension. Rather, multiple (conflicting) representations could all be mathematically correct.

Typically, this kind of work has been noted as students' informal understanding of mathematics (Bergoli & McClosky, 2006) as

opposed to recognizing a potentially different framing on the world, not unlike that highlighted in ethnomathematics (Ascher, 2002; D'Ambrosio, 2006; Knijnik, 2011). Here the “nos” would be the student’s view and the “otras” would be the view of the institutionalized mathematics community. Most often, the goal in mathematics teaching is to try to get the student to become a legitimate participant (Lave & Wenger, 1991; Lampert, 1990) in the community of mathematicians, thereby subsuming their identity within the currently sanctioned way of communicating in the field. This process results in “nosotras” from the point of view of school mathematics, but is unlikely to encourage a view of “nos/otras” that opens up the possibility for students to contribute to new ways of doing mathematics. Instead, mathematics tends to remain a fairly closed field (Restivo, 1994), allowing only those already sanctioned mathematicians (e.g., university professors) to deal regularly with uncertainty. Unfortunately, many teachers are not aware of the uncertainty that is present in mathematics. Ask any person on the street to describe the nature of mathematics and you will hear words like “black and white,” “absolute,” “one right answer,” “truth,” leaving you with the idea that mathematics is static and predetermined. Yet, talk to a mathematician and you will learn that mathematics is constantly changing and does not always give one right answer. In fact, many of today’s super-complex proofs (e.g., Kepler’s sphere packing conjecture, the “enormous theorem”) cannot be verified. Moreover, mathematics includes fields like complexity theory, chaos theory, fuzzy logic, fuzzy sets, and more. As society attempts to deal with its complex and dynamic surroundings, new forms of mathematics are being developed.

Yet, when students offer a different view, they are seen as having deficient, underdeveloped, or misconstrued understandings of mathematics. Let me be clear that I am not advocating for an “anything goes” kind of mathematics teaching. Rather, I am suggesting that when teachers can recognize a student’s unique perspective along side of but equally important to a mathematician’s or math educator’s view, there is greater potential for connection between the teacher, student, and new possible forms of mathematics.

This ability to perceive more than one reality also aligns with more

recent studies on semiotics in mathematics education as they relate to the construction of mathematical knowledge. For example, Steinbring's (2005) notion of being able to maintain a view that recognizes the tension between situatedness and generality is necessary for the construction of new knowledge. Extending the work of Miller (1986), he says,

This new conceptual relation is neither reduced to familiar fact or rule knowledge, nor is it separated from the familiar knowledge (for instance as isolated structures). The knowledge construction thus fulfills the criterion that *it requires the old knowledge and at the same time transgresses it.* (p. 197, my emphasis).

As such, the learner must be able to see both an old view of mathematics and a new view of mathematics, such that the new view is seen as separate from, yet connected to the old.

Embracing *Nepantla* in a Mathematics Teacher Education Program

So what would these notions of *conocimiento* and *Nepantla* look like in practice? I turn, now, to research I have conducted with pre-service teachers in a secondary mathematics teacher education program to show how an understanding of *conocimiento* and *Nepantla* influence their assessments of students as well as their teaching decisions.

As part of a year-long “community of practice” with an urban high school teacher and his Latin@ students, data was collected from teacher candidates enrolled in courses at a large Midwestern university during the 2002-2003 academic year. The community of practice involved 23 teacher candidates—10 males, 13 females. They were 22 Caucasians and 1 Asian American. The teacher candidates were undergraduate mathematics majors in good standing (or graduate students possessing a bachelor's degree in mathematics) and enrolled in a cohort model of teacher education. Most were undergraduate juniors and seniors (n=21) expecting to receive certification upon graduation, though two were completing a masters/certification degree. The courses in which they were enrolled as part of the community of practice were the first two of four secondary mathematics professional

development courses required for certification in the state. These two courses met twice a week (3 hours at a time) for 32 weeks over two semesters. As part of a cohort of secondary mathematics teacher candidates, they completed coursework (including foundations courses and student teaching) together for 2 years as required in their degree program.

I was the instructor for both of the courses that constituted the community of practice. As a Chicana whose research centers upon issues of equity in mathematics and urban education, the students were familiar with my general position on the importance of making mathematics meaningful to all students. In lectures and discussions, I often drew upon my research experiences with observations of math teachers in Chicago who were particularly successful using Interactive Mathematics Program (Alper, et al., 1997) materials with their Latin@ and black students.

The school with which we partnered was an alternative Chicago public high school that shared building space with an elementary school. Murrieta High⁸ served 88 percent Latin@ students where 99 percent qualified for free lunch and 6 percent had tested as low English proficiency. The 29 high school students who participated were generally unsuccessful in traditional schools. The students had to overcome a number of obstacles to attend Murrieta High --many of them held full time jobs (some held more than one), juggled childcare for their children, crossed gang boundaries on the way to school, and some were required to report to probation officers. Their choice to attend school was a deliberate one. Even so, the school was flexible and attended as much as possible to students' needs (e.g., the school day occurred 12:30pm until 6:30pm to ensure no late risers would miss class; school functions and fieldtrips emphasized the culture and language of the students, new enrollees were admitted at the beginning of each of the 3 semesters). The high school students were enrolled in one of two courses (Algebra or Data Analysis/Probability) during the 2002-2003 academic year. These courses gave them credit toward graduating from high school.

The practicing teacher in this community of practice, Philip, was a graduate of my university's teacher education program. Philip was a white male, monolingual English speaker who had grown up in an

economically well off neighborhood and predominantly white school. Even so, he was committed to social justice and lived in the neighborhood of the school where he taught and rode his bicycle to work everyday. He held a deep understanding of mathematics (had won awards and taught calculus in the math department at the university while still an undergraduate student) and when given an option of any curriculum, he chose to adopt Interactive Mathematics Program (IMP) materials because of the richness of the mathematics he saw there. While still an undergraduate student in mathematics, he conducted research one summer with me and had taken three of my courses (including a doctoral seminar on urban education). This teacher was chosen explicitly as he showed great potential to teach urban Latin@ students based upon his performance in the teacher education program and my interactions with him. Philip deliberately chose Murrieta over easier places to teach, and that became the site of our partnership.

This “community of practice” model of teacher education included two university courses designed with an experimental format (design based experiment) that was inextricably linked to the partner high school wherein the teacher was effectively using IMP curriculum materials. That is, a majority of the university readings and assignments were developed to serve the ongoing needs of the high school teacher and his students. Among other things, readings, lectures, and case studies included topics such as: race/ethnicity/Latinidad, culture, critical mathematics, ethnomathematics, NCTM professional standards, technology, coverage versus depth, problems versus exercises, equity, whiteness, student voice, and community.

More specifically, the community of practice required pre-service teachers to: 1) visit the school/neighborhood community in Chicago and complete mathematical activities with 2 high school math classes, 2) engage in mathematical activities that were part of the high school students’ curriculum (some IMP, some participant created), 3) discuss the merits and challenges of those mathematical activities with their university professor and peers, 4) view video of the high school students’ experiences of the same math activities, 5) discuss with the high school teacher (in person and over conference call) the math

activities and high school students' experiences, 6) develop lesson activities for use in the high school teacher's class, 7) email weekly with a high school partner for a 9-month period, 8) plan and execute a day-long field trip for the high school students to visit and learn more about the university.⁹

As aforementioned, pre-service teachers were required to do mathematical activities and then view video of math lessons, in part, to develop their ability to analyze classroom events—from the point of view of both students and teachers. Early on in the partnership, they did an IMP activity that involved a spinner, a divided circle with values assigned to the areas, and two students at a fair [the point of the activity was to figure out who had a better chance of winning the game at the fair and to compare theoretical probability with empirical probability]. After the pre-service teachers completed the activity, they were asked to comment on the kind of mathematics in which they were engaged, what they were learning, and to assess to some extent whether this would be a good curriculum to use with the students in Murrieta High (our partner). In general, the pre-service teachers enjoyed the activity, saw its power in connecting geometry with probability (many of them had not thought of these connections), valued the emphasis on concepts over procedures, and assessed it as part of a “quality” curriculum.

Although they saw these positive aspects of IMP, when asked to predict how the high school students with which we were partnering might experience the activity, they altered their views somewhat, suggesting that although it seemed to be a quality curriculum, it might not serve the purposes of learning for the students. They knew that the students were not strong in many of the basic skills needed to carry out the activity and that they were seeing “probability” for the first time in school math. They worried that there were not enough opportunities for students' repeated practice of problems, and so the students might not generalize their findings. Having seen the students code-switch (work partly in English, partly in Spanish), they also wondered how well the curriculum would match their English proficiency levels. From the point of view of the pre-service teachers, IMP involved a lot more reading than traditional textbooks. As such, when they considered what they knew about the curriculum and what they knew

about the students, they questioned whether IMP was a good choice for addressing equity. Their framings centered on a kind of proficiency match, where students were seen from a deficit perspective.

They then watched video clips from the lesson and were asked to comment on things such as: what kind of mathematics students were processing, how engaging was the mathematics, how it might connect to issues of equity we had discussed in class. When they saw how successful and engaged the students were, the pre-service teachers changed their framing to focus away from proficiency levels to issues of access and achievement [See Figure 4]. That is, they noted that because the high school students were doing well with these problems (were conjecturing and justifying their mathematical ideas), now the curriculum might be seen as giving them access to rigorous mathematics (something that is not common in classrooms that serve Latin@ and black students). The fact that the high school students were engaged led my pre-service teachers to believe that this kind of curriculum would serve Murrieta students well in terms of becoming legitimate peripheral members of the mathematics community. As they watched more and more video clips throughout the year, they further strengthened this view that IMP mathematics was a good match for addressing equity with these Latin@ students.

Later in the year, Phillip (the math teacher), was visiting our class and discussing our lesson plans. He brought up the fact that he recently had a discussion with his high school students about the mathematics curriculum and wondered whether it was the right thing to have done. He explained to us that he was casually commenting about how the mathematical activities in IMP (e.g., Baker’s Dozen, Overland Trail, and the Pit and the Pendulum) do not seem to reflect the students’ lives. He suggested that in some ways, because math curricula are

Assessment	Framing	Stance
Not a good fit	Deficit perspective— lacking English and basic mathematics skills	Distancing
Good fit	Greater access to rigor	Awareness of others
Both a good fit and not	Recognize rigor and identity issues	Solidarity

Figure 4 Pre-service Teachers' Perspectives of a Quality Curriculum

created by mainly white, middle class people, inner city students must be subjected to a kind of “parking their identity at the door” in order to learn rigorous mathematics. He recounts his conversation with his students, noting that they joked about the kinds of people making up these problems. At the prompting of this story, my pre-service teachers began to think differently about the curriculum. In our readings/discussions, I had introduced to them the notion of quality curricula including a window and a mirror—a mirror in the sense of offering students a chance to see oneself; a window in the sense of being able to see a different view onto the world. Several of them raised the question of whether this curriculum was adequately providing a mirror to the high school students. And, if it was not, could we really consider the IMP curriculum as addressing equity concerns? On the one hand, some pre-service teachers hung onto the idea that access to a rigorous curriculum was important in that their achievement would give them social capital along with a greater ability to do well on standardized tests for college. On the other hand, they worried that access to a rigorous curriculum might have unintended consequences.

Philip left us with his dilemma: Should he keep moving forward with the IMP curriculum as it was written (giving his students access to dominant mathematics) or should he switch to a version of mathematics that better connected with their lived realities (perhaps social justice mathematics)? He wondered whether bringing up the subject of the curriculum as not reflecting their lives would backfire and the students would use it as an excuse for not doing math the following week. The pre-service teachers, exasperated at this point, turned to me: “Was this or was this not a good curriculum for addressing equity???” I turned it around on them, “Yes! You are now in *Nepantla*. This is where we birth new knowledge.”

My pre-service teachers recognized the multiple realities that existed in the situation and saw that both could exist alongside of each other, that there was no one “regime of truth.” They began to recognize that mathematics curricula do not just provide access to future learning, but can have a large impact on students’ identities inside and outside of school. It was to this kind of space (*conocimiento*) I was hoping to move them. I explained that the knowledge they need for teaching is a

lot like being in *Nepantla*, where there are no “right” answers. I encouraged them to stay in this messy place (the neither here nor there) long enough to birth something new.

We did not try to definitively answer the question about whether this was a quality curriculum or not, as this would have “resolved” the tensions that arose. Instead, we began posing questions and thinking about strategies for gaining more information and different perspectives. Some of them suggested asking the high school students what they thought and looking for suggestions from them. Others wondered whether trying to alter some of the IMP contexts to make them more like the students’ everyday experiences was the way to go. Still others thought there was nothing wrong with acknowledging the tension but proceeding with the IMP activities as they were written. We spent most of the rest of class that day developing a list of things that began with the phrase “I wonder...”

Needless to say, the high school students returned to doing their IMP mathematics the following week with no complaints (presumably not feeling oppressed by “white” publishers). However, their teacher went on to create a supplemental activity that engaged them in looking for representations of themselves in popular media. The question they asked was: What was the probability of finding someone like yourself in magazines like Reader’s Digest, Time, Lowrider, etc. He had students count the number of faces they saw in these magazines that were the same race/ethnicity, gender, etc. and try to develop a symbolic representation of their mathematical thinking to present to others. He also noted the intriguing discussions that arose among students concerning how one knows what race/ethnicity a person is merely from looking at them. Although he lamented the lack of depth in the mathematical discussions that ensued (something he attributed to his lack of experience in creating such mathematical experiences), he still felt the work was worthwhile in that it acknowledged his attempts to create solidarity with the students.

So how do the pre-service teachers’ framings of the situation reflect their *conocimiento* and/or presence in *Nepantla*? They had moved from a position of limited awareness of broader issues of equity (beginning with their own positions and looking at the students from a deficit perspective) to ones that were inclusive of others’ views. In this

sense, they had gone from *nosotras* to *nos/otras* and had decided to reject the option of *desconocimiento*. Even so, from this stance, they easily could have decided to shift back to a view of teaching that gave greater weight to the idea that the curriculum needs to reflect students' lives (and they likely would have felt less white guilt in doing so). However, in deciding to not resolve the tension right away, they were open to a view of teaching that could simultaneously assess this curriculum as being of high quality and also not high quality. More than just acknowledging the tension, they were prepared to act on that heightened awareness (considering changes in mathematics activities so they might better reflect the lives of students, consulting with students as to what they thought was appropriate, and considering aspects of teaching that were otherwise hidden). As such, they were well on their way to a new *conocimiento* (a new relationship with students as related to their understanding of mathematics). Over this year-long process of engaging in the community of practice with Philip and his students, my pre-service teachers' *conocimiento* with others (as opposed to of others) allowed them to see both a "nos" and an "otras" in situations and to shift their position from one of "othering" to one of "solidarity."

Discussion / Conclusions

A focus on *conocimiento/Nepantla* is useful in mathematics education for many reasons. First, its "connection to people" allows a closer alignment with goals to incorporate a more humanistic/critical view of mathematics and the identity issues that are embedded. Such a focus also moves us away from the idea that a unity umbrella (e.g., "mathematics for all") is the key to preparing teachers for a diverse society. *Conocimiento*, as a part of a larger cycle, is never complete or "fixed." So, it allows us to name the process and fragility/frustration that many teacher candidates (and students) will go through as they attempt to better understand their own views and uses of mathematics and then try to relate those views and uses to others. While many researchers have commodified Anzaldúa's notion of "border theory," I return to her original emphasis on *Nepantla* in order to reclaim the indigenous perspective.

A *Nepantla/conocimiento* perspective also aligns with recruitment

strategies (e.g., getting more people of color into teaching), but not just because they may be able to connect with a diverse student population. Rather, because of their marginalized status in society, Lesbian/Gay/Bisexual/ Transgender/ Queer/ Questioning teachers, speakers of multiple languages, and teachers of color may be uniquely positioned to deal with greater levels of uncertainty that are found in teaching (Edwards, Gilroy, & Hartley, 2002) than their white peers.

Distinct from “cognitive dissonance” (where one chooses between two realities/perspectives to reduce the differences) and “care” (Noddings, 1992) where one is in a nurturing/superior role to others as opposed to being in solidarity with them, *conocimiento/Nepantla* moves beyond a disconnected/disembodied way of “knowing” and/or a missionary stance and offers a new perspective for mathematics teachers/scholars to consider.

Having a language to talk with developing practitioners is important as it offers perspectives on the often hidden aspects of everyday work. By having this language, it also has allowed me as a teacher educator to give a new set of lenses to teachers to help them see their worlds. Instead of giving them tools to use in their classrooms, giving them lenses helps them develop theories and learn to see how theory and practice are always intertwined.

Beyond its usefulness in mathematics teacher education and professional development, a view of knowledge that reflects *Nepantla/conocimiento* is also important to the field of mathematics education research. One of the strengths of focusing on tensions in teaching is that it better captures the negotiations that teachers undergo. In doing so, instead of locating practices within teachers alone, a focus on tensions has a greater likelihood of bringing in the identities of students, colleagues, administrators, and others.

Documenting the tensions that arise for teachers as they negotiate their practice with students, colleagues, parents, administrators, textbook publishers, and community members can help us better understand the complexity of teaching. In doing so, we may be able to challenge the current trend in educational policy of measuring teacher knowledge separate from the students teachers serve and of tying teacher quality to student achievement scores alone.

More than just documenting the kinds of tensions that arise in the

everyday work of teachers, researchers must also seek patterns in these tensions (probing for their nature with respect to such things as racism, sexism, classism, language politics). We also must look to better understand the relationship between these tensions and the identities of practitioners and learners (i.e. In what ways do the tensions that arise in teaching relate to the identities and ideologies of teachers and students?). In developing these patterns of tensions, it can help researchers develop a language that does not currently exist for talking about the complex nature of teachers' work when social transformation, not mere access to "rigorous mathematics" is the goal.

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Notes

¹ I use the @ sign to indicate both an “a” and “o” ending (Latina and Latino). The presence of both endings de-centers the patriarchal nature of the Spanish language, where it is customary for groups of males (Latinos) and females (Latinas) to be written in the form that denotes only males (Latinos). As opposed to the more commonly used Latina/o, I write the term Latin@ with the “a” and “o” intertwined as a sign of solidarity with individuals who identify as lesbian, gay, bisexual, transgender, questioning, and queer (LGBTQ).

² Noted exceptions include some of the recent work of Deborah Ball and colleagues, as well as Mason & Spence (1999) and Even & Tirosh (2002).

³ In Mexico, educación generally encompasses the moral, social, and intellectual development of a person. As such, saying that a person is “bien educado” (well educated) is more of an indication that the person is well raised/mannered than that the person is “book smart.”

⁴ Anzaldúa uses the feminized version (ending in “a” instead of “o”) in order to decenter the patriarchal nature of the Spanish language where groups of females and males are referred to in the masculine version.

⁵ Although Anzaldúa suggests that a focus on nosotras (without the slash) can be considered a stance that is refusing to know (the other), she also recognizes that in the future, when peoples are in greater solidarity, we may no longer need the slash. That is, she sees the potential for us to evolve to a more compassionate/connected human existence/consciousness such that the need to divide (to identify an us/them) will no longer be necessary. This would be an ideal state.

⁶ Desconocimiento translates to “ignorance” in English.

⁷ See for example, Martin (2006; 2007) for an explanation of the racialized experiences of mathematics learning that his African American community college students have undergone.

⁸ Murrieta, like all proper nouns in this manuscript, is a pseudonym to protect the identity of the practicing teacher, his students, and the school.

⁹ See Gutiérrez (2004) for a more extensive explanation of methods and analysis of this “community of practice” model of teacher education.

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