

Exploring Equitable Practices: Noticing the Student in Mathematics

Janet Mercado¹, Elizabeth van Es¹, Victoria Hand², University of California Irvine¹, Colorado University, Boulder²

Abstract

Focusing on understanding teacher practices in relation to equity could prove to be beneficial for creating opportunities for all students to learn. In order to understand how teachers create these opportunities, we investigated the practice of two secondary mathematics teachers who had been successful at supporting the learning of non-dominant students. Through interviews focused on goals for teaching and their noticing, we set out to grasp what they attend to during interactions with students and how that information informs their practice.

Keywords: Mathematics, Equity, Teacher Noticing, Teacher Practices

Introduction

After more than two decades, investigations into developing equitable practices continue to lead current research in mathematics (Aguirre et al., 2012; Boaler & Staples, 2008; Esmonde, 2009; Gutstein, 2003; Gutierrez, 2002; Hand, 2012). This is due to continued inequities, which marginalize students from non-dominant backgrounds (Martin, Gholson, & Leonard, 2010; Secada, 1992; Tate, 1997). While striving to achieve equity is a complex task, targeting teacher practice may prove to be beneficial for increasing student participation in mathematics.

A common contributor to inequities involves lack of support for teachers to comprehend and enact equitable practices (Boaler & Staples, 2008; Gutierrez, 2007; Nasir, Hand, & Taylor, 2008). Thus, the goal of this study was to examine how teachers make decisions in the classroom. We examined ways teacher noticing for equity impacts how teachers create opportunities for all students to engage in learning by answering the following questions: What do teachers who are exceptional at equitable mathematics instruction attend to during moments

of teaching and how do they interpret what they see? How does their noticing reflect their disposition toward equitable instruction?

Literature

Equity in mathematics. Seeing as it is essential to several disciplines, mathematics serves as a gatekeeper for future opportunities in higher education, employment, and participation in society (Schoenfeld, 2002; Secada, 1995; Stinson, 2004). While all students should be given the opportunity engage in rigorous mathematics, inequities continue to occur for learners of non-dominant backgrounds (Ladson-Billings, 1997; Lee, 2004; Martin, Gholson, & Leonard, 2010; Secada, 1992; Tate, 1997).

Often, inequities are attributed to systemic issues, limited resources, or teachers not being prepared to teach diverse learners (Lee, 2004; Orfield & Lee, 2006). Developing classrooms that empower all students to learn requires substantial changes to practice. However, teachers are not currently provided with the necessary support. Specifically targeting practice requires a transparent and comprehensive understanding of equity, concrete and empirical examples of practice, and opportunities to develop critical perspectives about students.

Noticing. Although progress has been made in identifying instructional approaches that encourage equity (Boaler & Staples, 2008; Nasir, Hand & Taylor, 2008), how teachers come to engage in these practices is not so evident. Research related to teacher noticing, the ability to attend to and make sense of complex classroom interactions (Jacobs, Lamb, & Philipp, 2010; Sherin, Jacobs, & Philipp, 2010; van Es & Sherin, 2002, 2008), serves as the theoretical basis for our study.

Noticing equitably. Seeing as noticing draws attention to the decisions teachers make during instruction, it was our goal to understand how noticing guides teachers in creating

opportunities to engage a wide range of learners. While past work on noticing has focused on student thinking, Hand (2012) proposed that noticing for equity involves attention to participation, access, and power as it arises in classroom interactions. Through observations, Hand developed a framework that explained how these teachers allowed students to “take up space” in a mathematics classroom. Thus, this work draws from the work of teacher noticing and ways teachers enact their dispositions towards equity through practice. The current study set to explore the noticing of teachers that were nominated as being exceptional at creating equitable learning opportunities in mathematics classrooms.

Methods

The methods described in this section were used to answer the following research questions:

- (1) *What do teachers who are exceptional at equitable mathematics instruction notice during interactions with students around mathematics and how do they interpret what they see?*
- (2) *In what ways do their goals for teaching and noticing reflect their dispositions toward equitable instruction?*

Setting and Participants

This study investigated the practice and noticing of two secondary mathematics teachers nominated as being exceptional equitable teachers from individual school sites in Southern California. Teacher educators and district leaders were solicited to nominate teachers based on the following criteria: (1) effective at narrowing participation gaps in classrooms, (2) skilled use of reform-based mathematics curriculum, and (3) district-level recognition. Six teachers were nominated, however, we observed three. Two of the three are discussed in this paper. Within two to three months, the research team (a university professor and a graduate student in education) visited each teacher’s classrooms, observed and filmed lessons, collected field notes,

and conducted four interviews. Teachers were compensated with gift certificates for participating.

Teachers. Tim, a Caucasian male, is a middle school teacher. His school site serves a student population from a predominantly Latino and lower-socioeconomic community. Tim has taught in a classroom setting for over 25 years. After taking a seven-year break from teaching to be the district's mathematics coach, he returned to teach middle school. Aside from his work in the district, Tim has taught teacher methods courses for credential programs at a university. We observed his 8th grade algebra course.

The second teacher, Raymond, is a male of Japanese and Mexican descent. Raymond teaches at a high school, which serves a mostly Latino and Asian, lower-socioeconomic community. He has taught for eight years in the same community where he attended school. For this study, we observed his 'core concepts' class, which focuses on teaching pre-algebraic concepts to school students of various grade levels (9th-12th).

Data Sources

Data collection began during the winter of 2013. Prior to videotaping lessons, the research team spent a week in each of the teacher's classrooms. While there, the research team took hand written notes on the mathematical concepts taught and teacher interactions with students. Classroom artifacts (e.g. tasks, handouts, lesson objectives) were also collected.

Videotaped goals interviews. At the beginning of the study, the teachers were interviewed about their goals for teaching. Each teacher was asked questions about their goals for the rest of the school year and for the classroom. Teachers were also asked to describe their expectations of students and what they think it takes for students to be successful in their classrooms.

Videotaped lesson segments. Three videotaped observations were conducted for each teacher. Each video captured an entire class period (approximately 50 min.) and focused on teacher interactions with students around mathematics. The researchers focused specifically on instants during instruction where the teacher's instructional decisions had implications for engaging a range of learners in mathematical activity. The research team reviewed the lessons and created shorter segments (about 4-7 minutes in length) to share with the teachers.

Videotaped noticing interviews. Shortly after each observation, teachers were interviewed (approximately 45 min.) about their noticing during the lesson. We conducted three semi-structured, post-lesson interviews where teachers were shown the selected segments and were asked to discuss what they noticed during in the moment of teaching and how they reasoned about the interactions. Generally, teachers were prompted with the following question, "What did you notice about your interaction with the student(s)?" The teachers were also invited to discuss anything else that they wanted to share regarding the observed lesson.

Data Analysis

Interview transcripts. To prepare for qualitative coding, all of the interviews were transcribed. Our approach to coding was iterative and informed in part by the work of Emerson, Fretz, and Shaw (1995), who describe open coding as line-by-line coding that considers "all analytic possibilities" and attempts to "capture as many ideas and themes" as possible (p. 151). For this analysis, we first read each line of the interview transcripts and recorded keywords on the side of each page margin. We generated an initial set of ideas for codes in relation to how teachers described their interactions with students. Early general themes (students as sense makers, attention to individual students, students accountable for each other's learning, difficulties in engaging all students) arose in the data. Through research team discussions and

analytic memos (Creswell, 2007), we reached consensus on specific themes found in what teachers discussed across interviews (Tables 1-4).

Results

Our analyses operate on the assumption that what teachers notice during moments of teaching and their goals are ways teachers enact their dispositions towards equity through practice. In this section, we discuss how two practicing secondary math teachers described interactions with their students around mathematics learning. We discuss the ways teachers' goals overlapped (or not) with aspects of teaching described through their noticing.

Tim. Tim's goals and noticing were centered around three themes: Seeking to instill a robust understanding of mathematics; making mathematics meaningful to his students; and expressing tensions associated with teaching with standards.

Seeking to instill a robust math understanding. Tim often discussed trying to build knowledge of concepts and having students make connections (Table 1 & 2). He described attempting to achieve building this knowledge by providing students with challenging problems that require eliciting various forms of conceptual knowledge. Tim expressed that he strives to build robust foundational knowledge for students to make connections now and beyond his classroom. For example Tim expressed the following in his goals interview,

“Now that they know factoring, then we have to do rational expressions. Now that they know a lot about solving equations, we can relate that to inequalities. It's things where we can build a lot on what they're doing.”

Tim explained how the concept he was working on at the moment, factoring, was related to concepts he was to teach before the school year ends. He had a strong focus on building

foundational knowledge. This was also evident in his noticing interviews as well. For example, Tim explained,

“My main concern in the entire part of the lesson was realizing that factoring was part of the multiplication. And again that will tie in later with what they need to do for the involving quadratic equations.”

Tim’s excerpt above demonstrates his concern with having students see connections among the different concepts that are learned throughout the school year. He didn’t just want his students to be able to use procedures for the sake of finding particular answer, but to build understandings of concepts. He explained that he builds understanding by implementing challenging problems,

“That’s one of the things we’ve tried to work on the thinking about what parts of equations represent. Um and kind of relationships between things. So I think that was important. So like what I was trying to do was lay the ground work for concepts that would stand out later in the chapter.”

Challenging problems required students to use multiple steps in order to solve the problem.

Thus, students had to understand the relationships between the steps and understand parts of the equation.

Meaning Making. Tim wanted all his students to participate by sharing their thinking and questions (Table 1 & 2). He made sure to provide students with opportunities to think and share ideas. During his goals interview, Tim shared,

“What it takes to be successful is willingness to put up with my questions and think about things as much as possible... everyone participates and saying you’re confused about something is perfectly fine, asking questions about things is what I expect”

He also shared similar ideas during his noticing interviews. When he described his noticing, he said he checks for student understanding in various ways (randomly calling on students, listening to peer discussions). Students are given time to think and are able to share their ideas, or say they do not understand.

Expressing tensions in teaching standards. While Tim's goals were to develop students' sense making and build a robust understanding, he revealed the difficulties in doing so. Tim has a pacing plan to follow in order to prepare for testing (Table 1 & 2). Both Tim's goals and noticing interviews exposed his concern about testing. When asked about his goals for the rest of the school year, Tim shared,

“Unfortunately... there is a lot of material that we have not gotten to that we need to work through before the CSTs. The challenge there will be to move through things quickly, but still keep as many kids on board and still having math make sense to them.”

His use of the words “unfortunately” and ‘challenge’ revealed feelings of tension.

In another interview, Tim stated that he was behind in the amount of standards to cover and would have to rethink his plans for the following year.

“I looked at all the standards we still need to cover and I will probably have to do a lot of rethinking for next year because we have spent a lot of time with really trying to help kids with equations, word problems, systems of equations.”

Although he did not mention it in his goals interview, analysis of his noticing interviews revealed that he also focused on promoting a discourse community among students and attending to individual students (Table 4).

Promoting a discourse community. During noticing interviews, Tim shared examples of students coaching others or discussing ideas with fellow students. For instance, Tim provided an example of a student coaching another boy.

“So he is good at coaching Alvaro and giving ideas. Just kind of coaching on the side. He can help and is able to explain it”

Alvaro had been absent so, Tim asked another student to help to ‘coach’ Alvaro. Tim knows that the student has an understanding of the mathematics and would be able to clearly explain it to another student. In the excerpt below, Tim also described asking another student, Daniel, to explain his problem solving strategies to the class,

“I told Daniel, ‘I would like you to be able to explain to the class as clearly as possible.’ I gave him some advance moments so he can think about it”

Tim explained that he had walked around and found that Daniel had solved a problem that the class was working on. He asked Daniel if he would share his strategies with the class and to do so as clear as possible.

Attending to student as individuals. Tim also revealed that he attends to students as individuals (Table 2). The individual attention that he gives students is related to wanting to figure out how individuals are making sense of the mathematics. When he discussed individual students he also described past achievements and contributions to the class.

“After the last one we are trying to get into Rochelle’s mind... Again she seemed to be pretty quiet so what I am trying to figure out is what she is thinking because she has been pretty inconsistent on test doing really well and then bombing”

Tim was questioning a student that was not providing a response. He described thinking about Rochelle’s past test results and mentioned that she was an inconsistent test taker, so it was

difficult to know how well she understood the material. Similarly, he describes trying to figure out another students' understanding in a separate interaction,

“I’m trying to figure out why he’s having a hard time, not coming up with anything in terms of even a question just to ask. Um he’s a good kid. He does his homework most of the time. I didn’t want to let him off the hook and make him feel that he can sort of just fade back into the background.”

Similar to his description of his interactions with Rochelle, Tim is attempting to figure out why this student is not answering and is recalling his knowledge of the student. Tim described this student as being quiet or a person that may ‘fade back into the background’.

Raymond. Raymond’s goals and noticing centered around four themes: Connecting mathematical concepts, making mathematics meaningful to his students; grouping students; and providing attention to individual students.

Connecting mathematics. Raymond discussed trying to make connections for his students in both his goals and noticing interviews (Table 3 & 4). Meaning, he wants his students to see links between mathematical concepts and their applications to the real world. He didn’t just want to present procedures and rules. Instead, students should understand why they are doing the mathematics and understand how the mathematics can be applied to the real world.

For instance, in his goals interview, he stated,

“If I can make those connections, then the students are more engaged... the students will be more into the classroom, rather than messing around, because I am going through things that bring the real world that they can apply.”

He continued to describe a specific example for a plan to integrate real world applications,

“Basically, you’re an air traffic controller and from there, I’m going to build distance equals rate times time, then distance equals rate times time plus where you start from, and that leads into $y = mx + b$. From there, I can start talking about slope and y intercept, what that all means”

In his noticing interviews, he described implementing a student’s “beat box” into a lesson. In this lesson, Raymond had been discussing rates of change and presented an example of a rate of change using clap sounds per second. A student asked how the rate would look if he integrated beats per second. Raymond asked the student to beat box for the class, keeps track of the beats, and plots the beats on a grid to demonstrate a non-linear relationship.

“one way to integrate was his beat box. It’s another chance to show the process this is a non-linear relationships the rate changes each time so it is nonlinear”

Although this was a non-linear example, he wanted to capture his students thinking by implementing something his student was interested in.

Meaning making. In his goals interview, Raymond described his expectations of his students (Table 3 & 4). First, he expressed that he wanted them to pay attention and be reason about problem solving. Specifically, Raymond expressed that he wants his students to know and understand what the numbers in the formula mean and why they are being used.

“I want them to realize that there is math going on there, what do these numbers mean...I want my students to be reasoning and sense making in the classroom so they can figure out where the formulas come from and why we are using them”

He expressed a similar concern through his noticing interviews,

“I analyzed him to know if he knows the answer. I want to see if he can justify his answer. ... So getting him to explain things by asking a follow up question. Then I go, “oh he didn’t get it”. I can help him a little more.”

He wanted to know if the student really understood. So, Raymond questioned the student’s answer and asked him to rationalized how he came to his answer.

Promoting a discourse community. Raymond shared that he expects students to communicate and feel comfortable working together (Table 4 & 5). In his goals interview, he explained

“I expect them to collaborate with each other, use the academic vocabulary, to be able to communicate with each other, to listen and engage and ask questions.”

Later in the interview, Raymond addressed ways he has students become comfortable to work in groups and collaborate. In order to do so, he pays attention to group dynamics. He explained what he has done to address students that don’t work well together,

“I will guide them in working together with someone they are not comfortable working with... There are cases where two students have already fought, I’m not going to put them together. I have to be careful of who I put together as well.”

He provides a specific example in his noticing interviews,

“Mariah got into a fight with Jasmine, so I have to keep them separated... I wanted her to feel empowered... Her working with Freddy is a good match because Freddy is pretty polite respectful in general and that Mariah would be safe with Freddy.”

Raymond asked Mariah to help to ‘empower’ her rather than pairing her with a student she has experience conflicts with.

Attending to student as individuals. One theme that was evident across Raymond's interviews was his attention to individual students (Table 4 & 5). He often discussed ways that he engages with individual students, as mathematical learners and at a personal level. For example, in his goals interview, he shared

"I sat down and talked to him; I explained to him, 'I understand this material is getting harder and we've been hard on you lately, but we don't want you giving up'. I gave him that one-on-one attention and told him what we are doing, we are responsible for the student"

Raymond took time to address a concern for an individual student to demonstrate that he was aware that the student was having a difficult time.

There were other instances in his noticing interviews where Raymond addressed interacting with individual students. Raymond described integrating a student into a lesson,

"I brought him up also because he likes to come up to the board and likes the attention and he is actually pretty smart...He doesn't start the work right away or do the work, but the days where I have him come up and do something... those are the days where he is more productive"

Raymond noticed that this student liked contributing to the class when called on, so he made sure to invite him to participate.

After watching another clip where a student blurted out a comment that Raymond initially thought was meant to be disruptive, he discussed how he made sense of the student's comment before reacting,

"I've learned how to communicate with her over the year so that we don't butt heads. I kind of know her personality and what she's saying and doing, what is intended and what

is not intended... It's the teacher's perspective versus the student's perspective. I looked at that moment from the student's perspective"

Raymond addressed past tensions with Jasmine, as well as his perceptions of her personality to try make sense of her comment.

Aside from paying attention to individuals in relation to mathematics learning, he provides students with individual attention at a personal level. For example, Raymond described noticing that a student who is typically engaged in class looking upset.

"Like Jawan comes in and he looks down and out. So I ask him hey man what's going on? Usually, you are smiling and happy. And then he starts blurting out his whole world, so I'm like lets go and talk in the back."

Raymond noticed that this student seemed different. Because Raymond noticed the change in the student, he spoke to Jawan individually and learned that his grandmother had recently passed.

While there was overlap in the things Raymond described through his goals and noticing interviews, there were also themes that came out only through his noticing interviews.

Noticing student deficits. A theme that came across often in his noticing interviews involved Raymond discussing student deficits (Table 4), such as learning or attention problems. This included students having a history of struggling with math or having problems in the home.

"These guys have struggled with math over and over and over again. Some have disabilities and some are visual learners some are kinesthetic learners. They are just different learners....One of the issues we have with this group is that they do not do homework at all, ever. Since kindergarten they have not done homework... there are a lot of broken homes here in this group."

He was speaking generally about the class, explaining that he learned about these students' past by talking to former teachers. While Raymond seemed to acknowledge that there were different types of learners in his class, he focused on deficits.

Enforcing rules. Raymond also expressed the ways he addresses strictness in enforcing rules for students in class (Table 4),

“I'm strict with the rules, but I want to make it light so they'll just take it off, rather than make it a big issue in the class because there are much more important things going on.”

While, he does want student to follow the rules instilled by the school itself, he does not want to draw too much attention off the topic at hand, the mathematics lesson.

Discussion

Our data analysis found similarities and differences in what teachers discussed (Tables 5-6). Table 5 describes themes that overlap between the teachers. While both were nominated as being exceptional equitable teachers, they were not entirely similar in the way they discuss their practices. Table 6 demonstrates areas where teachers discussed completely different themes. The goals interviews showed that while both wanted to create learning environments, which fostered students as sense makers, they differed in the ways they engaged students in sense making (Tim focused on a robust understanding while Raymond tried to connect real world examples). Also, while Tim worried about testing and standards, Raymond was concerned about students at an individual and interpersonal level.

Aside from their goals being different, they had different patterns in discussing their noticing. While Tim addressed the same themes he had addressed in in his goals (seeking to instill a robust math understanding, meaning making, and expressing tensions in teaching for standards), new themes emerged in his noticing interviews (creating discourse communities and

students and attending to the individual student). These themes were similar to those expressed by Raymond in his noticing and goals interviews (Table 5). Themes in Raymond's goals interviewed also aligned with those in his noticing interviews. However, themes emerged in Raymond's noticing (noticing student deficits, enforcing rules) that Tim did not discuss across any of his data (Table 6).

Conclusions & Implications

We sought to understand the noticing and goals of teachers that create opportunities for a wide range of participation in mathematics. This analysis articulates possible first steps to understand practices that seek to promote equity. We identify areas for future inquiry focused on understanding in what ways teacher noticing influences decisions made during instruction. These findings offer ideas to develop targeted learning opportunities for teachers with dispositions towards practicing equity. However, this targeted support cannot be limited to developing knowledge and practices only. For effective and successful implementation of equitable practices, teachers' stories, struggles, and concerns must be addressed.

Appendix

Table 1. Tim goals for teaching

Goals	
Seeking to instill a robust math understanding	<ul style="list-style-type: none"> • Build knowledge of concepts make connections
Meaning making	<ul style="list-style-type: none"> • Everyone participates-share thinking or questions • Time to think • Preparation for future experiences
Expressing tensions in teaching standards	<ul style="list-style-type: none"> • A lot of material to cover for testing in short amount of time • Concerned about keeping kids on board

Table 2. Tim noticing

Noticing	
Seeking to instill a robust math understanding	<ul style="list-style-type: none"> • Students interacting with challenging problems • Building strong foundational knowledge

Meaning making	<ul style="list-style-type: none"> • Opportunity to think • Listening to pairs share and responses • Teacher not the source for answer
Expressing tensions in teaching standards	<ul style="list-style-type: none"> • Not enough time to work through examples or tasks • Losing other's attention by focusing on 1 student
Students accountable for each other	<ul style="list-style-type: none"> • Students coaching and sharing ideas • Students explain clearly
Attention to individual	<ul style="list-style-type: none"> • Trying to figure out what is going on in student's head • Attention to past achievements and completion of tasks • Helping students resolve difficulties

Table 3 Raymond goals for teaching

Goals	
Connecting math	<ul style="list-style-type: none"> • Real world applications to engage students
Meaning making	<ul style="list-style-type: none"> • Reasoning and sense making • Know what numbers and formulas mean
Creating a discourse community	<ul style="list-style-type: none"> • Cohesive group work –listen, engage, ask questions • Students comfortable working together • Use academic vocabulary to communicate with each other
Attending to student as individuals	<ul style="list-style-type: none"> • One-on-one attention • Not giving up on students

Table 4 Raymond noticing

Noticing	
Connecting math	<ul style="list-style-type: none"> • Integrate student's talent
Meaning making	<ul style="list-style-type: none"> • Posing questions to different students • Student justification of answer
Creating a discourse community	<ul style="list-style-type: none"> • Separates students with interpersonal problems • Groups student to empower
Attending to student as individual	<ul style="list-style-type: none"> • One-on-one attention to make student more productive • Understand students' personal lives • Knows student's personality and how to communicate
Noticing student Deficits	<ul style="list-style-type: none"> • Problems with attention or language, learning disabilities • History of struggling with math • Problems in the home
Enforcing rules	<ul style="list-style-type: none"> • Not putting negative focus on inappropriate behavior/ language

Table 5 Similar themes discussed by teachers

Similarities		
Theme	Tim's description (data source)	Raymond's description (data source)
Meaning making	<ul style="list-style-type: none"> Explain rationale and ask questions (goals & noticing) 	<ul style="list-style-type: none"> Meaning of numbers and formulas (goals & noticing)
Engaging students in mathematics	<ul style="list-style-type: none"> Robust understanding (goals & noticing) 	<ul style="list-style-type: none"> Connecting real world examples (goals & noticing)
Attending to the individual student	<ul style="list-style-type: none"> Attention to individual (noticing) 	<ul style="list-style-type: none"> Attention to individual (goals & noticing)
Creating discourse community	<ul style="list-style-type: none"> Coaching and explaining strategies (noticing) 	<ul style="list-style-type: none"> Explain thinking (goals) Comfortable collaborating (goals & noticing)

Table 6 Different themes discussed by teachers

Differences		
Theme	Tim's description (data source)	Raymond's description (data source)
Expressing tensions in practice related to standards and testing	<ul style="list-style-type: none"> Not having enough time to cover concepts thoroughly for testing preparation (goals and noticing) 	NA
Noticing student deficits	NA	<ul style="list-style-type: none"> Student learning disabilities, issues at home, history of not engaging (noticing)
Enforcing rules	NA	<ul style="list-style-type: none"> Ways he enacts rules (noticing)

References

- Aguirre, J. M., Turner, E. E., Bartell, T. G., Kalinec-Craig, C., Foote, M. Q., McDuffie, R., & Drake, C. (2012). Making Connections in Practice How Prospective Elementary Teachers Connect to Children's Mathematical Thinking and Community Funds of Knowledge in Mathematics Instruction. *Journal of Teacher Education*, 0022487112466900.
- Boaler, J., & Staples, M. (2008). Creating mathematical futures through an equitable teaching approach:

- The case of Railside School. *Teachers College Record*, 110(3), 608–645.
- Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches*. Sage Publications.
- Emerson, Robert, Rachel Fretz and Linda Shaw. 1995. *Processing fieldnotes: Coding and memoing*. University of Chicago Press.
- Esmonde, I. (2009). Ideas and identities: Supporting equity in cooperative mathematics learning. *Review of Educational Research*, 79(2), 1008-1043.
- Gutiérrez, R. (2007). Embracing the inherent tensions in teaching mathematics from an equity stance. *Science and Math: Equity, Access, and Democracy*, 18(3), 9–16.
- Gutiérrez, R. (2012). Context Matters: How Should We Conceptualize Equity in Mathematics Education? *Equity in Discourse for Mathematics Education* 17-33.
- Gutstein, E. (2003). Teaching and learning mathematics for social justice in an urban, Latino school. *Journal for Research in Mathematics Education*, 37-73.
- Hand, V. (2012). Seeing culture and power in mathematical learning: Toward a model of equitable instruction. *Educational Studies in Mathematics*, 80(1-2), 233-247.
- Jacobs, V., Lamb, L., & Philipp, R. (2010). Professional noticing of children’s mathematical thinking. *Journal for Research in Mathematics Education*, 41(2), 169-202.
- Ladson-Billings, G. (1997). It doesn’t add up: African American students’ mathematics achievement. *Journal for Research in Mathematics Education*, 28(6), 697–708.
- Lee, C. (2004). *Racial Segregation and educational outcomes in metropolitan Boston*. Cambridge, MA; The Civil Rights Project at Harvard University.
- Martin, D. B., Gholson, M. L., & Leonard, J. (2010). Mathematics as gatekeeper: Power and privilege in the production of knowledge. *Journal of Urban Mathematics Education*, 3(2).
- Nasir, N. S., Hand, V., & Taylor, E. V. (2008). Culture and mathematics in school: Boundaries between “cultural” and “domain” knowledge in the mathematics classroom and beyond. *Review of Research in Education*, 32, 187–240.

- Orfeld, G., & Lee, C. (2006). *Racial transformation and the changing nature of segregation*. Cambridge, MA; The Civil Rights Project at Harvard University.
- Schoenfeld, A. H. (2002). Making Mathematics Work for All Children: Issues of Standards, Testing, and Equity. *Educational Researcher*, 31(1), 13-25.
- Secada, W. G. E. (1992). The reform of school mathematics in the United States. *International Journal of Educational Research*, 17(5), 399–516.
- Secada, W. G. (1995). Social and critical dimensions for equity in mathematics education. In Secada, W.G. Fennema, E. & Adajian, L. B. (Eds.), *New directions for equity in mathematics education* (pp. 146–164). Cambridge: Cambridge University Press.
- Sherin, M. G., Jacobs, V. R., & Phillip, R. (2011). *Mathematics teacher noticing: seeing through teachers' eyes*. New York, NY: Routledge.
- Stinson, D. W. (2013). Negotiating the “White male math myth”: African American male students and success in school mathematics. *Journal for Research in Mathematics Education*, 44, 69–99.
- Tate, W. F. (1997). Race-ethnicity, SES, gender, and language proficiency trends in mathematics achievement: An update. *Journal for Research in Mathematics Education*, 28(6), 652–679.
- van Es, E. A., & Sherin, M. G. (2002). Learning to notice: Scaffolding new teachers' interpretations of classroom interactions. *Journal of Technology and Teacher Education*, 10 (4), 571-596.
- van Es, E. A. & Sherin, M. G. (2008). Mathematics teachers’ “learning to notice” in the context of a video club. *Teaching and Teacher Education*, 24, 244-276.