Enabling the Practice of Mathematics Teachers in Context: Toward a New Equity Research Agenda

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In this article, I address the need for a more clearly articulated research agenda around equity issues by proposing a working definition of equity and a focal point for research. More specifically, I assert that rather than pitting them against each other, we must coordinate (a) efforts to get marginalized students to master what currently counts as “dominant” mathematics with (b) efforts to develop a critical perspective among all students about knowledge and society in ways that ultimately facilitate (c) a positive relationship between mathematics, people, and equity on the planet. I make this argument partly by reviewing the literature on (school) contexts that engage marginalized students in mathematics. Then, I argue that the place that holds the most promise for addressing equity is a research agenda that emphasizes enabling the practice of teachers and that draws more heavily on design-based and action research, thereby redefining what the practice of mathematics means along the way. Specific research questions are offered.

We are at a critical juncture in the history of mathematics education research. On the one hand, there is great interest in addressing issues of educational equity through mathematics. On the other hand, many aspects of our current society challenge these efforts. For example, prevailing views about who is capable of learning mathematics, how educational research is conducted, and pressures to address equity in an increasingly technological society all present competing agendas. How researchers choose to address these interests and challenges will surely influence our ability to either move forward or continue to go in circles—circles of poorly

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theorized research, rash recommendations, and ill-invested expenditures. I sub-
stantiate this characterization of moving in circles later.

Granting institutions such as the National Science Foundation (NSF), Office of
Educational Research and Improvement (OERI), and others are calling for re-
search that will develop programs or curricula that will make a significant impact
on segments of the population that traditionally have been marginalized in mathe-
matics: most notably, women, students of color, and those living in poverty. For ex-
ample, in conjunction with the RAND Corporation, OERI has funded a national
study panel to explore the kinds of research programs that should be developed and
supported in mathematics education over the next decade. The emphasis of this
study panel is on instructional practices that improve the learning of mathematics
by all U.S. students, especially those who have not performed well in the past.
Similarly, in conjunction with the Center for Research on Education, Diversity,
and Excellence (CREDE) and the National Center for Improving Student Learning
and Achievement in Mathematics and Science (NCISLA), OERI has funded a
mathematics education study panel to look at the kinds of research that should be
supported as it directly relates to cultural and linguistic diversity. It is reasonable to
assume that such funding agencies are interested in guidance as to the kinds of pro-
grams of study that should be developed because they are interested in funding
such endeavors.

In the area of teacher education, many schools are devoting course work specifi-
cally to issues of diversity, social justice, and to a lesser extent, social transforma-
tion. For example, at the University of Illinois, programs of study and courses have
been redesigned to reflect a commitment to teaching a diverse student population.
Preservice teachers in these courses are being asked (through readings, assign-
ments, and partnerships with local communities) to develop a deeper understand-
ing of linguistic and cultural diversity and social justice as it relates to teaching.
Other universities have moved in this direction as well. In the area of higher educa-
tion, recent academic postings for positions in mathematics education show a com-
mitment to addressing a diverse student population. That is, almost all of the math-
ematics education positions that were listed for the 2001–2002 academic year in
the Chronicle of Higher Education requested the candidate have a research agenda
grounded in student diversity or equity, expertise or interest in teaching courses or
helping develop local teachers in ways that addressed cultural–linguistic diversity
or equity, or both.

Although we should celebrate these recent funding and educational initiatives, a
number of obstacles challenge these efforts. First, equity is threatened by the under-
lying belief that not all students can learn mathematics. That is, whereas other coun-
tries believe that differences in student achievement are due to effort (Stevenson &
Stigler, 1992), U.S. citizens tend to believe that mathematics achievement is more di-
rectly related to ability at birth. Therefore, the belief goes, no amount of effort will
compensate for those students who lack innate ability or talent. Such beliefs under-
mine efforts to develop support systems or improved teaching for students who historically have not performed well in mathematics.

Another obstacle for addressing equity issues is the underlying deficit theory that tends to be applied to students who have been marginalized in mathematics. Most researchers and educators have moved beyond thinking that it is mainly the fault of students themselves, their families, or their cultures as to why they do not perform well in mathematics. Yet, even proponents of equity issues tend to frame their arguments in ways that suggest that benefits move from mathematics to persons and not the other way around. The assumption is that certain people will gain from having mathematics in their lives, as opposed to the field of mathematics will gain from having these people in its field. In other words, most equity research currently assumes the deficit lies within the students who need mathematics as opposed to, or in addition to, lying within mathematics, which needs different people. Such programs seem to imply that the people being served by the programs need to improve but that the mathematics does not.

The argument for why a field might need different people is most aptly addressed by feminist theory in science. That is, when women entered the field of science (e.g., Diane Fossey studying the gorillas of Africa), new approaches to science were born (e.g., trying to “be” one of the gorillas as opposed to being a distant observer), ones that produced new theories and allowed for new discoveries. Similarly, we might think about the way in which a more diverse student population in mathematics might expand the kinds of theories, discoveries, and applications of mathematics than have been developed to date. Furthermore, most researchers and educators are so preoccupied with trying to get persons of color, women, and students in poverty to participate and achieve in mathematics that they fail to stop and ask how advanced levels of mathematics will contribute to students’ identities, interests, or pursuits of happiness. These distinctions may seem subtle, but they have great implications for why and how we attempt to address broader issues of equity.

Finally, and perhaps most importantly, we still operate under a very loosely structured and poorly articulated research agenda around issues of equity in mathematics education. Secada (1995) summarized the problem eloquently:

[The] urgency [involving issues of equity] is often translated into a rush for answers and solutions, not only among policymakers and the larger community of practitioners, but also among researchers and others who usually take the time to carefully define issues and concerns in all areas of scholarly inquiry. (p. 149)

Several issues get clumped together under the equity umbrella in ways that make it almost impossible to address them all or to have any single one develop in depth. For example, issues of cultural diversity and linguistic diversity play out differently than issues of gender or issues of class. All four of these issues may operate
together in ways that are different than an accumulation of the research findings on these four separate issues might suggest. In many research programs, equity becomes an afterthought or a backdrop but not a central tenet. Moreover, even when researchers are concerned centrally with equity, the ideas embraced tend to reflect local (e.g., countrywide), not global, issues. There is little written on mathematics education that addresses how mathematics might play a role in broader global politics or planet sustainability (noted exceptions are the works of U. D’Ambrosio and others in the ethnomathematics group).

In mathematics education, there seems to be some general agreement that we want greater equity. The leading document for our professional organization, *Principles and Standards for Teaching Mathematics* (National Council of Teachers of Mathematics [NCTM], 2000), highlights equity as one of the five key principles. However, because *equity* is a value-laden term and requires human judgment, we have had fewer examples of what equity might mean empirically. That is, how might we know it if we saw it? Although we are not likely to come to a clear consensus, very little is outlined in the *Principles and Standards* document to give teachers, administrators, or researchers an idea of what might count in terms of equity. Secada (1989) made a compelling argument that equity in mathematics education still is not well theorized. Yet, in our race for solutions, we seem to be willing to work with a poorly defined goal. Perhaps the lack of a clear definition is what contributes to a general consensus that equity is worth striving for (everyone having their own vision of what it means). However, having a poorly defined target means we are only sure we are moving toward it when, in fact, we are very far from reaching it.

In this article, I address the need for a more clearly articulated research agenda around issues of equity by proposing a working definition of equity and a focal point for research. More specifically, I assert that rather than pitting them against each other, we must coordinate (a) efforts to get marginalized students to master dominant mathematics with (b) efforts to develop a critical perspective among all students about knowledge and society in ways that ultimately address (c) a positive relationship between mathematics, people, and equity throughout areas of the globe. Then, I argue that a place that holds significant promise for addressing equity is a research agenda that emphasizes enabling the practice of teachers and that draws heavily on design-based and action research, thereby redefining what the practice of mathematics means along the way.

**SURVEYING THE THEORETICAL DEBATES**

Previously, U.S. debates about equity have revolved around the idea that, as a nation, we cannot simultaneously seek to achieve excellent work with our highest performing students and bring our lower performing students up to a higher level. The excellence versus equity debate implies that the two goals are inherently in
conflict, that the strategies that would be involved in bringing lower performing students up to a much higher standard (e.g., detracking, receiving higher quality teachers and resources) would be ones that would damage chances for higher performing students to excel. Although the excellence versus equity debate has not been completely resolved (and clear definitions of equity have not always been present), the position that both goals can be addressed simultaneously is gaining momentum (Lee, 2001; NCTM, 2000).

The debate over traditional versus reform mathematics also seems pertinent to issues of equity in mathematics education. That is, many of the reform documents and NSF-supported curricula seek not just to teach different mathematical content to students. Rather, they have been developed and supported so that a broader cross-section of society can engage in meaningful mathematics—analyzing data, problem solving, reasoning, making connections, and communicating their ideas in ways that go beyond school mathematics. Moreover, even the basic arithmetical facts are different when students are asked to use such facts to make important decisions about data or to analyze patterns. What it means to do mathematics is significantly changed in the process (Vithal & Skovsmose, 1997). Therefore, the distinction is not just one of basic skills versus concepts, as is often depicted by opponents of reform (Baroody, 2001).

The argument made by supporters of reform is that even the highest performing students today are not being treated equitably. In other words, they are receiving a form of mathematics education that is inferior to what they could be receiving under reform. Boaler’s (1997a, 1997b, 1997c) research with high-performing students suggests that students in traditional mathematics classrooms neither retain for very long the information they have learned nor can they explain in real-world or conceptual terms what they are doing in mathematics. In her 3-year study, she found that students who learned in reform-oriented classrooms did as well on tests of basic skills and better on tests of conceptual skills than their peers who learned in traditional mathematics classrooms. However, Lubienksi (2000) suggested that students in poverty may not benefit from the kind of open-ended, problem-solving-type settings that are considered part of reform. The question remains: How is reform-oriented mathematics related to issues of equity along a number of dimensions?

Opponents of reform tend to argue that reform curricula lack the formality and rigor of mathematics that is needed for students to continue on to more advanced levels of mathematics and mathematics-related careers. Yet, Boaler and Greeno (2000) argued convincingly that the traditional instruction that most students learn does not prepare even the most successful (highest performing) students for further study of mathematics. In fact, students in the highest tracks of mathematics seem to become alienated from the subject and have little desire to continue their mathematical careers (Boaler, 1997c). Even if students were prepared to further pursue mathematics, it is not clear that masses of students pursuing advanced degrees in mathematics should be our overriding goal with respect to equity.
The debates about whether we can have an excellent and equitable mathematics education and whether all students can benefit from reform-oriented curriculum–pedagogy are clearly important for the future of mathematics as a field, for the teaching of it in schools, and for understanding the kinds of student outcomes we might expect under different arrangements. Even so, I have seen very few reform materials that ask students to think critically about society or its major institutions. Instead, reform mathematics seems to reposition basic skills and concepts into new ways of doing mathematics that extend students’ conceptions of what mathematics is (Baroody, 2001; McDermott & Webber, 1998; Shoenfeld, 1998) and how it relates to the world around them. In redefining what the practice of mathematics is, then, reform mathematics has the potential to also broaden the base of students who can do mathematics and how (and why) they develop mathematical practices. I see these practices resembling those that are found in out-of-school learning (Addington & Lipka, 2000; Civil, 2000; Cobb & Hodge, 2002/this issue; Lave, 1988; Nasir, 2002/this issue; Nunes, Schliemann, & Carraher, 1993). This means that we may see more equity in the kinds of students who identify with the practice of mathematics or who participate in mathematics while in school.

However, in its current state, I do not see that reform mathematics necessarily positions students to consider issues of power in society, something that (for me) is at the core of equity. That is, students can learn to read the world using mathematics, but depending on the goals of instruction, the world they are encouraged to read may remain politically neutral. For example, students might be encouraged to see geometrical shapes and spatial relations in the buildings and artifacts that surround them in their city or town. Students may collect data and make inferences about how tall and large such buildings and artifacts are in relation to themselves, using concepts such as estimation, measurement, ratio, proportion, and volume. They may even redesign their own city or town to make better use of space or to attend to their own unique desires, all while deepening their understanding of the relations between shapes and numbers. So, mainstream students will have opportunities to develop mathematical skills by exploring their worlds, and this can be quite empowering. However, students may never be encouraged to question whose interests are served by the buildings and structures that surround them. By relating to the world around oneself (and possibly broadening the base of people who are engaged in mathematics), reform mathematics begins to bring us closer to addressing issues of equity than traditional mathematics, which has emphasized memorizing facts and basic skills. However, reform mathematics alone does not ensure that issues of power in society are addressed.

As such, I suggest that the new tension that lies before us and that threatens progress is not excellence versus equity or traditional versus reform but one of dominant versus critical mathematics education. What I mean by dominant mathematics is mathematics that reflects the status quo in society, that gets valued in high-stakes testing and credentialing, that privileges a static formalism in mathematics, and that
is involved in making sense of a world that favors the views and perspectives of a relatively elite group. The practice of mathematics that is currently used in schools throughout the globe tends to reflect a Western (colonial) frame of reference (D’Ambrosio, 1985; Gutiérrez, 2000c; Powell & Frankenstein, 1997; Secada, 1994; Vithal & Skovsmose, 1997). The practice of such mathematics in countries outside of the West and with indigenous peoples in the West represents a kind of recolonization. In other words, in looking to goals of equity, access to school mathematics (with its emphasis on the dominant perspective\(^1\)) is seen as separate from (and at times in conflict with) access to creating mathematics and using mathematics to critique the world around us (with an emphasis on nondominant perspectives).

What I mean by critical mathematics is mathematics that squarely acknowledges students are members of a society rife with issues of power and domination. It takes students’ cultural identities and builds mathematics around them in such ways that doing mathematics necessarily takes up social and political issues in society, especially highlighting the perspectives of marginalized groups. This is the mathematics that challenges static notions of formal mathematics, as embedded in a tradition that favors the West. For me, the distinction between dominant and critical is not one of acquisition and application but rather one of aligning with society (and its embedded power relationships) or challenging society and its power relationships.

In fact, it may be that the “excellence versus equity” and “reform versus traditional” debates are necessary but insufficient means for addressing equity in greater society. That is, although I recognize that there still exists great tension between reform and traditional mathematics (and that reform mathematics may come to address broader definitions of equity), for now, I would collapse the two under the same umbrella (dominant mathematics). I do this because I see the distinction between dominant and critical mathematics education as having more serious implications for broader definitions of equity that I propose later in this article. In other words, even if we were to solve the debates of reform versus traditional and excellence versus equity, I am not convinced that we would move any closer to the kind of equity I envision.

Although I highlight the tension between dominant and critical mathematics (seeing the two as sometimes in conflict), for me it remains an empirical question as to whether we can coordinate them in ways that address broader issues of

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\(^1\)“Dominant perspective” here refers to the fact that in the United States (and elsewhere), Whites, men, and middle-class or wealthy individuals are automatically in a position of power because the views and perspectives that are portrayed in society tend to be in line with their own beliefs and interests. These very beliefs and interests are so embedded in our society that most people are not consciously aware of them. See, for example, McIntosh’s (1989) article, Lipsitz’s (1998) book on Whiteness, or Ladson-Billings’s (1998) and Ladson-Billings and Tate’s (1995) articles on critical race theory. The dominant perspective also refers to the fact that the aforementioned beliefs and interests tend to be supported by formal institutions in society (e.g., law, education, marriage) to the exclusion of other beliefs and interests.
equity. In fact, I suggest that until we find out otherwise, we should act as if the two are not always in conflict, and we should strive to achieve both. Therefore, my definition of equity has two driving forces that reflect a common goal of broader equity around the globe. In fact, it may be that the two parts interact symbiotically. That is, the learning of dominant mathematics may serve as an entrance for students to critically analyze the world (using mathematics), and being able to critically analyze the world with mathematics may be an entrance for students to engage in dominant mathematics. It may be that as reform mathematics empowers marginalized students to freely reason about the world around them, it will come to be associated less with dominant mathematics and more with critical mathematics in its aims. In this sense, reform mathematics may serve as a necessary catalyst for the ability to address broader equity goals.

TOWARD A DEFINITION OF EQUITY

How we define equity has serious implications for how we seek to achieve it or measure it. Equity has meant many things to many people over the years. Debates in the 1980s led researchers to emphasize concepts like educational access (e.g., equal resources, quality teachers, opportunity to learn) and to pay slightly less attention to student outcomes. Today, more researchers are focusing on students’ mathematical literacy (e.g., the ability to apply knowledge in new domains, the ability to make sense of data).

Although, equity means “justice” or “fairness,” it is often blurred with equality, which means sameness. For example, equality in a mathematics education setting might mean that all students are given the same access to meaningful mathematics, the same quality of teachers, the same curricular materials, the same forms of teaching, and the same supports for learning. This sounds good, if learning is universal and occurs in a vacuum. However, to redress past injustices and account for different home resources, student identities, social biases, and other contextual factors, students, in fact, need different (not same) resources and treatment to reach fairness. Beyond holding school approaches the same, equality might also mean that student outcomes (e.g., mathematical literacy) are the same, that students all end up in the same place. Yet, it is not clear that having all students reach the same goals represents justice for students’ own desires or identities. So, this distinction between equality and equity is an important one to keep in mind.

I recognize heterogeneity within and between groups of students. For example, two Latina students cannot be expected to be any more alike (in previous achievement, lived histories, natural talents, or personal interests) than any two White students (Nieto, 1996; Oboler, 1995). Therefore, the definition of equity that I pro-
pose assumes neither equal approaches (e.g., same treatment of students, same resources) nor equal outcomes (e.g., same achievement). Instead, I believe both approaches and outcomes should be equitable, not equal. My argument rests on the assumption that there exists natural variance between people in terms of goals, strengths, and interests. Therefore, if we operate under a “just” system, we could expect to see students achieve in school and aspire to do a variety of things. That is, we would not necessarily expect all Latinas and Latinos to perform poorly or exceptionally in school mathematics. There would be natural variation among any given group—girls, boys, those in poverty, the middle class, the rich, First Nations, Whites, Blacks, Chinese, and so on.

I emphasize the goal of being unable to predict student patterns (e.g., achievement, participation, the ability to critically analyze data or society) based solely on characteristics such as race, class, ethnicity, sex, beliefs and creeds, and proficiency in the dominant language. Being unable to predict mathematics patterns based solely on certain student characteristics addresses issues of power. Rather than expecting that mathematics reform will lead to middle-class White men falling out of power only to be replaced by another group (e.g., students in poverty, Black women), an equitable situation is when no group oppresses another (Freire, 1970, 1998; Macedo, 2000).

For me, equity is not just an abstract goal, it is a process (Rodriguez, 1998). To make headway in that process, we must be willing to develop working definitions of the concept, assuming we will refine and redefine them at a later point. I see equity in mathematics education as having three main parts; each of the parts has levels and time frames of their own. There are stages at which we might expect to see certain trends before others. Studying the trends systematically (via an indicator system) would be an important contribution to research. In this article, I describe the different parts and stages of equity, highlighting examples from recent empirical research. I borrow from D’Ambrosio’s (1999) “trivium for a new millenium” (numeracy, matheracy, and technoracy) in developing a working definition of equity.

Erasure of the Ability to Predict Students’ Mathematics Achievement and Participation Based Solely on Characteristics Such as Race, Class, Ethnicity, Sex, Beliefs and Creeds, and Proficiency in the Dominant Language

I call for an inability to predict student outcomes based solely on student characteristics. One might question, in what way would establishing the grounds for such an “inability to predict” lead to encouraging assimilation? In other words, does looking

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3Although the dominant language in the United States is English, I use the term dominant language to highlight the fact that there are other countries where English is not the dominant language. For example, in Mexico, Spanish is the dominant (colonizing) language, whereas there are several indigenous languages (e.g., Otomí) that are used by people in Mexico with less power in society. Moreover, at some later point in time, English may not be the dominant language of the United States.
for a lack of significant variation between groups encourage students to all become the same? Allow me to clarify. I suggest that only when there is sufficient variation within groups and no major clusterings that are associated with power or status in society between groups can we suggest that one level of equity is being addressed. I am less concerned with clusterings if they are not also related to power. So, it may be that students from a particular group show patterns of achievement or participation that cluster them together but that these patterns do not also convey them particular status (high or low) in society. In other words, I do not mean that everyone will end up in the same place (equality of outcomes), nor am I not looking to erase cultural markers in the process of erasing power relationships.

In principle, I am adamantly against viewing students as mere embodiments of cultural markers. My life as a Chicana in a society that does not value brown-skinned people or speakers of Spanish places me in the position of constantly being reduced to a category. However, I do believe there is a time and place for strategic essentialism. Strategic essentialism is the process of deliberately categorizing people based on socially defined traits for the purpose of reaching higher (equity) goals. That is, I use characteristics such as race, class, ethnicity, sex, beliefs and creeds, and language because these characteristics are the very markers used in society to determine power. Granted, categories such as race are not biological; they are socially constructed (Haney López, 1996; Menchaca, 2001; Omi & Winant, 1994). However, to ignore these characteristics would assume power relationships do not exist in society. If at some point, we, as marginalized people, are not willing to use these very markers to assess progress, inequity will always be reduced to a degree of relativism.

What I mean by achievement is mainly scores on standardized mathematics exams. However, achievement could also include course grades and scores on nonstandardized exams, especially ones that measure students’ conceptual understanding and their ability to apply mathematics. Similarly, participation refers to course-taking patterns (especially advanced mathematics courses), mathematics-based college majors, and mathematics-based careers, but it could also refer to individual students’ participation in class discussions or activities. I liken this part of equity to D’Ambrosio’s (1999) definition of numeracy, which includes the ability to understand graphs, tables, the condensed language of codes, and other ways of informing the individual. Basically, numeracy is the ability to read data and communicate it. Beyond a basic level of literacy, I also include aspects of D’Ambrosio’s matheracy in this outcome measure. Specifically, we could measure success also by how well students can draw conclusions from data and from their own calculations, make inferences, and propose hypotheses. According to D’Ambrosio, matheracy is the first step toward an intellectual and critical posture by the student.

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4I borrow and adapt this term from my colleague Mary “Fong” Hermes at the University of Minnesota, Duluth.
Another strong measure of achievement might be the five interwoven strands of proficiency that were developed by the Mathematics Learning Study Committee (National Research Council, 2001). The Committee suggested that students are proficient in mathematics when they have the following:

1. **Conceptual understanding**: comprehension of mathematical concepts, operations, and relations.
2. **Procedural fluency**: skill in carrying out procedures flexibly, accurately, efficiently, and appropriately.
3. **Strategic competence**: the ability to formulate, represent, and solve mathematical problems.
4. **Adaptive reasoning**: ability for logical thought, reflection, explanation, and justification.
5. **Productive disposition**: habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy.

We might label D’Ambrosio’s (1999) numeracy and matheracy and the Mathematics Learning Study Committee’s five strands of proficiency as the mastery of dominant mathematics in that it tends to reflect critical thinking within the confines of the given mathematics in society, not on broader issues that I attend to later in the article.

For me, equity in mathematics education can be measured at a number of different levels (e.g., classroom, teacher, school, district, state, nation, areas of the globe) and at a number of different time frames (e.g., 4th grade, 8th grade, 12th grade, college, graduate school, mathematics-based positions in society). Let me explain what I mean by different levels and different time frames. At the classroom level, evidence of equity might be that a given teacher could look at her class and be confident that an observer could not predict, solely on student characteristics, who would command center stage (e.g., time at the board, called on for answers, relied on for leadership or authority in the class). That is, the historical pattern in the United States is for White, middle-class boys and men to tend to dominate both participation and achievement in mathematics (Secada, 1992; Tate, 1997). However, because the goal is to eradicate hegemony, I am not advocating for a reverse pattern in a given teacher’s classroom (that instead, students of color, girls, and English-language learners would dominate classroom discussion).

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*I use the term *dominant mathematics* to suggest that the knowledge base currently used in schools throughout the world reflects a Western (colonial) frame of reference (D’Ambrosio, 1985, 1990; Gutiérrez, 2000b; Powell & Frankensteine, 1997; Secada, 1994). The use of such mathematics knowledge in countries outside of the West and with indigenous peoples in the West represents a kind of recolonization.*
To address justice, a clear pattern of hegemony would not be highly observable over a period of time. Of course, what that period of time ought to be is not clear. Teachers would have to use their own judgment, but a time frame of any given 3 to 4 years seems reasonable. Clearly, some students are more outspoken, and in some years, a particular group of students may become empowered as they move through the school system. However, it would be expected that teachers would find ways to decenter any one student or group of students who share particular characteristics over the course of her teaching. That same teacher should be able to look at her class and not see predictable patterns of achievement (e.g., on standardized tests, weekly exams, or mastery of mathematical discourse) throughout a given year or across years. Again, these are goals and would not necessarily be expected right away.

Another example is at the school level. Here, a principal should be able to look at their school and get a sense of whether students are disproportionately from a particular background in particular courses (an overrepresentation of African American, Latina/Latino, First Nations, or recent immigrants in courses like prealgebra, extended algebra, algebra) or if there is an underrepresentation of the same students in courses such as trigonometry, statistics, precalculus, and calculus. Of course, equitable outcomes at a given school site would not necessarily be assessed on a yearly basis, but again, a 3- to 4-year time frame seems reasonable for the assessment of patterns. Because of the history of the underrepresentation of certain groups in advanced mathematics, at first, it might be necessary to see an overrepresentation of those groups (African Americans, Latinas/Latinos, First Nations, students in poverty, girls) for equity to be addressed (Secada, 1991). I provide these aforementioned examples not as an exhaustive list of what teachers or principals can or should look for but rather as a means to envision what could count as equitable. As I mentioned earlier, a national indicator system (to assess both current status of achievement or participation and to document progress) would be necessary.

**Related research.** We are beginning to develop a solid base of mathematics education research that focuses on the aforementioned aspect of equity (student outcomes in dominant mathematics) in real settings. Although much has been written about school leadership, curricula, and detracking, I highlight only research that focuses on the teacher and practice, as I believe such a focus more accurately attends to the complex and situated nature of teaching and learning, something I return to later in the article. Research on the Quantitative Understanding: Amplifying Student Achievement (QUASAR) project has documented teachers who engage marginalized students in mathematical sense making and whose students score well on both basic skills tests and tests of conceptual understanding and mathematical interrelations (Doty, Mercer, & Henningsen, 1999; Silver, Smith, & Nelson, 1995; Silver & Stein, 1996). Similarly, Boaler
(1997a, 1997b) documented high school teachers in the United Kingdom who engage working-class students in problem solving and reasoning and whose students performed as well or better than their middle-class peers on traditional tests and significantly better on tests of conceptual knowledge and application (Boaler, 1997b; Boaler & Greeno, 2000). Anderson (1990) self-reported his success in teaching college-level mathematics to African American students, who in turn, participated in advanced levels of mathematics and pursued mathematics-related careers. Research on the Jaime Escalante Program (Escalante & Dirmann, 1990) witnessed Latina and Latino students who lived in poverty in Los Angeles actively participating in calculus and consistently scoring well on the Advanced Placement exam. I have studied teachers in high school mathematics departments across the United States who maximize the number of marginalized students who both take advanced course work in mathematics and score well on standardized achievement tests (Gutiérrez, 1996, 2000a). Although standardized achievement scores are not included for comparison, researchers have also documented settings in which African American, Latina/Latino, and bilingual students participate actively in mathematical discussions and meaning making (Fuson, Smith, & Lo Cicero, 1997; Gutiérrez, in press; Khisty, 1995; Khisty & Vieglo, 1999; Ladson-Billings, 1995; Moschkovich, 1999, 2000; Moyo & Jamar, 2000; Tate, 1995). This research has shown that students of all backgrounds can flourish in classrooms where, among other things, teachers have solid mathematical knowledge, teachers believe in their students, students are adequately supported to understand rigorous mathematics, real-world contexts are provided for their learning, and (on many occasions) students are encouraged to work in noncompetitive ways with their peers.

I consider this first area of equity to deal with dominant school mathematics, the mathematics that is overwhelmingly validated by society. I remind the reader that when I refer to dominant mathematics, I mean both reform mathematics (including problem solving, reasoning, analyzing data, and real-world problems situated from the dominant perspective) and traditional mathematics. Although students who have mastered traditional mathematics are not always able to use it in their everyday life (Boaler, 1997c), this is the mathematics of the college preparatory system that allows for certain paths in life. In other words, this outcome addresses equity in the kind of cultural capital that is needed for marginalized students to be able to fully participate economically in society.

However, the mere attainment of cultural capital for participation in an unjust society does not address fairness. Can we call it equity if students are expected to give up their cultural identities to participate in society? Kris Gutiérrez captured

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6However, increased participation or achievement alone does not guarantee full citizenship or even employment in society. McCarthy (1993) reminded us that increased levels of education do not necessarily translate into increased job prospects for students of color.
the dilemma aptly in the conference on Equity in Mathematics Education that was the impetus for this volume, when she said, “Do I get to become a better me, or do I have to become you?” Mathematics education can also prepare (marginalized and dominant) students to analyze data from the world around them and to develop a critical eye on knowledge and stance toward justice. As such, I describe a second aspect of equity that I see as necessary to achieve. This aspect of equity has a critical focus and suggests that marginalized students will also have opportunities to see relations between mathematics and their personal worlds and that both dominant and marginalized students will have opportunities to use mathematics to critique the world.

Erasure of the Ability to Predict Among Students
the Practice of Mathematics to Analyze, Reason About, and Especially Critique Knowledge and Events in the World Based Solely on Characteristics Such as Race, Class, Ethnicity, Sex, Beliefs and Creeds, and Proficiency in the Dominant Language

This aspect of equity borrows from D’Ambrosio’s (1999) definition of mathery (“concerned with more than utilitarianism,” “emphasis on critical focus,” “deals with the ability to be analytical”). It also reflects Powell and Frankenstein’s (1997) vision of a liberatory mathematics. The emphasis of this part of equity is that students would be able to participate democratically in society, not just economically, and contribute to the field of mathematics. It attends to the fact that not all persons have desires to attend college or to take future course work in mathematics; yet, everyone has a right to an education that is relevant and useful in life—one that supports their pursuits of happiness.

This aspect of the definition includes ethnomathematics, the diversity of mathematical knowledge that is created, transmitted, diffused, and institutionalized within different cultures, especially outside of formal education, and that challenges the notion that mathematics was discovered by Europeans. Unlike what is often highlighted in ethnomathematical work, this is not just the mathematics of other, often third-world cultures that relies on Western mathematics as a basis for rationality. I also include in this part of the definition the mathematics that comes out of the practice of peoples, regardless of its relation to what is normally considered formal mathematics. If the work of Restivo (1994) and other sociologists of mathematics (e.g., Brown, 1994) is followed, mathematical ideas become communicable concepts only when they can be shared. Therefore, the current base of

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7I chose these categories based on the current situation but leave open the possibility that other (socially constructed) categories will become necessary in the future.
mathematics will continue to be limited as long as mathematics is defined solely by the practice of an elite few.

Evidence of this aspect of equity being achieved is more difficult to measure, partly because the ability to be critical of data or mathematics in society has not been the focus of mathematics assessment materials. What might we expect to see if students are able to question mathematics and practice mathematics as a critique of society? Evidence of equity might be students’ ability to analyze relationships between people of different positions in society and mathematics and, perhaps more importantly, to recognize justice and injustice through the exploration of data (e.g., distributions of wealth). Although the last section on equity dealt primarily with the achievement gap (between middle-class Whites and marginalized students) and conceptual understanding for all students, this section centers more on whose mathematics gets created, whose mathematics is valued (Stevens, 2000), and how mathematics is represented and consumed—the sociology of mathematics (e.g., Apple, 1995; Bloor, 1994; Restivo, 1994). It also includes naming the world with mathematics where all groups are respected (e.g., Anderson, 1990; Burton, 1994; D’Ambrosio, 1985, 1990, 1997, 1999; Dowling, 1998; Gerdes, 1994, 1997; Mahalingam, 2000; Powell & Frankenstein, 1997; Volmink, 1994; Zaslavsky, 1979, 1994, 1996).

Exploring the social context, Ernest (1994, pp. 205–206) raised questions about the values that are inherent in mathematics. I have borrowed from some of his questions and raised them as goals here. As such, additional evidence that students are doing mathematics from a critical perspective might be that they can recognize the relation between mathematics and power. Alternatively, they might be able to see how mathematics has reoriented the modern world view so that quality is seen in terms of quantity. At some level, students should be able to recognize both the origins of mathematical knowledge and how the Western tradition became the dominant one. Do students see whose interests mathematics serves and its implications for humankind? Do they recognize that mathematical knowledge, as an outgrowth of human interaction, always brings with it values?

At the teacher level, teachers might begin to witness marginalized students seeing a connection between mathematics and their lives. Students may bring up examples or raise questions about events or information from their personal worlds that they want to explore through mathematics. Students of all backgrounds may be able to develop mathematical practices that help them analyze data embedded in controversial issues in society. When given topic choices of their own, students of all backgrounds may choose issues that relate to broader equity in society (e.g., housing patterns, school funding, chemical dumping) and make connections that indicate that they are seeing how mathematics plays out in their lives or the lives of others. Students should also be able to investigate and question the knowledge base of mathematics. That is, they may come up with conjectures or see connections that are not part of the canon of mathematics today. Beginning with entirely differ-
ent goals, they may start to ask questions that require the development of mathematics in unique ways (similar to the work of female scientists who changed the nature of science). Moreover, they should be able to recognize that mathematics can be a “persuasive influence in decisions that may affect them either positively or negatively” (Wagner, Roy, Ecatoiu, & Rousseau, 2000, p. 108).

**Related research.** A number of researchers have discussed the theoretical aspects of a critical mathematics pedagogy or curriculum (e.g., Apple, 1995; D’Ambrosio, 1990, 1999; Dowling, 1998; Skovsmose, 1994). Again, I focus on empirical studies that emphasize the practice of teaching. First, I briefly review research on teaching whose primary purpose has been to get students to practice mathematics in ways that highlights real-world contexts of nondominant peoples or to get students to develop a critical stance on society. Much of this research has been labeled *culturally relevant teaching* or *critical mathematics pedagogy*. Later, I highlight empirical studies that focus on mathematics teachers with critical stances on their own practice, but where students themselves are not necessarily using mathematics to critique the world around them.

Ladson-Billings (1994, 1995) first coined the phrase “culturally relevant teaching” and has focused on teachers well regarded by the African American community for their ability to get students to learn dominant or school mathematics in ways that connect to students’ culture and help them fight oppression. Similarly, Tate (1995) highlighted the efforts of teachers who embedded mathematics in the personal and cultural worlds of their African American students (e.g., figuring out the most economical bus pass to purchase from a nondominant perspective). Research on the Algebra Project has documented African American students in poverty using mathematics to make sense of their world (e.g., modeling a trip on the subway with mathematics) and coming to understand the historical contributions of nondominant peoples in mathematics (Moses & Cobb, 2000; Moses, Kamii, Swap, & Howard, 1989; Moyo & Jamar, 2000; Silva & Moses, 1990).

Frankenstein (1990, 1995) developed the concept of a critical mathematics pedagogy. In her work, she self-reported her efforts to teach low-income college students to use mathematics to critique society (e.g., discrimination in costs of electrical power, home mortgage distribution, the tax system). Her work has focused on how mathematics is sometimes used to obscure economic, political, and social issues. Gutstein (1999, 2000, in press) also self-reported his efforts to engage his Latina/Latino middle school students in mathematical practices that expose them to injustice in society (e.g., inequitable distribution of wealth in society, inequitable representation of countries in world maps). Although the development of mathematical understanding through a critique of society does not seem to be a major focus of the QUASAR Project, some teachers in this project were reported engaging urban students of color living in poverty with culturally relevant and historical aspects of mathematics (e.g., Benjamin Bannaker and the mathematics that was associated
with him, Mayan mathematics; Silver et al., 1995). To date, there has been no consistent documentation of student outcomes of the Algebra Project, which centers on students’ lives and social critique. Martin (2000) reported on one high school in the California Bay Area where teachers who were trained in the Algebra Project were not able to get students to buy into a nontraditional curriculum. In this setting, “students assigned little importance or instrumental value to mathematics learning” (p. 116).

With the exception of the QUASAR Project and the work of Gutstein (in press),\(^8\) many of the studies reported thus far addressed either (a) the mastery of dominant mathematics (mostly reform) or (b) critical mathematics thinking and a social justice stance (from a nondominant perspective). For example, teachers in the effective settings of Gutiérrez’s (1996, 2000a) national study showed success in getting students to take advanced course work, score well on standardized achievement tests, and pursue college, but the teachers did not show a clear commitment to getting students to think critically about the (unjust) world around them. As such, their students may be credentialed by society and perhaps benefit from a higher social status or broader options of future study. However, these same students may not have developed mathematical practices that position them to be leaders in addressing equity in society. The fact that, to date, most empirical studies address equity as outlined in either Part 1 (reform–traditional mathematics) or Part 2 (critical thinking or critique of society) but not both raises serious questions about what levels of equity we can achieve with the current research base.

Some studies seem to overlap with the equity categories mentioned. That is, they address aspects of both dominant and critical understanding but neither fully completely.\(^9\) These studies seem to indicate there is great subtlety and complexity in the relation between empowering students in traditional–reform mathematics, getting students to take a critical stance on (mathematics) knowledge and society, and empowering marginalized students to become leaders in society. That is, the teachers have a critical stance in their philosophies and aims and often use NSF-supported reform curricula, but their teaching practices more subtly connect to empowering students for leadership roles, knowledge critique, and/or changing society.

For example, a larger study conducted by Gutstein, Lipman, Hernandez, and de los Reyes (1997) documented the work of eight teachers in an elementary–middle

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\(^8\)Even researchers studying the QUASAR Project have suggested that the examples of teacher practice that they have included are not consistent across settings nor is there complete success with the practices described (Silver et al., 1995).

\(^9\)I recognize that this dominant–critical dichotomy currently is influenced by the fact that the way in which we assess students tends to reduce mathematics to basic skills absent from social contexts. If reform practices take stronger hold over the next couple of decades, it may be the case that students are assessed on critical thinking and their ability to read the world mathematically. This trend could reposition dominant mathematics more closely with critical mathematics.
school in the Midwest where Mexican American students were actively engaged in communities of inquiry in mathematics using the Mathematics in Context curriculum. Although teachers were not observed actively with cultural artifacts or by having students embed mathematical practices as they questioned society around them, the goals and dispositions of the teachers were strongly situated in a social activist stance, a philosophy that guided their work. In a study of an effective high school mathematics department in Chicago (Gutiérrez, 1999b, 2000b), I noted that teachers tended to address social criticism in the manner in which they engaged students in calculus in the classroom but also outside of the classroom or in their relationships with students (e.g., getting students to see the injustice in schools that are poorly funded or in administrations that focus on discipline instead of learning, getting students to organize around issues that are important to them and their communities). In these cases, the mathematics they taught was still reform oriented (from a dominant perspective) and in line with college preparation. Many of the research projects that begin as university–school partnerships and aim to support teachers in their ongoing efforts to support marginalized students in mathematics report the challenge for teachers in striving for these two goals, especially as the mathematics gets more advanced (Frankenstein, 1995; Silver et al., 1995). That is, it is not a simple task for teachers to begin with students’ cultural identities or out-of-school interests and find ways to support the emergence of mathematical ways of knowing calculus concepts.

A noted exception is Gutstein’s (in press) work with Latina/Latino seventh- and eighth-grade honors-track students. He reports using Mathematics in Context (an NSF-supported curricula) for close to 80% of class time, supplementing it with units on social justice (e.g., economic and racial discrimination, inequality, immigrant status, gentrification) that more closely attend to the issues his students and their families face. Gutstein’s students show some measures of success on both dominant and critical mathematics. That is, students reported that they learned historical processes and contributions of various social movements while in his mathematics class. Moreover, students in his class passed their eighth-grade standardized tests for entrance into ninth grade, gained 1 month on their standardized test scores for every month during the 2 years they were his students, and 15 of the 18 students who took exams for magnet schools passed them. It is worth noting that Gutstein worked with honors-track students and spent the majority of his time using an NSF-supported curriculum that addressed “dominant” mathematics. Some might argue that these conditions could account for the students’ standardized test scores. However, the students seem to identify issues of injustice while in his classes, something that rarely occurs in a mathematics learning environment. More research like the work Gutstein is conducting is sorely needed.

Some researchers have begun to write specifically about the challenges of teaching in a way that attends to the critical and the dominant. For these researchers, the core dilemma for teachers who value the two goals equally is deciding
which goal (when they are in conflict) takes precedence at any given time in the classroom. For example, studying six teachers in urban, secondary school settings in South Africa, Adler (1997, 1998) defined three types of dilemmas for teachers: (a) to switch or not to switch languages, (b) to listen and validate or to work on and formalize pupils’ mathematical expression, and (c) to talk or not to talk. For example, teachers found themselves unsure when to use English (the dominant or colonial language, in which many of the students were not fluent, or one of a number of indigenous languages that was familiar to only a few students at a time). She noted that these tensions reflect the nature of complexity not only in teaching mathematics in general but also in teaching at this particular point in our mathematics education history.10

Similarly, Reese (1998) explored his own attempts to teach mathematics to Native American11 students at a boarding school in a manner that was “liberatory.” He, too, highlighted the tensions he experienced as he tried to help students find personal meaning (e.g., an emphasis on the spiritual life of Pueblo Indians) while also maintaining access to the mathematical concepts on which they would later be tested (in this case, the quadratic equation). He suggested that he was more successful with lower level mathematics classes and that part of the challenge he experienced in attempting such a practice was the content of advanced (school) mathematics courses.

Price and Ball (1998) also self-reported the tensions around equity that they found in teaching mathematics to third-grade students and mathematics education to preservice teachers. Ball grappled with knowing when it was appropriate to correct students who were violating rules of the canonized mathematics curriculum and when to allow students to create new meaning or own the mathematics in other ways. Price reported that when his teacher education students viewed Ball’s practice through video, they were not sure whether exposing students to nondominant modes of thought about mathematics could further disadvantage students of color. Moreover, they wondered whether having marginalized students dominate the classroom discussion was any more equitable than a teacher (or other person normally in a position of power) dominating classroom discussion.

In all of these dilemmas, teachers faced the problem of how to begin with student voice, cultural ties, and personal development and connect them to emerging understandings of canonized mathematics. In focusing on these dilemmas, the researchers also displayed the role of power relationships between students and teachers. That is, how do teachers help develop communities of learning that simultaneously attend to students’ needs to have access to the dominant discourse of schooling (Delpit, 1988) and that disrupt existing power relationships in society?

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10See also Atweh, Bleicher, and Cooper (1998) for a discussion of sociolinguistic issues in the classroom.
11His term.
The research reviewed seems to indicate that it takes much more than merely understanding the lived histories of students, having mathematical content that is challenging and relevant, having a political stance toward teaching, and putting these things together to enact practice that leads to equity (measured modestly). Because many of the studies highlighted here involved veteran teachers who held a strong commitment to social justice and yet were still struggling with how to practice their beliefs, we are far from understanding what it might take for teachers to do this on a more consistent basis. Moreover, we are even further from understanding what it might take novice (or preservice) teachers to enact such practice. This focus on teaching dilemmas seems to point to an area worth further investigating, something I return to later in the article.

I have described two portions to a definition of equity that relate to somewhat short-term goals (perhaps 30–50 years from today): increased achievement and participation and the development of a critical perspective on knowledge and the world. However, just because students show the ability to participate and achieve in mathematics and to develop mathematical practices in school that allow them to analyze and critique aspects of society does not necessarily mean they will resist normative patterns or make significant changes in the relationship between people, mathematics, and the planet. Ultimately, we must be concerned with these outcomes.

In considering how power in society is organized, maintained, and transformed, Therborn (1980) suggested that for participants to become committed to changing something, they must first understand (a) what exists (e.g., what the world is), (b) what is good (e.g., what is right or just), and (c) what is possible (p. 19). Although most calls for equity concern themselves only with what exists or what is good, it is conceivable that without a clear understanding of what is possible, members of an exploited group could be highly aware of injustices to their group without holding concrete possibilities for ending exploitation. Equity cannot be just about naming the world where all groups are respected. It must eventually redress social injustices (Freire, 1970, 1998). McLaren (1999) criticized school reforms that stop at the development of a critical stance by educators or students:

Any attempt at school reform that claims to be inspired by Freire—but that is only concerned with social patterns of representation, interpretation, or communication, and that does not connect these patterns to redistributive measures and structures that reinforce such patterns, exempts itself from the most important insights of Freire’s work. Freire’s approach stipulates a trenchant understanding of patterns of distribution and redistribution in order to transform—and not just interpret—the underlying economic structures that produce relations of exploitation. (p. 51)

Taking to heart McLaren’s critique of school reform efforts that stop short of any real change, I include a third aspect of equity that looks more broadly at relationships in the world.
Erasure of Inequities Between People, Mathematics, 
and the Planet

This aspect of the definition of equity addresses the fact that having equal access to cultural capital and critical stances to society are necessary but insufficient conditions for change. That is, just because students can solve problems, reason about their surroundings, and identify inequities through mathematics does not ensure that they will choose to (or will be able to) act on their critical stances.

I recognize that this aspect of equity will likely be the most difficult for educational researchers to comprehend or believe. In fact, I acknowledge a complete erasure of inequities between people, mathematics, and the planet is not likely to happen in my lifetime. However, if we do not have long-term goals in mathematics education reform, we risk the possibility of creating a ceiling on equity. Building on the Universal Declaration of Human Rights, D’Ambrosio (1999) suggested that mathematics can play an important role in ensuring that all peoples are accorded freedom to develop themselves as they wish and to enjoy justice in broader society:

It is an undeniable right of every human being to have access to all the natural and cultural goods needed for her or his material survival and intellectual enhancement. … I see mathematics playing an important role in achieving the high humanitarian ideals of a new civilization with equity, justice, and dignity for the entire human species without distinction of race, gender, beliefs and creeds, nationalities, and cultures. (pp. 142–143)

D’Ambrosio suggested that one path to such “equity, justice, and dignity for the entire human species” is to replace our current commitment to “Reading, ’Riting, and ’Rithmetic” with a new trivium that focuses on numeracy, matheracy, and technoracy. D’Ambrosio’s concern seems to be eliminating arithmetic (as if it is the only goal in mathematics) and in not separating mathematics from reading and writing.

Beyond evidence that there is more equitable distribution between the participation, achievement, and critical thinking skills of students, we must look for changes in broader society. Evidence that equity is being addressed in this area might include some of the following: (a) There is shared distribution of wealth throughout areas of the globe, (b) mathematics is not being applied in ways that destroy the planet, (c) mathematics is not aiding in the oppression of other countries, (d) there is a raised awareness of ethnomathematics and the multicultural origins of mathematics without condemning any group of learners as “others” or “primitives,” (e) there is a growing positive relation between mathematics and the reduction of dominance, and (f) forms of egalitarian and liberatory mathematics are increasingly developed.

A number of questions arise. Who would monitor what gets counted as mathematics (McDermott & Webber, 1998)? Would we require mathematicians to moni-
tor the application of mathematics? Would we expect to see the training of applied mathematicians in the ethical uses of mathematics? Would we expect that doctoral programs would include this kind of sensitivity development in coursework and research appointments and fellowships? Would mathematicians strive for awards that showed mathematics was aiding in peace? Would an environmentally friendly movement develop that mathematicians embraced? 

**Related research.** On theoretical grounds, researchers have grappled with the relation between mathematics and equity throughout areas of the globe (e.g., D’Ambrosio, 1999; Skovsmose, 1994; the Ethnomathematics Group of the International Psychology of Mathematics Education Conference). However, I know of no empirical research that has attempted to address this part of the equity definition I propose. Of the aforementioned researchers who documented teachers using critical mathematics, only two (Frankenstein and Gutstein) attempted to measure the outcomes of such practice. Although Gutstein’s teaching shows promise in addressing the first two aspects of the equity definition I propose, Frankenstein met with somewhat mixed results. Frankenstein’s (1995) college students showed raised consciousness about discrimination and oppression through doing mathematics; however, it was not clear they planned to act on what they learned. At the end of one essay, Frankenstein recounted a student who became particularly aware of injustices while in her class but then wrote to her in a note after the course ended, “If you can’t beat these Capitalist pigs, join them!” (p. 186).

Again, it may be that the first two aspects of the definition I have outlined must be addressed simultaneously before we begin to see change in this third part. However, I do not mean to imply that we must wait for system-wide change or a revolution to occur before we can expect change in this third aspect of the definition. Change is always occurring around us. However, because it is local and incremental, change will take a lifetime before it becomes apparent enough for us to notice. Moreover, having a vision of what is possible is important for guiding future research and keeping us from regressing toward the status quo.

We might imagine two concurrent thrusts—1 and 2—driving 3:

1. Achievement and participation.
2. The ability to question society through mathematical practices.
3. Positive relationship between mathematics, people, and the planet in ways that erase inequities.

The important thing to consider in this admittedly simplistic model is that either 1 or 2 alone are not likely to make any significant changes to injustices in the world. Students need to be able to do both, to be able to play the game of

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12I liken this movement to that which has occurred in the investment world (to a modest extent) where “green funds” are now seen as desirable.
mathematics that is currently associated with power and intellectual potential and to be able to change the game of mathematics to serve a better society. Obviously, I am not the first to consider these dual goals. As aforementioned, a few research projects have begun to grapple with what it might mean to attempt both goals. However, I suggest a model with dual thrusts to keep us from pitting one goal against the other.

Given the working definition of equity that I propose and assuming we want to work toward that goal, where might our research efforts lie? I suggest in this section of the article that understanding and enabling the practice of teachers in context is critical to any attempts to reach student patterns of participation, achievement, critical analysis, and social transformation.

TEACHER PRACTICE: OUR KEY TO EQUITY?

Why might we want to focus our attention squarely on teacher practice instead of, for example, students and families, curricula, districts and schools, or more general education policies? First, we seem to have moved beyond many (although not all) of the deficit theories that were prevalent in the past 3 decades and that suggested students or their local or home communities are to blame for low performance on achievement tests or the lack of critical thinking among most U.S. students in mathematics. Second, the development and widespread adoption of national mathematics standards (NCTM, 1989, 1991) and principles (NCTM, 2000) along with steady and recent investment in developing NSF-endorsed reform curricula, have provided a solid base of content material for teachers to connect with their classroom practice. Third, ethnomathematics or multicultural mathematics as a tool to engage marginalized students depends critically on the commitment and expertise of teachers so that it is not reduced to stereotyping or deflecting current political situations (Gutiérrez, 2000c). Fourth, most of the top-down strategies for change (e.g., detracking, adoption of particular school improvement plans or district-supported frameworks) have been derailed by teachers (because their ideologies differed significantly) or are too far removed from the classroom to make any impact on learning. Finally, with broader acceptance of anthropological perspectives in education and the increase in qualitative (e.g., ethnographic, action research) studies in mathematics education that focus on rich description instead of quantifiable variables, we are uncovering even greater complexity in the practice of teaching than ever before. One aspect of this complexity is our growing understanding of teaching as a political endeavor, one that can liberate others and affect society (Beafoeuf-Lafontant, 1999; Freire, 1970, 1998; Hooks, 1994; Ladson-Billings, 1994).

13Again, I fully recognize as we reform mathematics and the teaching of it, we may begin to change what is considered dominant mathematics and, therefore, pull it closer to critical mathematics. The model begins with what I currently see in place.
Arguing that teachers can be agents of social change, Freire (1970, 1998) suggested that we need to be able to develop a profound respect for educators and students in practice. He argued further that if we are ultimately interested in change, not just describing the state of things in schools or classrooms around the world, we must see the pedagogical as political (localized pedagogical encounter between teachers and students). He warns that although teaching is about relationships, we cannot deny that teachers are in a position of authority. From Freire’s point of view, our goal as researchers is to try to help teachers develop the ability to create spaces of uncoerced interaction. Such ability would entail developing new relationships between teachers and students as well as between students and mathematics.

More recently, Beauboeuf-Lafontant (1999) suggested that teachers need not change the content of their courses to address social critique. In fact, she argued that it may be more helpful to think of what teachers do as being “politically relevant” rather than “culturally relevant”:

Cultural similarity and understanding are important yet insufficient preconditions for teaching students from marginalized groups. … Culturally relevant teaching should be considered through a renaming of it as “politically relevant teaching in order to emphasize the political, historical, social, as well as cultural understandings that teachers bring to their profession.” (p. 704)

Rather than the curriculum, Beauboeuf-Lafontant’s focus was on the overarching philosophy that guides teachers’ work and the decisions that teachers need to make as they enact practice.

Zevenbergen (1996) highlighted the fact that even under an umbrella of radical constructivism, we tend to glamorize individual meaning making as if the social context or power relationships do not matter. Further, she suggested that students must be able to decode what teachers want and what form is acceptable to be considered legitimate members of the mathematics classroom (Zevenbergen, 2000). Along these lines, Boaler and Greeno (2000) referred to the mathematics classroom as figured worlds, wherein (partly as a result of teachers’ pedagogy) students are often placed in the role of passive receivers of knowledge. In all of these situations, the teacher is a critical mediator between students, mathematics, and the world. Building on this idea of the teacher as critical mediator, D’Ambrosio (1990) argued that proposals for improving teacher education (preservice and inservice) have led no where because little attention has been paid to “students and teachers as human beings” or to “schools as systems at the service of society to which evaluation and testing must be subordinated” (p. 23). I agree with the positions put forth by D’Ambrosio and others, and I highlight a few reasons why focusing our
attention on teacher practice may help us move forward in our research efforts to address equity.

MOVING BEYOND SIMPLISTIC NOTIONS OF TEACHER ABILITY

The question of what teachers do in the classroom has been explored along a number of dimensions. Most often researchers do not use the term *ability*; however, they suggest that what mathematics teachers do in practice is integrally related to their knowledge (e.g., Ball, 1992; Fennema & Franke, 1992; Ladson-Billings, 1995; Ma, 1999; Shulman, 1986a, 1986b), their beliefs (e.g., Gutiérrez, 1996; Stodolsky & Grossman, 2000; Thompson, 1992), and other (mainly individual) factors, such as personality traits (e.g., Clemens, 1991) or their own lived experiences (e.g., Grant, 1991). Teacher knowledge often attends to the complex interwoven of what teachers know about: mathematics, teaching, the teaching of mathematics, and to a lesser extent, students. For example, researchers have argued that without fundamental knowledge of mathematics, teachers will not be able to teach in ways that highlight for students mathematical concepts over school mathematics procedures (Ball, 1992; Ma, 1999).

Teacher beliefs also seem to be directly related to the kinds of practice that a teacher adopts in the classroom. Like knowledge, beliefs tend to be framed around how teachers conceive of mathematics, teaching, the teaching of mathematics, and students. For example, teachers who perceive their role in the classroom to be strictly about conveying subject-matter information (which puts the responsibility for learning on the students’ shoulders) show a difficult time teaching students who enter the classroom unconvinced that mathematics is worth learning (Gutiérrez, 1996; Silvernail & Capelluti, 1991; Stodolsky & Grossman, 2000).

According to Ball (1992), strategies for improving teachers’ practice have tended to fall into three areas: improving the materials teachers have to use, training teachers in skills of effective teaching, and ensuring that teachers have adequate subject-matter knowledge. Recognizing that what teachers are able to do is related to more than subject-matter knowledge, she made an argument for increased knowledge of mathematics. Although there are exceptions as to what might factor into how well teachers are able to teach, the majority of studies that explore effective or ineffective teaching emphasize teaching absent from a local context or absent from the decisions that factor into a teacher’s mind before she commits to a particular action. These studies lend themselves toward lists of teaching behaviors that can be prescribed (Bartolome, 1994). That is, most of what has been written about what teachers do in the classroom has focused on
teacher ability (knowledge, beliefs, skills) and has been situated in an individualistic or cognitive framework.

Yet, we know that the kind of teaching practice we witness in mathematics classrooms is more than just what an individual teachers knows or does. Such practice is intricately connected to the students in a classroom, the nature of the mathematical activity or task, and what the teacher knows and aims to do. Ball and Bass (2000) convincingly argued that practice must be thought of as more than simply the cognitive demands of teaching (e.g., subject-matter knowledge) or simply actions (e.g., behavioral practices, pedagogy). They suggested that it must include the regularities of teaching as well as endemic uncertainty. As such, instead of the teacher (e.g., teacher ability, knowledge, skill) as the unit of analysis in equity arguments, it might be more useful to consider teacher practice (the interplay between the cognitive and the behavioral in regular and novel situations) as the unit of analysis (see also Cohen & Ball, in press; Cohen, Raudenbush, & Ball, 2000). This level of analysis would take into consideration such uncertainties as how students will respond to a given practice. For example, Boaler (1997a) suggested that students who tend to do well in traditional (basic) school mathematics tend to be the most opposed to their teachers changing their practices. So, understanding how teachers might anticipate or respond to student opposition would be included in a focus on teacher practice.

Moreover, merely knowing what teachers do in practice as it relates to the mathematical task or students must be complemented by what happens outside of the classroom. So, we might further extend this unit of analysis to teacher practice in context. Allow me to explain what I mean by context.

A number of studies have highlighted the fact that teachers must continually negotiate their teaching practice with others. As such, their ability to teach is influenced by much more than what they alone bring to the classroom. For example, teachers who desire to utilize an equity-driven curricula (e.g., Interactive Mathematics Program [IMP]) often face organized parents who do not agree with a detracked mathematics setting and must negotiate their practice with outsiders (Alper, Fendel, Fraser, & Resek, 1997). Some of these teachers have even faced opposition from parents whose children are not in IMP classes. Gutiérrez (1999b) documented mathematics teachers receiving opposition to their preferred practice from their school administration and school district, even in light of students receiving higher test scores. Martin (2000) suggested that part of the failure for Algebra Project teachers to enact practice as they wanted was due to opposition they received from students, involving a negotiation process that took up valuable class time.

We are beginning to better understand that teachers are constantly developing knowledge as a result of their participation in communities of practice (Lave & Wenger, 1991; Wenger, 1998). Researchers studying the impact of teacher workplace (e.g., Gutiérrez, 2000b, in press; Hargreaves, 1994; Johnson, 1990; Little &
McLaughlin, 1993; McLaughlin, Talbert, & Bascia, 1990; Siskin & Little, 1995; Stodolosky & Grossman, 2000) have argued that what teachers do in practice is influenced by not only their own beliefs, knowledge, and experiences but also by the norms and practices of their colleagues. Specifically in mathematics, researchers have highlighted how the school mathematics tradition and school settings (including colleagues) can undermine a novice teachers’ ability to practice teaching in a preferred manner (Cobb, Wood, Yackel, & McNeal, 1992; Gregg, 1995) or to support reform-oriented practice (Stein, Silver, & Smith, 1998). Although negotiating one’s practice with others (colleagues, parents, students, administration, or public officials) clearly relates to the ability for a mathematics teacher to do her job in a manner she desires, these barriers are often not addressed in research that emphasizes improved teaching. Instead, there is an overwhelming emphasis on teacher beliefs, knowledge, and curricular materials.

Do not misunderstand me. I do not mean to imply that beliefs, knowledge, or any of the aforementioned factors are not critically important to the teaching practice. However, I echo Ball and Bass (2000) that beliefs, knowledge, and curricular materials alone do not dictate teacher practice. Rather, because teachers’ beliefs and knowledge emerge and are grounded in their participation in workplace settings, we must attend to these contexts.

Moreover, more than just understanding the knowledge and skills that are necessary for enacting equity practice, we must also consider the moral aspect of teaching: the commitment that teachers hold toward students, their colleagues, and society. This moral dimension seems to factor prominently into the practices of teachers who work toward equity and who serve marginalized students (Gutiérrez, 1996, 2000b, in press; Gutstein, in press; Ladson-Billings, 1995; Michie, 1999; Rose, 1995).

If the practice of teaching is not merely what teachers bring to the classroom (e.g., their beliefs, knowledge, lived histories, personalities) but also is part teachers’ membership in local communities, how might we understand what it takes to enact particular practices, especially ones that relate to certain kinds of students or equity goals? I see effective teacher practice as the knowledge, skill, and commitment to engage in the local context and community under a variety of conditions, many unexpected. I have already discussed some of the teacher characteristics (beliefs, knowledge) that likely influence a teacher’s ability to teach. I discuss here the aspects of time and context a bit further.

Practice (and the Ability to Enact It) Is Dynamic

For me, the ability to enact practice is not static. That is, a given teacher’s practice is not something that once built is always available (like a set of clothing stored away for winter). Rather, it is always in the process of becoming and must always be reproduced. At any given point, teachers may possess the ability to
teach in a particular microsituation (e.g., in a given setting, with a given set of students, at a particular point in the teacher’s career, for a given mathematical task) that if not used consistently may not be available at a later point in time for that same teacher with her students. Because teacher ability attends to the local context and community in which teachers engage, no two situations will ever be the same. Practicing teachers know this all too well. That is, a particular mathematics activity that works well with a given school population can flop with the next years’ set of students. The difference could be the students, but it might also be the teacher (who has evolved since the last time of teaching). Effective teachers seem to have the ability to make appropriate judgments about how to apply their knowledge and skills under a number of different teaching situations. This kind of flexible and dynamic practice seems key to addressing the equity issues discussed earlier.

Practice (and the Ability to Enact It) Is Situational

Just as teaching is situational, so, too, is teacher ability. That is, for any given situation, based on student identities, schooling environment, mathematical content, community setting, relationships with others, and so on, a teacher may possess different resources to address equity. A teacher who has shown success in getting bilingual Latina and Latino students in an inner-city classroom to engage in mathematics in ways that help both credential them in society and attend to their lived experiences may or may not be successful if she was placed in a suburban setting with middle-class White students. Similarly, a teacher who is successful in a suburban school with honors courses may display clear ability to address equity with her students. Yet, if that same teacher is given prealgebra courses in the same school, she may not possess the ability to support the matheracy of her new students. This idea supports the argument that studying successful teachers in absence of context is meaningless (Secada, 1995). That is, when we develop lists of effective mathematics teaching practices, we must ask ourselves for whom the mathematics is effective and under what conditions.

The relation between the practice of teaching and equity outcomes is not new. NCTM (1991) touched on this issue in the *Professional Standards for Teaching Mathematics* a decade ago. They suggested that one goal is “to develop teachers’ knowledge of students so that teachers … affirm and encourage full participation

14As it stands, good mathematics teaching tends to be cast in narrow, universalistic terms, ignoring the very issues that teachers of diverse students must attend to inside and outside of the classroom on a daily basis. Often, mathematics teaching is reduced to merely an interchange between teachers, students, and mathematical content. Therefore, issues such as combatting a poor image of public schools, working with families whose first language may not be English, and working with few material resources are no longer seen as related to mathematics instruction.
and continued study of mathematics by all students” and that teachers should be “sensitive to and respect students’ diverse interests and linguistic, cultural, and socioeconomic backgrounds” (p. 82). Although NCTM did not overtly state that teachers should develop in their students the ability to be critical of knowledge or society, the Council did seem to acknowledge that full participation in the study of mathematics should not be seen as in conflict with respecting students’ own interests and backgrounds. Of course, how this is to be accomplished was not addressed.

More recently, in the Principles and Standards for Teaching Mathematics, NCTM (2000, p. 18) asserted that teachers establish and nurture an environment conducive to learning mathematics through the decisions they make, the conversations they orchestrate, and the physical setting they create. Beyond these rather simplistic acknowledgments, we are far from understanding the practice of teaching in ways that will sufficiently inform our ability to influence teaching toward equity goals.

RESEARCH THAT ENABLES THE EQUITY PRACTICE OF TEACHERS IN CONTEXT

If we are concerned with equity and we see that teaching practice is integrally linked to more than just teacher characteristics, how might we frame our goals for research? I assert that we need to focus research on enabling the practice of mathematics teachers in ways that support the three aspects of equity I proposed earlier. I explain first what I mean by the term enabling, and then I discuss what defines equity practice. Finally, I offer specific research questions and research methodologies that might be helpful in our efforts to address equity.

The choice of the term enabling is deliberate. Finnegan (1988, p. 38) suggested that rather than thinking that the technology of communication is the single cause of social development, it may in fact only be an “enabling factor.” Building on this theory, a focus on enabling the practice of teachers moves our attention away from thinking that effective teaching can be turned on or off by merely changing one factor. Rather, there may be a multitude of things that influence synergistically how effective teachers of marginalized students employ their skills, knowledge, and commitment. Unlike the term professional development, which seems to imply an endpoint or something that can be considered complete at some point in time (e.g., for increased pay, credentialing), enabling teacher practice respects the dynamic nature of the teaching and learning process whereby people are constantly remaking society and the classroom in their relationships to mathematics and others in their community. Rather than merely understanding the ability of teachers, I take a position that it is part of the responsi-
bility for researchers to help develop that which we hope to see in schools (effective teacher practice and ultimately student learning).

I use the phrase “enabling the practice” rather than “capacity building” to highlight the fact that all teachers already possess the ability to make decisions in their classrooms and to negotiate a complex set of goals. However, any teacher who is honest with herself will admit that she likely has the ability to teach some students better than others or under some conditions better than others. All teachers possess the ability to do some things. Yet, many of the things they are able to do are influenced by their mathematical settings, their colleagues, and their own beliefs, knowledge, and commitment.

Equity practice refers to the practice enacted between teachers, students, and mathematics that empowers students to (a) develop proficiency in dominant mathematics, (b) develop critical stances and new perspectives on the relationship between mathematics and society, and (c) contribute toward a positive relationship between mathematics, people, and society in ways that erase inequities on this planet. Clearly, there will be many degrees to which we might label a particular practice as equity based. For example, there will be times when teaching will more clearly address proficiency in dominant mathematics and will be at odds with developing critical stances or new mathematical insights or vice versa. At first, the goal would be on practice that would maximize the achievement of all three equity goals outlined earlier, not just a single one. However, as we get closer to our goals, dominant and critical mathematics will become more closely aligned.

Like notions of equity, at some point we must make critical decisions (ones that are value laden). I have presented an argument based on a decision I have made. I argue for a bottom-up strategy where there is a significant focus on practice, where practice is embedded in communities. First, a bottom-up strategy with a focus on practice holds more weight than previous efforts in affecting the critical juncture in which students ultimately learn mathematics (in relationships with teachers and each other). Second, with a focus on enabling the practice of teachers, the process of belief deconstruction or reconstruction (Hyland, 2000) surrounding who can do mathematics (a major obstacle in equity) can be studied and influenced. Third, the notion of enabling equity practice also is consistent with a growing body of research that indicates students are complex, multivocal, situated in contexts, and more than demographic markers (Cobb & Hodge, 2002/this issue; McCarthy, 1993, McNair, Gutiérrez, & Martin, 1999). Fourth, a focus on teacher practice also

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15Often, a teacher is most successful at teaching students with whom she has had the most experience or students who are similar to her in some critical way.

16This is not to say that students do not learn mathematics without teachers or outside of the school walls. However, as researchers and educators, we are not as likely to affect processes outside of schools or the classroom.
highlights the fact that teachers themselves, as well as their students, are members
of communities that contribute to and are always in the process of remaking mathe-
matics. That is, teacher practice aligns with the everyday dilemmas that teachers
face, the power that they wield, the influence of local contexts, and the relation-
ships between humans. Finally, I argue for an emphasis on enabling equity practice
because it will help us both to understand the practice of teachers and to place re-
searchers in a proactive stance toward equity.

My emphasis on a focused area such as enabling the equity practice of teachers
does not preclude us from considering things that have concerned previous re-
searchers and that affect teachers or equity (e.g., student cognition and learning,
school or district policies, tracking, parental influence). Rather, it suggests that as
we study teachers in their communities of practice, we will necessarily take up
these issues. In fact, I believe that the more we (researchers) shine light on the im-
 pact of equity practice, the more pressure we can put on political and social deci-
sion making to affect the environment (e.g., willingness to pay for professional de-
velopment of inservice teachers and increased funding for teacher education, the
equalization of funding at schools).

Given the focus on enabling the equity practice of teachers, what are some of
the research questions we might ask? Certainly, there are a multitude of ques-
tions that could be researched. The purpose of this part of the article is not to de-
velop an exhaustive list. Instead, I outline here some of the major questions (and
some of their accompanying subquestions) that might serve as starting points.
For each of the major questions I propose, I use terminology that reflects the
three goals of equity I discussed in this article: achievement and participation in
dominant mathematics, the ability to create mathematics while being critical of
knowledge and society, and the erasure of inequities throughout areas of the
globe. As mentioned previously, for now I see the first two goals as somewhat
symbiotic. However, I leave open the possibility that, at times, one issue might
need to be explored before or separate from the others.

Possible Research Questions

First, what are some of the core characteristics of the practice of teaching that leads
all students to (a) participate and achieve in mathematics, (b) be critical of (mathe-
matics) knowledge and society, and (c) begin to erase inequities on this planet?

Among other things, this question might include teacher knowledge (about
mathematics, teaching, mathematics teaching, and students), their buffering of
negative community effects (parents, political finesse or management), their up-
take of positive community and context resources (e.g., students, parents, col-
leagues, administration), their dealing with a system of schooling that is not fair,
and their recognition and nurturing of talent:
• What do we know about teaching that leads to students of all backgrounds participating and achieving in dominant mathematics, having critical stances, and acting on those stances to erase inequities in the globe?
• What characteristics are displayed in the practice of teachers who serve particular populations (especially students who traditionally have performed poorly)?
• What characteristics of equity teaching are shared across students (e.g., teachers having deep and flexible subject-matter knowledge, knowledge of students, moral commitment)?
• Under what conditions and contexts are particular teaching practices facilitated or supported?
• What are the mathematical resources that teachers employ in their practice?
• What are the student resources that teachers employ in their practice?
• What are the contextual (local or workplace) resources that teachers employ in their practice?

Second, how do teachers develop the useable knowledge and commitment they need to enact practice that leads to (a) student proficiency in dominant mathematics, (b) the ability for students to be critical of mathematics knowledge and society, and (c) the erasure of inequities on this planet?

• How do teachers develop useable mathematical understanding?
• How do teachers develop useable student understanding?
• How do teachers develop useable context understanding?
• How do they develop moral commitment?

Third, why do teachers develop the useable knowledge and commitment they need to enact practice that leads to (a) student proficiency in dominant mathematics, (b) the ability for students to be critical of mathematics knowledge and society, and (c) the erasure of inequities on this planet?

• Does it relate to their involvement in communities of practice where equity traditions are supported (e.g., membership with other teachers, membership in broader communities, partnerships with universities)?
• Does it relate to their need to feel efficacious as a teacher?

Fourth, how do we enable the practice of teaching such that we cannot predict (a) student participation and achievement in dominant mathematics and (b) the ability for students to be critical of mathematics knowledge and society based solely on characteristics such as race, class, ethnicity, sex, beliefs and creeds, and
proficiency in the dominant language and so that we (c) begin to erase inequities on this planet?

- How has the ability to engage students in dominant mathematics (and to critique society and begin to erase inequities) been built in places where it occurs naturally and organically?
- How is the practice of teachers (and others) supported and extended in these places?
- How is the practice developed in places where it does not normally occur?
- How do we translate and extend practices that occur with a particular set of students to operate with other kinds of students?
- Are there parts of people’s lived experiences and identities that are important and that cannot be addressed through the notion of enabling teacher practice as it relates to moral commitment (e.g., political activism or first-hand experiences of being marginalized in society)?

Fifth, how do teachers engage and respond to our attempts to enable their practice?

- Where do lived experiences and identity fit?
- What forms of resistance occur?
- What are the sources of resistance?

Sixth, how do teachers draw on their resources when they teach?

- What translations do they make between the knowledge, skills, moral commitment they have and when and how it is put to good use?
- Is there a critical lens to what they have developed?
- Do they continue to assess how effective their strategies are?
- What kinds of feedback do they use?

Seventh, why and when do teachers act on their resources?

- Is there a selective process for different kinds of students?
- Do they do it because it works after trying it (feedback cycle)?
- Do they do it because it fits their preconceived notions (e.g., of who can do mathematics; what the proper relationships between people, mathematics, and the globe are; and what a just society is)?

Eighth, how does enabling the practice of teaching influence the broader system of education, mathematics, or society?
Does it influence the kind of mathematics teachers who are later part of the school system?
Does it influence the kind of mathematics that is created or used?
Does it influence the ways in which people use mathematics in their every-day lives?

As we progress toward all three major goals, I can imagine that the first two will become more closely aligned. That is, eventually, as teachers further develop equity practices, what comes to be considered dominant will be reflective of a new status quo, validated by new assessment measures, and will likely involve and give value to a broader range of participants in the mathematics community.

(A FEW) METHODOLOGICAL CONSIDERATIONS

In thinking about how to research the aforementioned questions, I turn to a few methodological issues. It seems with the kind of practice-based focus and interest in enabling (not merely understanding) teacher practice, there are some methodologies that might lend themselves nicely to my goals. First, it would be important to continue somewhat traditional (qualitative and some quantitative) research on effective teachers in their environments. These are the kinds of studies that attend to teaching practice that show success with students who have been marginalized in mathematics or society and that try to understand teachers in a dynamic process. That is, what can we learn from effective teachers (as defined by different kinds of students and environments and time frames) that helps us define what it takes for teachers to teach toward greater equity. This research would most likely address participation and achievement of students, but it could also include a critical stance on knowledge and society.17

However, traditional studies of this kind, for the most part, fail to address how such effective teachers got to be that way. That is, how is the ability for these teachers to teach generated and sustained? For example, few accounts of research suggest how someone moves from critical thought to critical practice (McLaren, 1999). In this respect, it seems important to consider design-based research that attends to the local setting (National Academy of Education, 1999) and action-based research (Lather, 1986; Noffke, 1997) that seeks to make an impact on a given setting. This kind of research is more likely to inform us about the process of enabling the practice of teaching.

17In seeking to understand the practice of teaching in settings with a broad enough base to address the characteristics of race, ethnicity, sex, and so on that I outlined earlier, it would be critically important to include students and settings that reflect a representative sample that include and cut across categories.
In addition to forms of research, the nature of the researcher seems to influence the kinds of research that is accomplished and the kinds of results that are obtained (Campbell, 1989). As such, we will need to recruit people with diverse backgrounds (e.g., age, ethnicity, class, race, proficiency in languages other than the dominant one of a given society) and perspectives to explore the research questions posed earlier.

We also need to think seriously about the presentation of data so that it is useable by different groups of people. To date, most research is presented for consumption by other researchers and tends to highlight the mathematical tasks or the kinds of students it will serve. Bartolome (1994) made a cogent argument that the presentation of research results in ways that attends to “methods in the absence of people” is not humanistic. Similarly, research that attends to people in the absence of their context is also not humanistic.

By focusing on the practice of teaching, we more naturally will attend to the relationships between mathematics, students, and teachers in their local contexts. In other words, it may be highlighted that certain strategies used by teachers are effective in a particular situation and that situation includes Chinese students, but the implication is not that these strategies are particular for Chinese students. A presentation of results that includes the local context rather than merely the people also more closely aligns with the reality of U.S. (and global) classrooms, where there is great variety among students. In addition, a narrative approach to presenting data (with its emphasis on thick descriptions) seems to be especially helpful for teachers who can identify similar aspects of their working environment rather than look for single descriptors of students or teaching behaviors.

CONCLUSIONS

Patterns of inequity in mathematics education have been with us for most of this past century. Educational researchers have been grappling with the problem and have dedicated extensive economic resources to developing viable solutions. However, to date, we can still predict with a fair degree of accuracy how well students will participate in, achieve in, and use mathematics by knowing only their race, class, ethnicity, sex, and/or proficiency in the dominant language.

For a long time, we have blamed teachers, students, the curriculum, and even the system for inequities in mathematics education. In our analyses, however, rarely do we consider that we (the mathematics education research community) could be part of the reason why very little in the way of significant changes ever arise in the kinds of achievement, participation, and relationships with mathematics that so many oppressed students experience. I do not mean to imply that researchers are actively conspiring to make sure that the mathematics education system remains the status quo. Rather, I am suggesting that our failure to more fully
develop theories of equity has contributed to the slow progress we have seen in affecting change in teacher practice or student learning.

In this article, I have attempted to move us closer to a coordinated mathematics equity research agenda. I have tried to move beyond modernist depictions of teaching as a romantic or autonomous endeavor (Hargreaves, 1994; McLaren, 1999) or of equity as a simplistic, unidimensional, or unattainable goal. More specifically, I have offered a definition of equity that has short-term and long-term goals and that does not pit reform and traditional outcomes against critical outcomes. To ground this definition, I have reviewed research (where possible) that attends to all three levels of equity and highlights the dilemmas that teachers face in practice. I also have suggested that we focus on enabling (and thereby understanding) the practice of teachers and that we rely more heavily on design-based and action research methodologies.

Some skeptics may feel that the goals of equity I have outlined in this article are just not attainable (in the near or far future). However, my guess is that these people are in the minority of researchers in mathematics education. If we did not believe equity was an attainable goal, many more of us would have left education long ago and would be in more lucrative jobs by now. Mathematics education researchers are more likely to hold the position that the goals I have outlined cannot be addressed simultaneously because achievement and participation in dominant mathematics is inherently at odds with getting students to engage in mathematical practices that reflect a critical position or because previous attempts to influence teaching in more than superficial ways have been unsuccessful. However, the research we have to date is insufficient to support the conclusion that achievement and participation in dominant mathematics are always at odds with getting students to develop mathematical practices in ways that reflect a critical position in society. That is, I have not encountered empirical research that suggests either that we cannot address equity through classroom practice or that equity practice can be enacted on a consistent basis. Rather, the research seems to indicate two general things: (a) In places where teachers have shown some success in addressing only one of the two goals, it is not clear that teachers ever sought to reach both goals; and (b) in places where teachers seek to reach both goals, they are still experimenting in their practice. In either case, it seems an empirical question whether reform and traditional mathematics are inherently in conflict with critical mathematics (and, therefore, whether equity as I have defined it in this article is an attainable goal).

Moreover, educational researchers are beginning to develop a strong focus on teaching as a practice, thereby developing new understanding of how and why teachers do what they do and, subsequently, how we might better influence teaching and learning. The time is ripe to move forward with our conceptions of equity while new conceptions of teaching are also on the horizon.
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