Journal of Contemporary Research in Education

Volume 1
Number 1 *August 2012*

Article 3

8-1-2012

Don't I Know You? A Misstep in Teaching Mathematics with and for Social Justice in a Rural Context

Joel Amidon
University of Mississippi

Don't I Know You? A Misstep in Teaching Mathematics with and for Social Justice in a Rural Context

Journal of Contemporary Research in Education
1(1) 9-21

Joel C. Amidon
University of Mississippi

Abstract

In this paper, I document my own struggles and insights in moving toward a pedagogy of teaching mathematics with and for social justice within a rural high school. Teaching mathematics for social justice has been presented as a way to address the inequities present in the classroom, and the world at large, by having students work with mathematics to question and analyze inequities in their world (Gutstein, 2006). Inclusive education has been presented as a means for providing all students, regardless of their needs, abilities and interests, access to engaging content in the classroom (Villa & Thousand, 2005). These approaches to education can be summarized as teaching with and for social justice (Wager, 2008). I offer teaching mathematics with and for social justice as a way to make mathematics meaningful within a rural setting.

Teaching mathematics for social justice has been presented as a way to address the inequities present in the classroom, and the world at large, by having students work with mathematics to question and analyze inequities in their world (Gutstein, 2006). Inclusive education has been presented as a means for providing all students, regardless of their needs, abilities and interests, access to engaging content in the classroom (Villa & Thousand, 2005). These approaches to education can be summarized as teaching with and for social justice (Wager, 2008). Although these approaches are promising, changing teaching practice to enact these approaches can be problematic for teachers (Davern, et al., 1997; Gau, 2005; Gutstein, 2007). In this paper, I document my own struggles and insights in moving toward a pedagogy of teaching mathematics with and for social justice within a rural high school.

Ball (2000) describes criteria for engaging in a "first-person perspective" study and states "one central goal is to contribute to scholarly discourse communities and to the development of theory" (p. 374). I chose to use my own teaching "practice as a site for research" (Cochran-Smith & Donnell, 2006, p. 507), based on the work of other researcher-teachers who strove to study pedagogy that was not available to be studied in other classrooms with other teachers (e.g. Gutstein, 2006; Lampert, 2001). In these examples the pedagogy in question was still evolving and the researchers found it necessary to directly engage in the exploration and iterative change to refine the pedagogy, and associated theory, in order to develop something that can be described and disseminated. Thus, in attempting to teach mathematics with and for social justice, I came to understand some of the difficulties in engaging in such an endeavor, and realized the previously articulated goal set forth by Ball for engaging in a "first-person perspective" study.

In this article, I will describe the framework I created to design, enact, and analyze instruction along with the challenges and insights gained from examining my teaching practice. The culminating insight is a refined framework, namely a better understanding of how to characterize the key players within the classroom, to teach mathematics with and for

social justice within a rural high school. The resulting framework will provide practitioners and teacher educators with the needed assistance when engaging in and/or promoting (Nganga&Kambuta, 2009) this type of work.

Theoretical Framework

I draw on the work of Lampert (2001), Gutstein (2003, 2006, 2007), and Udvari-Solner, Villa, and Thousand (2005) to create a framework with which to base the study of my own practice, teaching mathematics with and for social justice. Lampert's (2001) articulation of teaching and learning as it happens in the mathematics classroom, provides a way to make sense of the complexities of the relationships between the teacher, the student and the content. The components of teaching mathematics for social justice, as described by Gutstein (2003, 2006, 2007), provide a target for instruction in the mathematics classroom. Finally, the work of Udvari-Solner, Villa, & Thousand (2005) provide a process of designing inclusive instruction, or teaching *with* social justice (Wager, 2008), that addresses the abilities, challenges, and interests of students while simultaneously meeting content demands for the lesson. I merge these three perspectives into the Unified Framework to support my efforts to design, enact, and examine instruction meant to teach mathematics with and for social justice.

Problem Space of Teaching

Lampert (2001) articulates the forum of teaching in her book Teaching Problems and the Problems of Teaching. Ultimately, the goal for any mathematics teacher is to facilitate a connection between the students and the content.

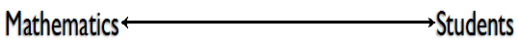

Figure 1.Teacher's goal to connect students to content (Lampert, 2001).

Lampert describes this goal as wanting students to "study" mathematics, where studying is described as "any practice engaged in by students in school to learn"(p. 32). To promote this connection is the practice of teachingas proceeding "…simultaneously in relations with students, with content, and with the connection between students and content" (p. 33).

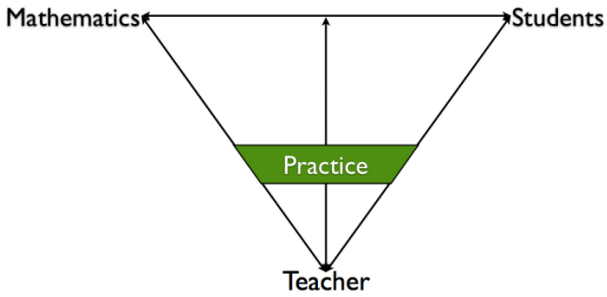

*Figure 2.*Forum of teaching as a series of relationships (Lampert, 2001).

And she defines teaching as "the practice of structuring activities of studying in relation to particular content and particular students" (p. 32). Simply put (but not simply executed), the teacher's job, through the defined practices of teaching, is to facilitate students "studying" mathematics, but how does the complexity change when the task shifts to teaching mathematics *with* and *for* social justice?

Teaching Mathematics for Social Justice

Teaching mathematics for social justice (Gutstein, 2003, 2006) is a means for teaching mathematics that attempts to realize the goals of culturally relevant pedagogy (Diversity in Mathematics Education, 2007) to "produce

students who can achieve academically, produce students who can demonstrate cultural competence and develop students who can both understand and critique the existing social order" (Ladson-Billings, 1995, p. 474). Wager (2008) extends this thinking by describing the goal of teaching mathematics *for* social justice as positioning mathematics as a tool "to empower students to challenge society" (p. 100).

Teaching mathematics for social justice, as can be seen in the writing and teaching of Gutstein (2006, 2007, 2009), is to simultaneously promote the use and development of three types of knowledge: classical, critical and community.

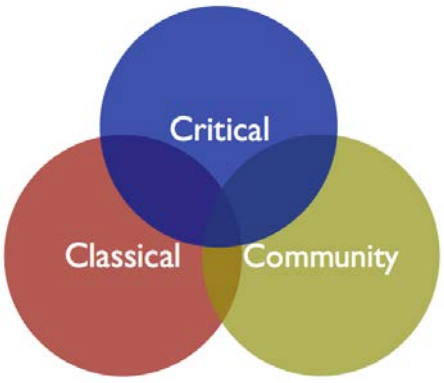

Figure 3.Teaching mathematics for social justice as an intersection of domains (Gutstein, 2009).

Classical knowledge is the mathematical knowledge needed to gain access to advanced mathematics and to excel at high-stakes tests (Gutstein, 2006). Critical knowledge is the knowledge (both mathematical and otherwise) necessary to understand one's sociopolitical reality (Gutstein, 2006). Community knowledge is the knowledge (both mathematical and otherwise) that exists within individuals from the school community context, which may not be understood by those who do not participate in the community (Gutstein, 2006). This final component of teaching mathematics for social justice acknowledges the "funds of knowledge" (Gonzales, Moll, &Amanti, 2005), or where and how mathematics is being used in the local community. Community knowledge can provide context and motivation for facilitating the use and development of critical and classical knowledge. Taken together these three domains describe the aims and challenges of teaching mathematics *for* social justice.

Teaching mathematics for social justice has been previously described as "promising" towards addressing the inequities that exist in the mathematics classroom and society at large (Diversity in Mathematics Education, 2007). Brantlinger (2007) suggests that equitable approaches to teaching mathematics that are implemented in urban contexts should also be encouraged in other contexts as well, such as the rural context. The research of Anderson & Chang (2011) has shown that students in rural communities take less mathematics than those in other contexts. The same research describes students in rural communities starting at lower levels in mathematics and having less access to Advanced Placement Courses than their non-rural counterparts. Teaching mathematics with and for social justice can be a means for addressing these inequities by helping "teachers in rural schools make mathematics…more relevant to the lives of their students" (Harmon, Henderson, & Royster, 2003, p. 56).

Some of the difficulty of in-service teachers attempting to teach mathematics for social justice has been described as a curriculum or lesson development issue (Gau, 2005; Gutstein, 2007). The inherent nature of teaching mathematics for social justice necessitates teachers utilizing local contexts, which inhibits teachers "plugging in" lessons that are designed

by a third party, thus calling for teachers to assume the additional role of a curriculum developer (Gutstein, 2007). Gau (2005) found in her study of in-service teachers learning to teach mathematics for social justice that the teachers did not perceive the lessons they developed as intending to teach mathematics, but merely using mathematics that was already learned to explore a social justice context (Diversity in Mathematics Education, 2007). To address the challenges of designing lessons that meet the target of instruction as articulated by Gutstein (2006, 2009), I offer the Universal Design Process (Udvari-Solner, et al., 2005).

Figure 4. The Universal Design Process (Udvari-Solner, et al., 2005).

Teaching Mathematics with Social Justice

To decide to teach mathematics *for* social justice, to position mathematics as a tool "to empower students to challenge society" (Wager, 2008, p. 100), suggests that the enactor of such an approach realizes that there are inequities in the mathematics classroom and/or the world at large that need to be challenged. Having made such a choice to teach mathematics for social justice would also suggest that the teacher would want to provide a just classroom environment where the teaching and learning of mathematics can occur. Wager describes this type of environment as "a socially just community in which students participate equally" (Wager, 2008, p. 99) or to teach mathematics with social justice. Inclusive education has been defined as a means for providing all students, regardless of their needs, abilities and interests, access to engaging content in the classroom (Villa & Thousand, 2005), and parallels what it means to teach *with* social justice.

In brief, a teacher who chooses to teach mathematics for social justice, or seek to create a more just world through the teaching and learning of mathematics, would reasonably be one who would want to teach mathematics with social justice (Wager, 2008), or seek to create a more just classroom environment for the teaching and learning of mathematics. The Universal Design Process can help with both of those intentions, as well as address some of the previously described instructional design challenges associated with teaching mathematics for social justice.

The Universal Design Process (Udvari-Solner, et al., 2005) is a means for developing lessons that address the needs, abilities, and interests of all students that are to learn the desired content. It is primarily associated with supporting teachers of inclusive classrooms, where all students, despite label and/or ability, are taught together, and the underlying assumption is that "living and learning together benefits everyone" (Falvey&Givner, 2005, p. 5). Specifically, the Universal Design Process (Udvari-Solner, et al., 2005) has four components (see figure 3): 1) learning about the students in the classroom, 2) naming the content that is to be learned, 3) deciding how students will engage within the content, and 4) determining how students will demonstrate their learning of the content.

In learning about the students, a teacher is "developing positive profiles of students' social and academic abilities, strengths, and learning concerns" (p. 138), with the suggestion being to use a multiple intelligence perspective (Gardner, 1993) to construct the optimum means for delivering instruction. In naming the content, a teacher decides "what is to be taught;

what level of knowledge or proficiency students are to demonstrate; and what context, materials, and differentiation are necessary to allow all students, including those with disabilities, a point of entry to learning" (p. 141). Some of this component is dictated for the teacher through district approved curricula or state standards. Deciding how students will engage with the content, or the "process" component, involves a teacher deciding on the "instructional strategies that afford students multiple means of engaging with the curriculum" (p. 143). This component represents how the students will learn the content of the lesson. The last piece of the Universal Design Process, or the "product" component, has teachers determining "how students will demonstrate and convey their learning" (pp. 145-146). This last component is the assessment portion of the design and provides an opportunity for students to represent their learning within a tangible artifact.

Unified Framework

Lampert's (2001) description of the forum of teaching provides a base with which to overlay the other two perspectives within the Unified Framework.

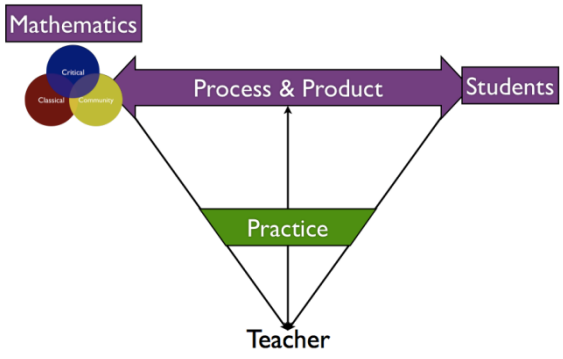

Figure 5. Unified Framework to design, enact, and examine teaching mathematics with and for social justice.

The Universal Design Process (Udvari-Solner, et al., 2005) can be layered onto this representation of teaching practice, with the first two components already being found within the representation. The relationship between the teacher and the students in the forum of teaching would naturally imply the first component of the Universal Design Process, which is for the teacher to acquire an understanding about how the students learn.

The second component of the Universal Design Process is concerned with naming the content to be studied. Expanding on Lampert's notion of content are the components of teaching mathematics for social justice as articulated by Gutstein (2006, 2007, 2009). A teacher engaged in teaching mathematics for social justice is concerned with the student learning the identified mathematical objectives of the unit (classical knowledge), learning how the mathematics can be found in the everyday reality of the student (community knowledge), and learning how the mathematical objectives could be used to better understand that everyday reality and/or affect it for the better (critical knowledge).

The relationship between the students and the content is one that is facilitated by the teacher. The students engage with the content through the tasks and environment that the teacher has designed. This relationship can be equated to the "process" component of the Universal Design Process, or how students will "study" (Lampert, 2001) the mathematics.

Udvari-Solner, et al.(2005) describe the "product" component of the Universal Design Process as "how students will demonstrate and convey their learning" (pp. 145-146), which is the evidence that the students are "studying" the content. Further, the product can be used as evidence that the process component was effective in facilitating students learning what the lesson was designed to teach. This evidence of learning, or lack thereof, can also be equated with evidence of success/struggle in attempting to teach mathematics with and for social justice. The literature calls for the documenting of this type of struggle in the classroom. Specifically, "(m)ore work is needed in this area to see what teachers struggle with, as they learn to teach mathematics for social justice" (Diversity in Mathematics Education, 2007, p. 420), which leads to the research question for this study:

What are the inherent struggles of teaching mathematics with and for social justice within a rural context?

Methods

To answer the research question, I conducted a "self study" (Zeichner&Noffke, 2001) of my own teaching practice. Acting as a researcher-teacher, I used the Unified Framework to guide my teaching practice and this study, which I position as an instrumental case study (Ball, 2000; Cresswell, 2007) in "an attempt to bring together theory and book knowledge with real-world situations, issues, and experiences" (Berg, 2007, p. 232). The boundaries for this case were tied to documenting the students "studying" (Lampert, 2001) mathematics, and how it was facilitated within the mathematics classroom, which occurred over six, 45-minute, class periods

Setting & Participants

This study was situated in the only high school within a geographically large rural school district, primarily composed of two small towns, and within commuting distance of a mid-size Midwestern city. The students were enrolled in one section of the second course of the high school mathematics sequence, which used Course 2 of the Core Plus curriculum (Hirsch, Fey, Hart, Schoen, & Watkins, 2008). The primary population for the class was tenth grade students, with a smaller group of ninth grade students. Given no alternative track for mathematics, and the required two credits of mathematics for graduation, the class of 25 students had a heterogeneous mix of students, reflective of the school's demographics.

Data Generation

Two categories of data were used to capture what went on during the study: 1) teacher journals and, 2) student work. The teacher journal (Cochran-Smith & Lytle, 1993) has been shown to be a useful tool in generating data for practitioner inquiry (e.g. Gutstein, 2006; Heaton, 2000; Lampert, 2001; Lubienski, 2000). For this study an audio teacher journal was used to document the teaching practices that occurred within the classroom and the reactions to those

teaching practices. Referring to the Unified Framework (see figure 5) the audio journal was generated to capture the interactions between the teacher (myself) and the content, the teacher and the students, and the teacher and the facilitated connection between the students and the content (aka process & product).

The student work that was generated consisted of the daily work, informal assessments, and final products for the lesson. The student work was meant to capture the process and product portions of the Unified Framework (see figure 5), which implies how the students engaged with the content and ultimately learned from the lesson.

The Lesson

The six-day lesson occurred in one section of the course in the high school's mathematics sequence, which meant that I was responsible for teaching the same content (expected value) that was being taught in all of the other sections. My intention was to integrate the lesson into the Core Plus curriculum in order to maintain the pace and expectations of the course set forth by the school's mathematics department. This model differs from what has been articulated by Gutstein (2003, 2007, 2009), where the social justice projects occurred in addition to the Standards-based curriculum that he taught. In addition, this model better aligns with the classroom reality of teachers that may want to attempt this approach to teaching mathematics.

The six-day lesson was designed as a student-generated exploration of the fairness of the classroom teacher's grading practices using expected value. Prior interactions and informal assessments of the students allowed me to create a profile of the multiple intelligences represented in the classroom. Utilizing a core of identified multiple intelligences (Gardner, 1993) a series of learning stations were created for students to work though during the lesson. Students were assigned one of six sets of anonymous student grade data to use throughout the learning stations. The goals of the stations were for the students to represent the data as a whole and to judge how the grades would be represented using different probability scenarios for collecting assignments at random (as was the practice of the classroom teacher). As a final product, students were to create a grading practice recommendation for the classroom teacher, which was designed to use the completed mathematics as support for their recommendation. The student products were evaluated using a rubric based on Gutstein's (2006, 2007) articulation of the aims of teaching mathematics for social justice, or how the students demonstrated classical, critical, and community knowledge related to the lesson.

Data Analysis

The purpose of this study was to document the struggles of a teacher attempting to teach mathematics with and for social justice within a rural context. Thus, using a loose understanding of "struggle", analysis of the

transcribed audio teacher journal employed the tradition of grounded theory (Corbin & Strauss, 2008; Emerson, Fretz, & Shaw, 1995). Open coding was used to identify instances within the transcript that were associated with perceived struggles in the practices of teaching. A second pass of the transcript data allowed for refining and categorizing the specific areas of struggle, with a third pass allowing for themes to emerge. The rubric evaluations of the student products were used as "provisional" codes (Saldaña, 2009), which aligned with Gutstein's (2006, 2007) articulation of the aims of teaching mathematics for social justice. The goal of the coding was to articulate the nature of the students "studying" the intended content. Finally, the emergent themes from the transcript data were compared with the coded student product data looking for connections.

Findings & Implications

…if we are looking at the three C's of classical, critical, and community, I don't think I did that.

Audio journal excerpt from 6.2.2009

The above quote is a reaction from the teacher journal taken from the last day of the lesson and suggests an initial feeling of frustration in the outcomes of the lesson.

After an examination of the products and audio teacher journal, there emerged a general disconnect between the tasks that students were being asked to do and the purpose behind those tasks. Students were overall engaged and demonstrated enthusiasm for learning mathematics using the learning stations. Yet the work of the students appeared to be completed as an exercise rather than with a greater purpose of evaluating the grading practices of the classroom teacher, or grading practices in general. This disconnect could be seen in the student products where students made grading recommendations but rarely connected those recommendations to the mathematics.

One of the student products that did make this connection was a letter addressed to the classroom teacher, and contained the following quotation:

When we took the averages of all of [a student]'s assignments, she got a 8.93. Looking at how you would collect 1/4 or 3/10 assignments, she got lower averages, which were 8.4 and 8.31. This shows that you aren't giving her the grades she deserves.

This part of the letter provided evidence that the student used the intended mathematics (expected value or finding the average of a probability distribution) to calculate the grade given the different scenarios. In addition, the student made a comparison with the different averages/scenarios and made an argument that the grading was unfair because the teacher was not providing the student with "the grades she deserves". Both of these instances were positive indicators according to the rubric used for evaluation. But the last sentence in the quotation also provides evidence of the

disconnect between the learning profile of the students and the intended outcomes of the lesson. The students were never asked to collaboratively define what they understood a grade to represent, or what is "fair" for assigning grades to a student. Did a grade represent conceptual understanding of a mathematical concept? Did a grade represent effort expended toward learning mathematics? Did it represent a combination of the two? The answers to these questions were unknown, because they were never asked, or (unfortunately) deemed necessary to be answered before or during the six-day lesson.

Previously stated, I defined the content using Gutstein's (2006, 2007) framework for teaching mathematics for social justice and then defined the students from a multiple intelligence perspective (Gardner, 1993). Also previously stated, the goal of teaching is to facilitate a connection, or relationship, between the students and the mathematics. To facilitate the connection is the process and products that are put into place by the teacher. Given these different perspectives it makes sense that the disconnect was observed within the products that students produced for the lesson.

To address these findings, I call for adapting the Unified Framework to better fit the aims of teaching mathematics with and for social justice. In the students' final products, there was a low level of fidelity between the intended content to be learned and the level of demonstration in the products.

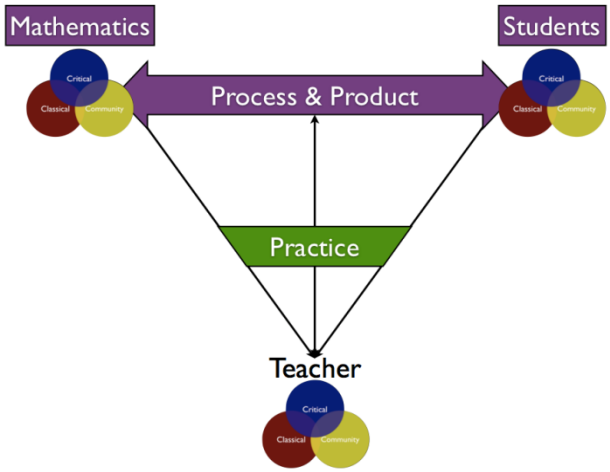

Figure 6. Refined framework to design, enact, and examine equitable pedagogy

Previously, I expanded the notion of content to contain the classical, critical and community components proposed by teaching mathematics for social justice. I now propose that the three components extend into the other design elements of the Unified Framework. Instead of merely developing a learning profile of each student using a multiple intelligence perspective (as suggested by Udvari-Solner, et al. (2005)), a teacher should gauge the students' aptitude for the various components of knowledge suggested by teaching mathematics for social justice. What is the collective knowledge about the community context? What perspectives have students considered in thinking about the topic? What positions do students hold? How could mathematics be used to learn more about the topic? Thus, if a teacher is to attempt to teach mathematics for social justice it would be appropriate to understand students as learners of mathematics for social justice. Extending the logic, the teacher should also

be understood as a teacher of mathematics for social justice. This reframing of the teacher and the learner would make it imperative to assess how the students and the teacher understand the community perspective of grading, how they understand the fairness of the grading practices, and how they understand the mathematical concept of expected value, in order to best design a process and product that facilitates students "studying" the intended content. Viewing the students and the content from the same perspective can better allow the process and product to be a bridge between the two, rather than to highlight a disconnect.

Identified within the data was the problem of connecting tasks to a purpose. What I propose to answer that challenge is to be explicit in the process component of the lesson design as to how specific tasks will allow students to "study" the named content according to each of the dimensions of teaching mathematics for social justice, and to be explicit with students concerning the intent of the topic. This is similar to what Harel (2008) proposes, in his "necessity principle", where a well designed problem will create a need to use certain mathematics, only I wish to extend it to include the two other components of knowledge proposed in teaching mathematics for social justice.

Conclusion

In this paper, I document my own struggles and insights in moving towards a pedagogy of teaching mathematics with and for social justice within a rural high school. This work answers the call to document the struggles that teachers experience in attempting to teach mathematics for social justice (Diversity in Mathematics Education, 2007). In addition, this work responds to the appeal to teach mathematics for social justice in non-urban contexts (Brantlinger, 2007), and may help address some of the issues teacher educators have described in promoting teaching for social justice in rural contexts (Nganga&Kambuta, 2009). Further work is needed to document the use and development of the refined framework as it applies to designing, enacting and examining equitable pedagogy. In conclusion, I believe this paper fulfills Ball's" (2000) requirements for engaging in this type of work by contributing "to scholarly discourse communities and to the development of theory" (p. 374).

References

Anderson, R., & Chang, B. (2011). Mathematics course-taking in rural high schools. Journal of Research in Rural Education, 26(1), 1-10. Retrieved from http://jrre.psu.edu/articles/26-1.pdf

Ball, D. (2000). Working on the inside: Using one's own practice as a site for studying teaching and learning. In A. E. Kelly & R. A. Lesh (Eds.), Handbook of research design in mathematics and science education (pp. 365-402). Mahwah, N.J. : Lawrence Erlbaum.

Berg, B. L. (2007). Qualitative research methods for the social sciences (6th ed.). Boston: Allyn & Bacon.

Brantlinger, A. (2007). Geometries of inequality: Teaching and researching critical mathematics in a low-income urban high school. Unpublished Doctoral dissertation, Northwestern University, United States -- Illinois.

Cochran-Smith, M., & Donnell, K. (2006). Practitioner inquiry: blurring the boundaries of research and practice. In J. L. Green, G. Camilli & P. B. Elmore (Eds.), *Handbook of Complementary Methods in Education Research* (pp. 503-518). Mahwah, NJ: Lawrence Erlbaum Associates American Educational Research Association.

Cochran-Smith, M., & Lytle, S. (1993). Inside/Outside: Teacher research and knowledge. New York: Teachers College Press.

Corbin, J., & Strauss, A. (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory (3rd ed.). Los Angeles, CA: Sage Publications.

Cresswell, J. W. (2007). Qualitative inquiry and research design: Choosing among five approaches (2nd ed.). Thousand Oaks, CA: Sage Publications.

Davern, L., Sapon-Shevin, M., D Aquanni, M., Fisher, M., Larson, M., Black, J., et al. (1997). Drawing distinctions between coherent and fragmented efforts at building inclusive schools. Equity & Excellence in Education, 30(3), 31-39.

Diversity in Mathematics Education. (2007). Culture, race, power, and mathematics education. In F. K. Lester (Ed.), Second handbook of research on mathematics teaching and learning (Vol. 1, pp. 405-434). Charlotte, NC: Information Age Publishing.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (1995). Writing ethnographic fieldnotes. Chicago: University of Chicago Press.

Falvey, M. A., & Givner, C. C. (2005). What is an inclusive school? In R. Villa & J. Thousand (Eds.), Creating an inclusive school (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Gardner, H. (1993). Frames of mind: The theory of multiple intelligences: Basic Books.

Gau, T. R. (2005). Learning to teach mathematics for social justice. Unpublished Doctoral dissertation, The University of Wisconsin - Madison, United States -- Wisconsin.

Gonzales, N., Moll, L., & Amanti, C. (2005). Funds of knowledge: Theorizing practices in households, communities, and classrooms. Mahwah, N. J.: Lawrence Erlbaum Associates.

Gutstein, E. (2003). Teaching and Learning Mathematics for Social Justice in an Urban, Latino School. Journal for Research in Mathematics Education, 34(1), 37-73.

Gutstein, E. (2006). Reading and writing the world with mathematics: Toward a pedagogy for social justice. New York: Routledge.

Gutstein, E. (2007). Connecting community, critical, and classical knowledge in teaching mathematics for social justice. The Montana Mathematics Enthusiast, 1, 109-118.

Gutstein, E. (2009). Developing social justice mathematics curriculum from students' realities: A case of a chicago public school. In W. Ayers, T. Quinn & D. Stovall (Eds.), Handbook of social justice in education (pp. 690-698). New York: Routledge.

Harel, G. (2008). What is mathematics? A pedagogical answer to a philosophical question. In R. B. Gold & R. Simons (Eds.), Proof and other dilemmas: Mathematics and philosophy (pp. 265-290): Mathematical American Association.

Harmon, H., Henderson, S., & Royster, W. (2003). A research agenda for improving science and mathematics education in rural schools. Journal for Research in Rural Education, 18(1), 52-58.

Heaton, R. M. (2000). Teaching mathematics to the new standards: Relearning the dance. New York: Teachers College Press.

Hirsch, C. R., Fey, J. T., Hart, E. W., Schoen, H. L., & Watkins, A. E. (2008). Core Plus Mathematics: Contemporary Mathematics in Context, Course 2: Student Edition (2nd ed.). Columbus, OH: Glencoe/McGraw-Hill.

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. American Educational Research Journal, 32(3), 465-491.

Lampert, M. (2001). Teaching problems and the problems of teaching. New Haven and London: Yale University Press.

Lubienski, S. (2000). Problem solving as a means toward mathematics for all: An exploratory look through a class lens. Journal for Research in Mathematics Education, 31(4), 454-482.

Miles, M., & Huberman, M. (1994).*Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage.

Nganga, L., & Kambuta, J. (2009). Teaching for democracy and social justice in rural settings: Challenges and pedagogical opportunities. In S. L. Groenke& J. A. Hatch (Eds.), Critical pedagogy and teacher education in the neoliberal era: Small openings (pp. 191-204): Springer.

Saldaña, J. (2009). The coding manual for qualitative researchers. London: Sage.

Udvari-Solner, A., Villa, R. A., & Thousand, J. S. (2005). Access to the general education curriculum for all: The universal design process. In R. Villa & J. Thousand (Eds.), Creating an inclusive school (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Villa, R. A., & Thousand, J. S. (2005). The rationales for creating and maintaining inclusive schools. In R. Villa & J. Thousand (Eds.), Creating an inclusive school (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Wager, A. (2008). Developing equitable mathematics pedagogy. Unpublished Doctoral dissertation, The University of Wisconsin - Madison, United States -- Wisconsin.

Zeichner, K., & Noffke, S. (2001). Practitioner research. In V. Richardson (Ed.), Handbook of research on teaching (4th ed., pp. 298-330). Washington, D.C,: American Educational Research Association.