# HOW CAN UNDERSTANDING STUDENT EXPERIENCE IN THE MATHEMATICS CLASSROOM ENRICH, CHALLENGE, AND HELP US IMPROVE OUR OWN LEARNING AS TEACHER EDUCATORS AND RESEARCHERS?

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*In this paper, we explore the ways in which learning more about research on students' experiences in mathematics classrooms has the potential to transform the work we do with teachers in teacher preparation, professional development, and research settings. We focus in particular on questions of student access to and participation in mathematics and highlight studies of the racialized and gendered experiences of students and the connections between these experiences and broader narratives about race, gender, and ability/disability. We conclude with questions and possibilities raised by these studies for our individual and collective efforts to support and understand teacher learning and changes in teacher practice.*

Keywords: Teacher learning, Student experience, Equity

The title of our paper is a question, not a statement, which we hope will provoke conversation among us. To begin, we would like to introduce ourselves and then explain how we came to ask the organizing question for this paper and use selected studies as cases to help us dive into discussion.

## How Did We Come to the Focus of this Paper?

We decided to use this occasion as an opportunity to further our own learning by highlighting recent work in the field that we think can inform our work with teachers. To that end, we are not attempting a comprehensive review of any kind. Instead, we selected articles, be they written for researchers or practitioners, that would shed light into how particular students have experienced the mathematics classroom. You will notice that some of these accounts and narratives are first-person accounts, while others were generated through close collaboration between researchers and students.

The ways we think about teacher practice and teacher learning in research and teacher education focus heavily on teacher performance - along a variety of dimensions, with a variety of foci. This focus can be seen in the many studies of changes in teachers' practices, in recent practice-based teacher education efforts, and in the variety of observation protocols used to observe, understand, and sometimes evaluate teaching. Both personally and as a field, we have learned a lot in recent decades from thinking about teaching in this way. In our own work, we have learned about ways in which teaching is difficult and complex for teachers, particularly novice teachers; approaches to supporting prospective teachers in developing ambitious teaching practices; the roles of tools such as student work and frameworks of children's mathematical thinking in advancing changes in teachers' practice; and how to design learning environments for teachers to learn together. We have also learned from work that has examined relational aspects of teaching, though primarily from the perspective of teachers, about the importance of teacher care and productive relationships with students (e.g., Bartell, 2011; Jansen & Bartell, 2013).

Studies of teaching can benefit from more attention to the nature of student experience in mathematics classrooms as a lens for understanding teacher practice and teacher learning. When we make this claim, we want to be sure to note that attending to student experience is not the

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same as attending to student outcomes/achievement; many studies have tried to link teacher practice and student achievement. Instead, we are interested in understanding teaching in terms of student experience, which is broader than student achievement or even student learning, and also takes into account students' experiences of mathematics in relation to identity, participation, motivation, and agency (Aguirre, Mayfield-Ingram, and Martin, 2013).

Our interest in this paper is in deepening our understanding of teaching by focusing on students and their experiences because although we have learned many important ideas from focusing on teacher performance and practice, we have yet to deeply understand the link between teaching and student experiences or ways in which teaching might disrupt persistently inequitable patterns in student experiences. Jansen & Bartell (2013) note that, "A teacher may intend to enact care, but unless the care has been received by a student, the student will not feel cared for." (p. 36) This points to a key limitation of research on teacher education that focuses on teacher performance without also considering student experience. In order to address this limitation, we, as teacher educators and researchers of teaching, we are going to foreground research on students' experiences. Connecting and expanding the literatures we put into conversation together can further our efforts to prepare teachers who can create transformative and inclusive classroom and support students' access to and participation in mathematics.

## What do we Know about Student Experience that Might be Helpful for Thinking about Teacher Practice?

In the cases that follow, we focus first on understanding individual students' motivations and experiences related to participation in mathematics discussions. We then move to cases of studies that explored the racialized, gendered, and networked nature of students' participation in mathematics classes. Finally, we explore cases of participation in and access to mathematics in relation to broader racialized, gendered, and ability-related narratives.

### Understanding Students' Experiences as Listeners and Speakers in the Mathematics Classroom

Hintz (2011) studied the experiences fourth-grade students had in two classrooms during classroom discussions. She sat with them as they replayed video from a recent discussion and asked the students to share with her what was happening for them during those segments. In research on classroom discussions, studies have examined how discussions unfold, what children say or do, and what decisions teachers make for discussions to be mathematically productive. Hintz applies a different lens to understanding classroom discussions, as she carefully examines the demands that these discussions place on students both as listeners and speakers and illuminates how students experience those demands. In her 2011 article, Hintz presents the complexities one student, Norah, experienced in a common discussion structure, called strategy-reporting, during which students share the different ways they thought about a problem.

Hintz sat with Norah to look at a particular time when Norah shared her answer to a multiplication problem while also making a hand gesture to indicate that she was not confident it was right. During strategy reporting, teachers commonly ask questions about a student's strategy and often work through any errors that arise. But Norah did not like to share when her solution had a mistake because she anticipated being asked to talk about it in front of the other students. Hintz recounts what unfolded in the classroom and how Norah experienced it:

> During one particular interview, Norah and I rewatched the videotape of an episode during a lesson when she shared a mistake and I listened to her talk about that experience. After solving the problem 14×5 mentally, she had offered up her answer saying, "I think it is 120."

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> As she said her answer she was grimacing with a look of uncertainty and concern. She turned to her neighbor and gestured her hand back and forth in a flip-flop motion showing that she was unsure about her answer. Later in the discussion, as a different answer was decided to be correct, Norah raised her hand and said with a shy smile and shrugging downward, "I counted wrong." The teacher responded, "You counted wrong. And that's OK, we do that all the time don't we? That's part of our life," and moved on with the discussion.
>
> As Norah narrated her experience during this episode, she shared,
>
> *Since I did 14 × 5 = 120, I messed up because I added differently than I should have. I did 4 × 5 is 20 and then I put the one from the 10 right on as 100. I should have thought more about it instead of going right to it. It is kind of embarrassing.*
>
> What she felt was embarrassing was "getting it wrong," and she added, "But if you make a mistake then you can keep practicing that problem and it will become a fact that you know. Next time I would still start with 4 × 5 = 20 but then I would do a different step." This comment reveals that she sees the potential for learning from your mistakes and continued practice. Yet the social consequences of making a mistake publicly weighed heavy on her mind and shaped how she chose to take on the roles of sharer and listener. An important part of why Norah did not like to share when her solution had a mistake was because of how she may have been asked to engage in talk about the mistake with her teacher in front of the other students. It is common during strategy reporting for a teacher to ask questions about a student's strategy when there is a mistake in an effort to uncover a misconception and work through an error. In talking about this experience, Norah said, "Sometimes I don't like to make mistakes because it's kind of embarrassing when you thought you got it right and then you got it wrong and then you have to keep working out loud" (Hintz, 2011, p. 268).

Norah explained she was happier not to be called on when her thinking was incorrect. It does not seem, in the way she recounts her experience, that she does not like revising her thinking. But, she feels badly doing it in front of others. The teacher, like many of us, tries to normalize mistake making. Classrooms benefit when a norm is established that it is okay to be wrong. And certainly we do not have evidence other students made Norah feel badly. Still, her worry was real and impacted whether or not she wanted to participate. And Norah's feelings about sharing and listening are not unidimensional. She also told Hintz that she liked hearing and using other students' strategies, and that she was comfortable trying out multiple strategies until one worked for her. If the teacher also understood the complexities of how Norah felt, what kind of dialogue between them could help Norah process these experiences and grow from them?

Amanda Jansen's work (e.g., Jansen, 2006, 2008) similarly focuses on students' experiences with participating in classroom mathematics discussions. In this work, she identifies relationships among middle school students' beliefs, motivation, and participation in whole-class discussions. Through in-depth interviews with students and many hours of classroom observation, she identified student beliefs that both constrained and supported student participation in whole-class discussions. Some students she interviewed echoed Norah's feelings about the risks of verbal participation and the benefits of listening during mathematics discussions.

Students in her study also demonstrated motivation to participate more actively in order to meet social or behavioral goals, such as helping others. In particular, these students believed in the value of participation for supporting their own learning and understanding of mathematics. These views were exemplified by Becky:

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> Becky: And when you have to do problems, don't just sit there. You have to get into the conversation in order to actually get it yourself and make you understand it, don't just understand it like how other kids do it. (Jansen, 2006, p. 417)

Consider Becky's perspective and Norah's side by side. One common practice in mathematics classrooms is to collect answers and then ask students to share those answers. While many conceptions of and research on ambitious pedagogy focus on the importance of discussion for learning, it is important to also recognize the risks of participation that can be inherent in participation for some students. Further, while teachers may work on class-wide strategies for encouraging participation, we need to understand that these strategies will be received and understood differently by different students, depending on their prior experiences, beliefs, and goals. How often do we learn about what our students are experiencing in the classroom? How can we create the time and gain the trust for students to tell us? Taken together, Hintz's and Jansen's work remind us that participation in mathematics discussion can take many forms and that understanding the ways in which listening, questioning, and other forms of participation support learning is important work. Finally, Jansen's findings illustrate the deep interconnectedness of students' social and academic goals and beliefs in shaping students' access to and participation in mathematics.

**Understanding Students' Participation and Positioning as Racialized and Socially Networked**

In the next section, we continue to learn from and about students' experiences in mathematics classrooms with a focus on the social aspect of participation as racialized, gendered, networked, and closely connected to mathematics access and achievement.

Maisie Gholson's and Danny Martin's work (2014) takes a "microsociological (e.g., Shalin, 1978) approach" to understanding Black girls' experiences in a mathematics classroom, "using the girls' voices in this study to make sense of the emergent social structures that organize access to mathematics participation and learning." (Gholson and Martin, 2014, p. 19). Through this approach, they identify the shifting roles, identities, and social networks within a 3rd-grade classroom that not only affect the girls' social identities, but also shape their access to and success in the classroom mathematics. They find that even those students who identified as "competent mathematics students" found their access to participation in mathematics class "mediated" by their positioning within the social network of the classroom, especially their positioning in relation to the "high-status cluster" within the network. (p. 30). The close connection between social positioning and access to classroom content is illustrated through the story of Shawna, a strong mathematics student who identified as good in mathematics, but often found herself outside the "high-status cluster" of the classroom girls' social network:

> M(Gholson): Like if Ms. Robinson calls everybody to the rug, sometimes you'll sit at your desk or sit at the very back. Do you think that's true?
>
> S: [Nods affirmatively.] When she calls us to the rug, I'll stay at my desk sometimes.
>
> M: Why do you like to stay at your desk sometimes?
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> S: Because I don't like to go to the rug.
>
> M: Is it good to sit away from the rug and get away from people sometimes?
>
> S: Yes.

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M: How does it make you feel when you sit away from the group? Does it make you feel good? Does it make you feel bad?

S: Good.

M: It does? And why does it make you feel good?

S: Cause some of the people mess with me.

(Interview 03/01) (Gholson & Martin, 2014, p. 28)

Gholson and Martin go on to say that, "On the rare occasions when Shawna was included by one or more of the girls in a classroom activity, she was highly engaged." (Gholson & Martin, p. 28) Gholson and Martin conclude that, "It is not uncommon for reports of studies of mathematics learning to state explicitly that any talk not related to mathematics was excluded from the analyses. However, this necessarily dismissed children's social worlds as unimportant and misunderstands the intimate connection between children's learning of disciplinary content, such as mathematics, and their social relationships." (p. 31).

In more recent work (Gholson & Martin, under review), the authors use a performative framework to analyze classroom video and student interview data in order to understand how one student, a Black middle school girl, positions herself within mathematics class. They focus in particular on the movement of bodies within the mathematics classroom space and illustrate how the performative lens allows us to see the ways in which "mathematics learning is a contextualized performance, requiring and enabling children to simultaneously negotiate race, class, and gender." (p. 4) In doing so, they illuminate the ways in which mathematical practices, described abstractly in documents such as the CCSSM, are realized through embodied performances.

Gholson and Martin's work helps us understand how we can miss salient aspects of students' engagement with and access to mathematics when we focus only on overt teacher and student behaviors and only on students' interactions with and identities in relation to content. Understanding students' positioning with respect to one another, as well as to the content, provides a lens for making sense of patterns of student participation. At the same time, Gholson's and Martin's long-term and deep interactions with students lead to compelling narratives of the personal, social, familial, and community contexts in which students' mathematical development is situated. We wonder if and how teachers can engage in similar long-term and deep interactions leading to the co-construction of student narratives. Finally, Gholson and Martin point to the ways in which students' classroom and network positioning is situated in broader narratives of race, gender, and ability in mathematics classrooms. These narratives are the focus of the next set of studies described below, by Shah, Lewis, and Rubel.

**Understanding Students' Experiences of Narratives of Race, Gender, and Ability/Disability in Mathematics Classrooms**

The classroom, while a community onto itself, is of course constitutive of the outside world. Shah (2017) interviewed 35 high school students across 4 classrooms who went to the same high school in Northern California. They identified as Asian, Black or African American, Latinx, Polynesian, White, and mixed race. He was interested in how students invoked racial narratives when they talked about mathematics learning, how these narratives worked in relation to one another, and what these relationalities meant for how students were positioned with respect to

race. A primary interest in his work is to study how students make sense of these racial narratives and how it contributes to the shaping of racial ideologies and students' own identify formation.

It is not surprising that the adolescents he talked to reported hearing numerous racial narratives at school and that they were in line with what Danny Martin (2009) has called a racial hierarchy of who is good at mathematics. Within his data corpus, students invoked 98 different racial narratives over a broad range of topics from intelligence, academic performance, and ability to body type, personality, cultural practices and career paths. Shah examines how various racial narratives and their interconnections impacted their everyday experience in the mathematics classroom. For example, at the time of the study, Troi was a higher performing senior in an advanced course of Precalculus. Troi's statements about how a substitute teacher's might react to him conveys how he is aware of the racial hierarchy in mathematics with respect to how Indians and Samoans are perceived in mathematics, "'Yeah, so say a substitute teacher would come in [to class] and she'll see the Indian kid and think, 'Oh he must be the best one here in math,' and she'll look at me and think, 'How did he get into this class? What the heck is he doing here?'" (p. 23). Moreover, as Shah explains in this next excerpt, for Troi, narratives about intelligence were linked to narratives about physicality and mathematical ability:

> Polynesian students at Eastwood High were a small but prominent population on campus. Samoan and Tongan cultural practices were well represented in school events, and the Polynesian male students in particular were known for their participation in contact sports, such as football and rugby. Several of the faculty I spoke with viewed them as "troublemakers" and found them difficult to manage in their classes. In the excerpt below, Troi (Samoan, 12th grade) elaborates on how perceptions of Polynesian bodies and personalities contributed to their being positioned as mathematically, academically, and intellectually inferior:
>
> > Other students just see me as big and mean…and here [at Eastwood High], the Polynesian kids are seen as like we're big, that we do whatever we want. Like we're not very intellectual, and like we're not smart. But once they meet me they'll know that I'm actually very intelligent, and I can do math, I know how to do English, I can do science…all that kind of stuff. I think when I come in they just see me as someone who's going to hurt them or beat them up or someone who freaking wants to kill. They're not going to take time out to sit and talk with me, and actually greet me and actually get to know me.
>
> In this excerpt, Troi draws connections among multiple categories of racial narratives. Initially, he connects a narrative about Polynesians being "big" to narratives about Polynesians being seen as "mean" and "someone who's going to hurt them or beat them up or someone who freaking wants to kill." The relations among these narratives evoke an image of Polynesian students as angry and violent people that others should fear. Indeed, Troi implies that classmates tend to avoid him, and do not attempt to "greet me and actually get to know me." But Troi perceives these narratives to be consequential in ways that go beyond his social standing. They also matter for how Troi is positioned from an intellectual standpoint. After invoking narratives about Polynesians' body type and personality, he notes that people view Polynesians as being "not very intellectual." (Shah, 2017, p. 27-28)

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Reading Troi's experience and the many others in Shah's article provides us with a compelling window into how students feel about the way they are read by others and the very real consequences for the educational opportunities they pursue or not. Implicit in Troi's description is a rather segregated social space. If students do not have genuine opportunities to develop friendships across cultural and racial groups, how does the lack of relationships figure into the ways they are asked to interact in the academic setting of the classroom? How do teachers check their own assumptions and views of particular racial and cultural groups in the school? Where do the perceptions about troublemakers get challenged?

**Understanding how students with learning disabilities developing systems to compensate for cognitive differences.** Katie Lewis studies the characteristics of mathematics learning disabilities. Drawing on sociocultural frameworks, she analyzes how students make sense of mediational tools such as symbols and representation when doing mathematics. Importantly, she tries to understand the resources that students use not what they seem to lack. One important turn in her recent work is to marry the Vygotskian notion of compensation with a critical disability studies frame. By collaborating with individuals with mathematics learning disabilities, she has been documenting the intentional actions that they take to gain access to spaces, context, and mediational tools in mathematics that would otherwise be inaccessible to them. This emancipatory research inverts the typical power dynamic between researcher and researched.

In a recent paper, Lewis and Dylan Lynn (2018) discuss the significant and persistent challenges Dylan, who graduated with a major in statistics from UC Berkeley, encountered when doing mathematics and how she compensated for them in order to succeed. Together they documented eight distinct compensatory strategies by analyzing videos of interactions between and another college student with mathematics learning disabilities and interviews with Katie. Dylan's challenges included inverting numbers, distinguishing symbols, making sense of dense notations, and understanding the impact of operations on values. She had developed her own system of addressing these challenges which included the use of mathematical tools such as graph paper, particular colored pens and pencils in ways that helped her navigate notations and solution processes.

We will give you one particular example of these compensatory strategies. An important aspect of understanding Dylan's experience was how our education system's policies were set up to exclude her and actively discourage her from pursuing mathematics. When she was diagnosed with a disability in college, the university's response was to waive her mathematics requirement. There was no real way for her to be supported to continue with mathematics, and she had to find her own way to persevere. She learned what to ask her tutors to do, and she had to persist through numerous course graders who complained about the length and verboseness of her assignments. In the excerpt below, she explains how one strategy of rewriting mathematical symbols into words supported her understanding of new concepts and notational system.

> Dylan: "This is calculus, but you can see it illustrated with this notation [*writes f(x) = x + 4x3; see Figure 2*] this notation, the way people say this is "f of x" which is also terrible. It's the *function* of *x* equals this [*as writing "function of x = x + 4x3; see Figure 2*]. This little notation here [*points to f(x)*] would throw me off really badly in my classes, because f times x? No, it's a notation that is basically applying this function to the variable x. I would sometimes write out something like this [*writes bracket underneath "function of x"*] right underneath whatever it was and again, this is really verbose, [but] it might be helpful."

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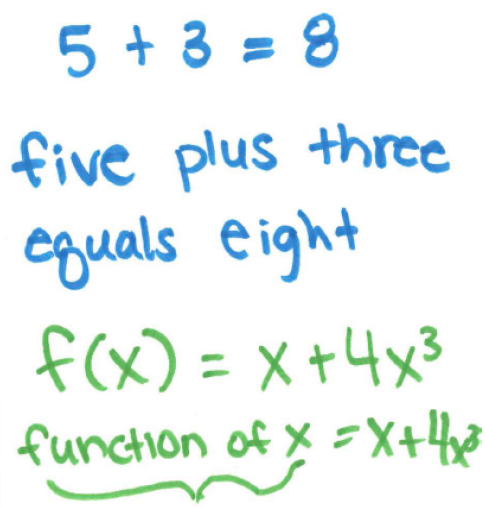


**Figure 2.** Dylan's examples of rewriting mathematical symbols with words, which helped her translate and make sense of the meaning of the notation.

> Dylan noted that she often used this kind of translation in her notes to help her decode the meaning of the symbols, and described it as her creation of metadata for the notation. ...
>
> This translation of symbols into words took Dylan extra time both when writing notes and when solving problems. Because this kind of translation was not available in her classes or textbooks, she paid tutors to provide this kind of support. She explained that "I would force tutors to give me the English words for the symbols, which was always funny because these are grad students who haven't thought about this stuff in years. 'How would you use this in a sentence? I haven't thought about it that way.'" The kinds of supports that Dylan needed were not something that the tutors were skilled at providing. Although this compensatory strategy provided her with a way of understanding the mathematical symbols, it placed additional demands upon her requiring that she spend more time and money than her peers to have access to mathematics. (Lewis & Lynn, 2018, p. 6-7)

One theme that is beginning to emerge in the selections we have made is how much students are doing and thinking about that is not available to the teacher. The full study documents many more strategies that Dylan generated to help her understand and advance in her mathematics coursework. Her brilliance and ingenuity are so clear, even though it appears that her college instructors are not empathetic to how much more work she does in order to be sure she understands.

**Understanding students' gendered experience in the mathematics classroom.** There are many issues with respect to gender and sexuality that we need to consider as mathematics educators. Gender narratives around mathematics have been typically associated with masculinity. In a brief article written for practitioners (Rubel, 2016), Laurie Rubel recounts her own experience as a teacher in a professional development session led by a mathematician who was engaging participants in how problems could be modeled with graph theory. He chose a regularly used problem because its purportedly binary categories would simplify the mathematics for learning purposes. But that is not how she experienced it, as she explains in this next excerpt.

> When I was a beginning teacher and in my twenties, I attended a professional development course for mathematics teachers, in which the Stable Marriage problem was explored as an example of a problem that can be modeled with graph theory. The facilitator, a professor of mathematics, led an activity similar to the one described above. He handed pink cards with fictitious names to the people he identified as women in the room and blue cards to the men. He told the women, holding the pink cards, to create rankings of their marriage preferences. If you were a woman, you were holding a pink card, and you were allowed only to rank your choices of men as spouses.
>
> I remember feeling uncomfortable with this arrangement. When I voiced an objection to this constraint, I was told that this is the set-up of the problem. In other words, this problem is not really about marriages. The problem refers to a particular kind of mathematical pairing between set A and set B. The story about men and women and marriages is just a story to lead us to a particular mathematical model. The story is supposed to help clarify the parameters of the mathematical model. "Just focus on the mathematics," I was told, even though I was being handed a pink card and thereby being placed in a particular location on a gender binary. Not only that, but heteronormativity was being reinforced with the statement that, in this model, all women have to want to marry men. (Rubel, 2016, p. 438)

There are several important ideas here that are important for our work with teachers. As a student in this context, Laurie, tried to speak out but was rebuffed. The teacher responded to her by admonishing her to just focus on the mathematics, making her own reaction to the problem irrelevant. So even though the algorithm they were studying had been applied to settings where college applicants are matched with colleges or medical students with residencies, the context of this problem was set in marriage between heterosexual couples, and students were not given a choice in their gender assignment or whether they wanted to use the marriage context for an extended discussion. Through her writing, Rubel pushes us to take up Rands' (2013) idea about gender-complex education, directly acknowledging gender diversity by making our curriculum and pedagogy reflect the existence of transgender and gender nonconforming people. If mathematics is a way of making sense of our world, it seems impossible to discount our world to just focus on the mathematics.

**What Theoretical Frameworks are Researchers Drawing on to Study Student Experience?**

A rich array of critical theoretical perspectives are used across these studies to help us interpret student experiences. Noting these are important for what theories we study in teacher preparation, doctoral preparation, and our own ongoing learning. Psychological, cognitive, and sociocultural theories of learning are likely to be insufficient in helping us understand students' mathematical learning. In this small collection of articles, scholars are drawing on theories that help us attend more to relations of power and how race, gender, class, ability, and sexuality shape these relations. Social theorists, philosophers, critical race theorists, disability studies, black feminist scholars, and poststructural theorists, to name a few, are being used to bring depth and complexity to our understanding of teaching, learning, schooling in how they shape students' learning, their identification with mathematics, their experiences as learners and the meanings of their education.

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**How Did Researchers Learn about Student Experience?**

Narrative plays a central role in the studies we have highlighted here. Spending time with students over a long period of time to come to understand their varied experiences is common to them all. Interviews aided by video enabled Lewis and Hintz to have moment-by-moment interpretations of what students were thinking, and doing, and feeling. In his interview protocols, Shah asked students to comment on cartoons that conveyed narratives that broadly circulate in society. Rubel and Dylan use personal biography tell us their own stories, albeit in different ways. Rubel shares her own stories as a way of speaking out and speaking up. Lewis, in her collaboration with Dylan, provides an example of emancipatory research, which aims to transform the relationship between researcher and researched. Many of these stories are not readily shared by students with one another or with their teachers. So in some respects we can expect that many of us through our teaching would not necessarily have access to these stories. They demand then, that we think about the relationships we need to foster, and the kinds of interactions we need to have with students in order to better understand what is happening for them as they try to learn with one another.

**What are the Implications of Thinking about Teacher Practice in Terms of Student Experiences?**

Students' participation in and access to mathematics is not solely or even primarily about the student's mathematical competence or the teacher's moves. Instead, it is about the individual, social, and cultural narratives within which the student is positioned and positions her/himself. Therefore, any study of or work with teachers should include attention to ways in which teachers can learn about these individual, social, and cultural factors, along with how the work of teaching can respond to and/or disrupt their effects in ways that provide opportunities for greater access and participation for all students, particularly those who find themselves marginalized in classroom communities.

The cases we have selected here are not full of joy and delight and liberation while our goals for teaching and education purportedly are. Instead they are filled with tension, with challenge, with being unknown and unseen. Like Shah, we wonder, “Do all students have the opportunity to be seen for what they are truly capable of doing in a classroom?” (p. 36). But we think it is worth pondering how that can be difficult and perhaps not normative. The work discussed above has important implications for the work of teaching and our work with teachers. In our work as teacher educators, we must intentionally build time and space for teachers not to just reflect on their own teaching, what went well and what did not, what did they observe and notice in their classrooms, but also what did their students directly teach them. It leads us to ask how teachers learn about student experiences and how they respond to what they have learned. What did students think and feel and experience during a lesson? How did they feel they were treated? What was challenging to do and what was not? What enables students to develop enough trust to be in honest conversation with their teachers and their peers about how they are experiencing the classroom community?

It would be an understatement to say coming to learn about how students are experiencing the classroom takes a lot of skill and empathy on behalf of teachers and the ability to step outside of one’s own worldview, to suspend judgement. What do teachers need to know and be able to do to understand and engage with student experience? How can teacher educators support teachers in learning these things? Is it possible for teacher and teacher educators, given their positioning and authority in classroom spaces, to elicit and learn about student experiences in the ways that researchers do? In many of the studies described above, teachers were not aware of the student

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perspectives and experiences uncovered by researchers. Students' experiences remained hidden from teachers, either because the experiences are happening in students' worlds, where teachers may not belong, and/or because teachers and students are not having the kinds of conversations that researchers and students have had. Even if we acknowledge that it is not fully possible for teachers to access students' experiences in the ways that researchers are able to, how do we take what we are learning from these researchers about the emotional, motivational, social, structural, political, and identity-related aspects of students' experiences in mathematics and use these understandings to build mathematics classrooms and teaching practices that pull students in and increase access to mathematics rather than pushing them out and preventing access?

Despite all of these questions, we can begin to imagine how this work related to student experiences might transform the ways we work with teachers in teacher education and professional development settings. For instance, what if the focus of a mathematics methods course assignment or professional development experience was for teachers to deeply understand the experiences of a student who was different from them along one or more dimensions of identity? The goal would be to understand not just their knowledge and ways of thinking about mathematics, not just their home and community-based funds of knowledge, as has been explored in other projects (e.g., Aguirre et al., 2013), but the ways they experience participation, their positioning in the networks of the classroom and community, their relationship to broader racial, gendered, and ability-based narratives? What would this understanding motivate teachers to want to know and be able to do in relation to mathematics teaching? What further questions would they want to ask? What if teachers collected video and sat with a few students to get their take on what was happening in the classroom?

The work on students' experiences also has implications for studying teacher learning and practice. In fact, it was in the context of a project studying novice teacher practice that Elham (a member of the project's advisory board) suggested the focus of this paper. As we explored various protocols for studying (or measuring) teaching practice, we (the project team) asked Elham what we might be missing when viewing teaching through the lens of these protocols. She suggested that student experience was notably absent and asked the question at the center of this paper – What if we focused on student experience as well as teacher performance when studying teaching practice? How would that change the ways we study teaching or work with teachers to improve teaching? Some research projects have begun to move in this direction and we will be interested to follow the extent to which they are able to move the field forward in understanding teaching in terms of student experience. For example, the work of several researchers and partner districts on "practical measures of instruction" builds on ideas related to improvement science (Bryk et al., 2015) to incorporate quick and actionable measures of student experiences in class discussions into professional development and the improvement of teaching. Another example might be the work of Reinholz and Shah (2018) on "equity analytics" - quantitative measures of who is getting access to the mathematics and mathematical discourse during classroom instruction. While neither of these examples fully capture the richness of student experiences in the ways described above, they do provide tools and processes for teachers and researchers to gain some understanding of student experiences as they unfold in the context of instruction. These examples also suggest the importance of research-practice partnerships in both understanding and improving teaching through a focus on student experience.

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In conclusion, we wonder about directions for our own learning. How do we continue learning about student experiences in mathematics classrooms and the ways in which those experiences are related to learning, to power and participation, and to dimensions of identity including race, gender, and class? How do we teach each other about these ideas and how do we support teachers in learning about, responding to, and enhancing student experiences in ways that promote access to rigorous mathematics for all students? An important aspect of the studies described above is that they each draw on theories that go well beyond the theories of learning we learned in graduate school. How will we and our doctoral students learn about these theories and/or work together to bring multiple theoretical lenses to these questions? By addressing these questions in collaboration with one another and with teachers, we can begin to make progress in understanding and supporting teaching that disrupts inequitable patterns of participation and provides access to mathematics for all students.

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