

Mathematics Teacher Educator

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ARTICLE TITLE:

AUTHOR NAMES:

DIGITAL OBJECT IDENTIFIER:

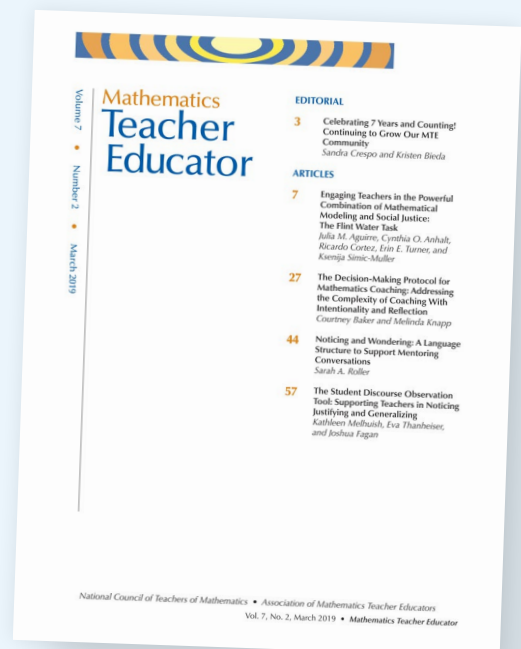
VOLUME:

ISSUE NUMBER:

Mission Statement

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When Only White Students Talk: EQUIP-ing Prospective Teachers to Notice Inequitable Participation

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We introduce a teacher learning practice called *EQUIP-ing*, which aims to foster sociopolitical noticing by leveraging EQUIP, an equity-oriented classroom observation tool. We detail our iterations of EQUIP-ing to a field-based Number Talk experience in a secondary mathematics methods course with 25 White prospective teachers (PTs). We offer empirical accounts of how EQUIP-ing empowered PTs to connect their teaching practices with racialized and gendered patterns of student participation; as a result, PTs began to reconsider taken-for-granted practices. However, we also found that PTs demonstrated potentially detrimental ways of attributing marginalizing patterns to minoritized students without actionable plans to redress the inequity. We conclude by inviting mathematics teacher educators to apply EQUIP-ing while emphasizing purposeful support for asset-based noticing.

Keywords: noticing; race; gender; equity; Number Talk

EQUIP-ing Prospective Teachers

Supporting prospective teachers (PTs) to recognize the sociopolitical contexts of teaching is increasingly becoming a focus of teacher preparation programs (Carter Andrews et al., 2017; Turner et al., 2012). In mathematics teacher education, these efforts have included introducing PTs to innovative pedagogical approaches that draw from minoritized students' cultural, racial, and linguistic assets (for an overview, see Bartell et al., 2017; Celedón-Pattichis et al., 2018). One critical piece in this endeavor is equity-oriented noticing (Hand, 2012; van Es et al., 2022; Wager, 2014). Without

noticing classroom-level inequities, PTs would not see the need to rethink taken-for-granted teaching practices that produce inequity (Wager, 2014). An important problem of practice for mathematics teacher educators arises: How can mathematics teacher educators support PTs to notice inequitable patterns, especially subtle forms of inequity, in ways that amplify equity for students from minoritized social marker groups?

To address this problem, we present a practice called *EQUIP-ing*, which we argue can support equity-oriented noticing. EQUIP (<https://www.equip.ninja>) is a classroom observation tool that generates quantitative analytics on participation patterns disaggregated by social marker groups (Reinholz & Shah, 2018). We define EQUIP-ing as a practice of teacher learning in which teachers use EQUIP data to identify classroom-level inequities in terms of social marker groups, interpret those inequities in sociopolitical context, and then redress inequities in ways that prioritize the needs of minoritized groups.

In this article, we demonstrate the practice of EQUIP-ing by applying it to a commonly used activity focused on eliciting students' mathematical thinking: Number Talks (Humphreys & Parker, 2015; Parrish, 2010). Our study explores how 25 White PTs in a mathematics methods course noticed equity and inequity by EQUIP-ing a Number Talk they taught as part of their fieldwork. Specifically, we investigate this research question: *What are the affordances and constraints of EQUIP-ing for PTs' noticing of inequity?*

We begin with a brief overview of the teacher noticing literature, which is followed by our conceptualization of the practice of EQUIP-ing. Next, we analyze the impact of PTs' EQUIP-ing of their Number Talks on three facets of teacher noticing: attending, interpreting, and responding (Jacobs et al., 2010; Wager, 2014). Our findings show that EQUIP-ing has the potential to amplify PTs' attending to inequities—particularly racial inequities—but that additional support structures are needed to support sociopolitically grounded forms of interpreting and responding. We conclude by discussing how other aspects of PTs' learning in methods courses might be EQUIP-ed (e.g., effective group work), as well as limitations of EQUIP-ing and how they can be addressed in the future.

Equity-Oriented Noticing in Mathematics Teacher Education

Foundational studies on teacher noticing focused on teachers' noticing of students' mathematical thinking (Sherin & Han, 2004; van Es & Sherin, 2002). Building on this work, Jacobs et al. (2010) conceptualized noticing as a set of interrelated skills, which include "attending to children's strategies, interpreting children's understanding, and deciding how to respond on the basis of children's understandings" (p. 169). Although these studies highlighted teachers' cognitive processes and students' mathematical thinking, multiple scholars have expanded on this foundation by emphasizing the broader social and sociopolitical contexts of teachers' learning to address inequity (e.g., Dominguez, 2019; Louie, 2018).

Drawing on situated theory, for instance, Hand (2012) identified cultural and sociopolitical forms of teacher noticing as a necessary component of equitable mathematics teaching. Relatedly, Wager (2014) extended Jacobs and colleagues' framework from a focus on noticing student thinking to noticing student participation. Wager found that the teachers' equity-oriented noticing is associated with their positionality as equity-oriented teachers. Equity-oriented noticing has since been extended to focus on issues specific to minoritized social marker groups, including the noticing of racial phenomena (Shah & Coles, 2020) and the strengths of linguistically and culturally diverse learners (Crespo et al., 2021; McDuffie et al., 2014). Louie et al. (2021) crystalized this equity-oriented form of noticing as "sociopolitical framing" in their FAIR framework (Framing, Attending, Interpreting, and Responding). They argue that the added component of sociopolitical framing shapes and is shaped by all three other interacting components. These further developments of the framework acknowledge that teacher noticing is a social practice, mediated by broader social and sociopolitical discourses that often undervalue the knowledge and abilities of minoritized students.

Building on this sociopolitical understanding of noticing, this article aims to contribute to the development of teacher learning practices that can support PTs in engaging with sociopolitical aspects of noticing in a tangible manner. The aforementioned studies offered a range of learning opportunities for PTs, such as engaging with simulated classroom scenarios including multilingual learners (Crespo et al., 2021); identifying racialized moments and formulating ways to respond to them (Shah & Coles, 2020); and analyzing video excerpts of mathematics lessons (McDuffie et al., 2014). Although these activities successfully incorporate sociopolitical perspectives in PTs' learning to teach mathematics, the challenge remains in situating PTs' sociopolitical noticing *in their own teaching*

with their own students. In other words, we wanted to better address the need for bridging two teacher learning spaces: the university methods course and accompanying field-based teaching experiences, often referred to as the "two-worlds pitfall" (Feiman-Nemser & Buchmann, 1985). With EQUIP-ing, we aim to bridge PTs' learning of sociopolitical issues in the methods course with their social marker-conscious noticing in field-based teaching experiences.

EQUIP-ing: A Practice to Support Teacher Learning About Inequitable Participation

The EQUIP tool, a free, customizable web app, has been utilized in a wide range of teacher education settings (Herbel-Eisenmann & Shah, 2019; Reinholz et al., 2020; Shah et al., 2021). EQUIP generates analytics on classroom participation patterns at three levels: whole-class, groups of students by social marker (e.g., race, gender, disability), and by individual students. Users customize and code dimensions of classroom discourse, such as the quality of a teachers' questions or the length of student talk—the EQUIP app then allows users to disaggregate these discourse dimensions by social markers (see Reinholz & Shah, 2018 for more details). This feature allows teachers to track what proportion of high-level questions went to, for example, Native American or Black students with disabilities.

In EQUIP-ing their Number Talks, the PTs in this study videorecorded themselves teaching, coded those videos, and then reflected individually and with other PTs about the equity patterns revealed by the EQUIP analytics. The practice of EQUIP-ing is grounded in several assumptions about how teachers learn equity-oriented forms of noticing.

First, inequity cannot be confronted unless it is explicitly identified and named in terms of specific social markers. For instance, research in teacher education has documented rampant color-evasiveness among White PTs (Haviland, 2008; Shah & Coles, 2020). EQUIP analytics automatically disaggregate data by social markers like race to mitigate such avoidance. Indeed, the EQUIP app includes race as a default social marker to encourage users to consider race and racism in the classroom. Second, teachers are more likely to value data when it comes from their own teaching. Whereas grappling with hypothetical teaching scenarios or participating in teaching simulations can offer important learning experiences, there is something powerful (and potentially less deniable) about analyzing data from one's own teaching (e.g., Sherin & Han, 2004).

Finally, identifying inequities only matters if they lead teachers to redress those inequities, specifically in ways that prioritize minoritized groups. Frequently, mathematics educators pursue generic, “for all” versions of equity (Martin, 2003). These efforts often fail because they are reticent to acknowledge that different social marker groups hold different histories of oppression (and resilience) and therefore require different resources. At its best, EQUIP-ing facilitates a sociopolitically sophisticated, multidimensional interpretation of classroom-level data, where teachers situate EQUIP analytics in the context of oppressive institutional structures, personal bias, and longstanding societal narratives about minoritized groups. As we will discuss, though, realizing this vision poses a legitimate challenge for MTEs.

Methods

Research Setting and Participants

Our implementation of EQUIP-ing was situated in a mathematics teacher preparation program in a large public university that serves predominantly White students in the Midwestern region of the United States. The course was one of two required methods course that focuses on facilitating equitable learning opportunities through designing or adapting tasks, facilitating mathematics discussions, and reflecting on (in)equitable student participation. The topics included complex instruction (e.g., Horn, 2012), equity issues in mathematics education (e.g., Aguirre et al., 2013), teacher discourse moves (e.g., Herbel-Eisenmann et al., 2017), and teaching mathematics for social justice (e.g., Gutstein & Peterson, 2005). This course required PTs to spend 4 hr every week at field placement, with gradually increasing involvement in the instruction with their mentor teachers. Four major teaching tasks were assigned: Number Talk, Chalk Talk, test review session, and a full lesson. Although we integrated EQUIP-ing in all four teaching tasks, we focus in this article on its integration into Number Talk because it was the PTs’ first use of EQUIP over the course of the semester and it therefore highlighted the most salient effect on PTs’ noticing.

The three-person author team consists of mathematics educators who identify as two Asian men and one disabled White person. From our relatively privileged positionalities in mathematics, we recognize the importance of supporting other nonracially minoritized mathematics teachers to address racial inequity in mathematics classrooms. We worked with 26 participating PTs: 19 White women, six White men, and one woman of color. Elsewhere we have focused on the experiences of teachers of color and ways of supporting them (e.g., Reinholz et al., 2020; Shah & Coles, 2020). However, for this study,

we focused on the White PTs for multiple reasons. First, we aimed to address head-on the well-documented challenge of engaging White PTs in questions of race (Haviland, 2008; Shah & Coles, 2020). Although this narrowed focus risks silencing the lone PT of color, we felt that supporting teachers of color deserves a more thorough treatment than space allows for here. Second, we also faced ethical concerns related to research reporting. Because she was one of the only PTs of color over the 2 years in the mathematics teacher preparation program, identifying her with social markers poses the risk of exposing this person’s identity.

During the first iteration (Spring 2019), the first two authors cotaught the course, and for the second iteration (Spring 2020), the first author cotaught the course with another instructor. The third author contributed to the design, analysis, and reporting of the implementation. We combined the data from two iterations for the thematic analysis reported here because the two cohorts had similar demographic characteristics and experienced the consistent use of the same assignment, outlined as follows.

EQUIP-ing the Number Talk Assignment

Before PTs’ Number Talk, we introduced EQUIP, focusing on its use and affordances as discussed above. The class watched and coded a sample video of mathematics teaching to familiarize students with the app. This introduction was coupled with a whole-class discussion on three different teachers’ roles in addressing gender equity (Levi, 2000). We purposefully chose to begin the discussion with gender issues because more gender diversity was represented in the classes (six men and 20 women), rather than other social markers, such as race. The initial focus on gender allowed us to draw from a wider range of marginalized learning experiences of the PTs. On the basis of the reading, PTs discussed if they should “provide equal opportunities and respect [gender] differences,” “ensure that [students] have the same experiences” regardless of their gender, or “attempt to compensate for gender differences in society” (Levi, 2000, p. 102). This discussion offered a common frame of reference for different ways the PTs may respond to the observed disproportionate participation patterns and also raised questions about their responsibilities to students in their professional capacities.

After the enactment of their Number Talk, PTs engaged in individual and small-group reflective activities based on their video-recorded Number Talk facilitation. PTs produced EQUIP analytics on their own (see [Appendix A](#) for the guidelines) and developed written reflective memos on participation patterns that are visualized in the EQUIP

analytics. We then facilitated an in-class small-group reflective discussion (see [Appendix B](#) for the guiding questions). This discussion was to allow PTs to negotiate their meaning-making of the observed patterns with other PTs. We grouped the PTs together with someone who is familiar with the teaching context (e.g., PTs who share a mentor teacher or school site) so that PTs could draw from their broader contextual knowledge about the school and community to interpret the participation patterns in EQUIP analytics.

Data Sources and Analytical Approach

To examine the effect of integrating EQUIP into Number Talk, we gathered PTs' written individual reflections and audio recordings of their group reflections. We chose these two sources of data because of their differing audiences. First, *individual reflections* were part of a half-page double-spaced written assignment that was submitted to only the instructors with the length of a half-page double-spaced. Second, *group reflections* were small-group discussions that lasted for roughly 10 min of class time. These discussions were audio-recorded then transcribed for further analysis. After introducing guiding questions to launch the discussion, the instructors played a minimal role during the discussions (see [Appendix B](#)). The audiences of small-group discussions were their peers in each small group, and the recordings were not used for grading

purposes. These different sources of data allowed us to determine that the findings were consistent across these two settings.

For the analysis, we adopted Wager's (2014) application of the noticing framework in her analysis because her focus on noticing student participation was well aligned with our goal of supporting PTs in noticing inequitable participation patterns. We began the analysis by identifying evidence of three components of noticing (i.e., *attending*, *interpreting*, and *responding*). Following Wager (2014), we coded the texts as *attending* when we saw PTs' "observations of what had occurred without reference to why" (p. 323). *Interpretation* comments were those that explained why PTs thought observed participation patterns had happened. When we saw PTs' plans of action, we coded as *responding*. We allowed simultaneous coding (e.g., coded as *attending* and *interpreting*) to capture as wide a range of noticing components as we could. These noticing comments, in turn, were categorized on the basis of emergent thematic patterns (Miles et al., 2020). We then developed separate thematic codes for each component of noticing (see Table 1). This step was followed by selecting representative excerpts that better encapsulate the common characteristics across multiple noticing comments within each theme. In the following section, we elaborate on these themes with representative excerpts.

Table 1

Themes of Noticing (In)equitable Participation

Component of noticing	Themes (number of PTs who indicated the noticing out of 25 PTs)
Attending	<ul style="list-style-type: none"> disproportionate frequency or length of talk by social markers (e.g., race, gender, special education status) (24) "So between both of us [considering our two EQUIP analytics], only one comment made by somebody who wasn't White?" overall number of students who participated (9) "Honestly not that many people talked in general, like, I think only 5. It was just this same people kind of same stuff." participation of students who do not regularly participate (9) "I was pleasantly surprised by a few that volunteered solutions that, from what I have observed, normally do not."
Interpreting	<ul style="list-style-type: none"> teacher's actions and characteristics (19) "Perhaps I implicitly see men as doers that would be better at explaining procedures." students' actions and characteristics (10) "I think a good bit of that is simply based on who raised their hands and seemed eager to participate." classroom norm and social context (10) "Only about 3-4 students contributed to the discussion, and discussion is not a norm in the classroom."
Responding	<ul style="list-style-type: none"> changing discourse practice (14) "I only asked 'why' questions to male students. This is something that I'm glad I was made aware of, and I want to be more conscious of in my teaching." building relationship with students (2) "I should be saying that trying to look at their names all hour so I can call on them such."

Findings

In this section, we detail how White PTs attended to, interpreted, and planned responses to inequitable participation patterns. Our analysis focuses on racial and gender inequities because these were the foci of this assignment. Although it is beyond the scope of this article, we note that some PTs also analyzed patterns by other social markers, such as disability.

Attending to Inequitable Participation: Engaging Race and Nuancing Gender Inequity

Typically, White PTs tend to avoid *attending* to race and racism in their teaching (Haviland, 2008). In contrast, we found that 15 PTs (60%) openly discussed racialized patterns of participation in their Number Talk. For instance, in the following exchange during a group reflection, Hailey¹ describes the moment when her EQUIP data showed that White students were dominating her Number Talk:

Hailey: I was looking at like—I was like, “Oh no, my data, like only the people who were contributing are White.”

Madison: Right! Ok, so, I had the same issue when I was giving my number talk. I was like, “Kids, stop raising your hand!” Like Dylan [a White student] kept raising his hand in the third hour.

Hailey’s surprised reaction suggests that she was not expecting this racial inequity. Would Hailey and Madison have noticed this racialized pattern had they been watching videos of their Number Talks? It is possible that the EQUIP analytics, which explicitly display data in terms of social marker patterns, made it harder for PTs to completely avoid naming race. Of course, it is still problematic that 10 PTs (40%) did not discuss racialized patterns in their data. Indeed, three PTs stated that race was irrelevant to track in EQUIP because they had no students of color in their classes. We also note that Madison raises the problem of managing the participation of dominant individual students—we return to this issue later when we report on PTs’ responding.

Whereas race is something that White PTs tend to avoid, they do—and White women in particular—readily discuss issues of gender. This pattern syncs with our data, as 24 PTs (96%) discussed gendered patterns in their EQUIP analytics. Most PTs taught in classrooms with a variety of

gender expressions; some also included nonbinary gender expressions. What we found was that beyond merely attending to gendered patterns, engaging with EQUIP analytics led some PTs to grapple with nuanced relationships between multiple gendered patterns. Consider the following individual written reflection from Samantha:

Samantha: During the discussion I felt that the girls were dominating the time, but through EQUIP I was able to see that the boys were talking longer, giving more voice to their thoughts, and the girls were giving shorter answers more frequently.

This excerpt shows how EQUIP-ing her Number Talk afforded Samantha deeper insights into gender inequity. By cross-referencing two discourse dimensions (*frequency* of talk and *length* of talk), Samantha realized that boys were actually “giving more voice to their thoughts.” Interestingly, although her real-time impression that girls were “dominating” was indeed supported by some of the data, her EQUIP analytics allowed her to nuance and revise that conclusion. Again, Samantha might have recognized this by watching the video alone, but it is evident that coding the video and having the quantitative patterns in front of her illuminated these patterns in useful ways.

Overall, we argue that EQUIP-ing amplified the quality of PTs’ *attending* to inequity, both in terms of engaging race and nuancing their identification of gender inequities. Next, we examine PTs’ *interpreting* and *responding*, where the data show greater variation.

Interpreting Inequitable Participation: Locating Sources of Inequity

As PTs *interpreted* their EQUIP data, we found that they sought explanations for the sources of inequities that emerged. There was variation in these explanations, ranging from those that placed the burden on their own teaching practices to those that located the burden on students. Among PTs in the former category, we found that they referred to the discourse dimension of “teacher question type” to reflect on and reconsider their teaching practices. Consider the following reflection by Adeline, where she compares equity ratios² between boys and girls (see Figure 1):

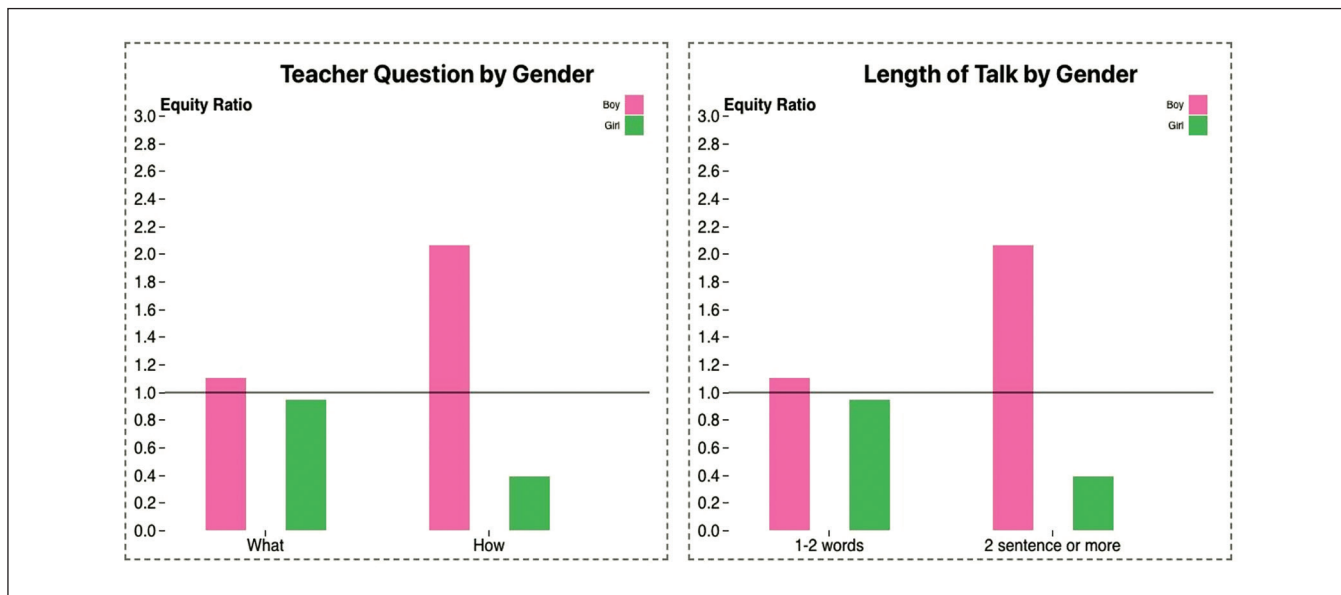
Adeline: The analytics for males and females was more meaningful to look at and it was clear that we spent a greater amount of time hearing deep explana-

1 All names are pseudonyms (including names of students mentioned by the PTs).

2 An equity ratio is a metric built into EQUIP that describes equity patterns (see Reinholz & Shah, 2018). It is the ratio of actual participation to expected participation, based on demographics. In this case, an equity ratio greater than 2.0 suggests that boys were contributing more than double the number of 2+ sentence-long contributions that we would expect.

Figure 1

Adeline's EQUIP Analytics



Note. This is a graph in Adeline's EQUIP analytic generated in Spring 2020. After multiple improvements to the EQUIP app, the EQUIP analytic looks slightly different now.

tions from males than females. This is shown in the Length of Talk by Gender box where the equity ratio for 2 sentences or more was 2.0 for males and 0.3 for females. This is a direct result of the questions I asked males. I asked males more How questions than I did to the females, with the equity ratios being the exact same as above.

Adeline's statement showed how she did not consider student participation patterns in a vacuum. Instead, she linked the length of student talk to the types of questions she asked and how she distributed "how" questions by gender. This kind of interpretation can be empowering, as Adeline took responsibility for the inequity.

Other PTs went further by situating their interpretations of EQUIP data in sociopolitical contexts. Indeed, 10 PTs' interpretations (40%) connected local classroom patterns to broader factors, such as societal narratives about minoritized groups and personal bias. For example, consider the following written reflection by Joseph on gender inequities during his Number Talk:

Joseph: The one glaring thing to note was that only one female responded compared to the six males. I had simply called on the hands that were up and didn't directly exclude female responders, but this could be for a number of reasons including classroom bias, the fact that I knew several male students from last semester but not one female or my identity as a male teacher.

Here, Joseph considered the gendered nature of socialization, as well as his history of interaction primarily with male students in the room. He relates this to his positionality as a "male teacher," and a gender bias might explain why only one female student volunteered during his Number Talk.

Sociopolitically grounded interpretations were a notable trend in the data. However, just as many PTs (40%) also located the source of inequitable participation in the students themselves, emphasizing perceived characteristics or deficit behaviors. For example, in the following reflection, Hailey described how her students of color acted during her Number Talk, where she found that White students' participation was dominant:

Hailey: For race, I tracked participation of White students compared to students of color. Of the different classrooms that I've seen at [Midwestern Suburb HS], this Algebra II Honors class has the highest proportion of students of color that I've seen (around 1 in 5), so I was hoping to get some meaningful data. However, none of these students volunteered to share during the number talk. I tried to engage one female student of color, but she said she didn't have anything particular to share. Maybe I should have pushed more here, but I did not want her to feel put on the spot.

In contrast with Adeline, who interpreted her data in terms of factors related to her teaching, Hailey explains

her data in terms of student actions and perceived preferences. Rather than focusing on whether and how she solicited participation from students of color, she instead emphasizes their lack of volunteering. In Hailey's lone reflection on her own teaching—an attempt to engage a girl of color—Hailey states that “she said she didn't have anything particular to share.” In our view, this portrayal of students of color as reticent or unwilling to participate implicitly attributes inequitable participation to deficit-oriented characteristics of minoritized students, thereby blaming them for a structurally produced predicament (Ladson-Billings, 2007). We have found similar moves in prior research where teachers describe minoritized students as “shy” or “quiet” to explain underparticipation (see Shah et al., 2020). Even though Hailey justifies her decision to not actively solicit this student's participation on the grounds that she was caring for the student's feelings (“I did not want her to feel put on the spot”), this kind of interpretation is problematic because it can prevent teachers from responding to inequity. That is, portraying perceived characteristics of students can become a way for PTs to deflect their professional responsibility of responding to inequities (Byun, 2023).

Overall, our data reveal a range of ways EQUIP-ing mediated PTs' interpretations of inequitable participation. Many PTs tethered their interpretations to their teaching choices, sometimes in sociopolitically grounded ways. In other cases, though, PTs located the source of inequity in the students. This finding suggests a potential limitation of this implementation of EQUIP-ing, which we explore further in the Discussion.

Responding to Inequitable Participation: Ambiguity and Tensions in Responding

We found less explicit evidence for *responding* compared to *attending* and *interpreting*. Even for the 14 PTs (56%) who expressed an intent to counter the inequities they identified, their proposed responses were often vague. The following comment by Grayson is a representative example:

Grayson: I think that if I was the teacher of this class full time, I would definitely try to encourage students of different races to participate more, as these results are typical for what I have seen in the classroom throughout the year. I would try not to make it an obvious thing, but I would try to encourage a more diverse amount of participation.

Grayson seems sincere in his desire to redress the racial inequity he observed. At the same time, how he will “encourage students of different races” is unclear.

Without a clear proposal for changing teaching practice, statements like this are unlikely to amplify equity.

Some PTs did offer more specific ways of responding. Typically, their proposals involved implementing different methods of soliciting participation:

Khloe: To correct [the inequity], I think it could be beneficial to pick students randomly to share their thoughts. Picking sticks randomly with students' names on them is one way I could implement this.

Piper: I still noticed patterns of myself wanting to just call on the first person who raised their hand, which was usually a boy in the class that was more social. Looking at the EQUIP data, it was reflected that I did call on boys often in the class. Next time, I want to be more patient in waiting for students to raise their hands before choosing someone to share. I don't want to create the pattern that the quickest student gets to go first, reinforcing status in the classroom.

The random solicitation method offered by Khloe—sometimes called “equity sticks”—is often proposed as a solution to inequitable participation (e.g., Safir, 2015). Although this approach could bring about dramatic changes in participation opportunities, “equity sticks” may actually reinscribe inequity by limiting teachers' ability to strategically prioritize minoritized students' participation, or by implicitly sending the message that students can only participate when directed by the teacher (Warren & Ward, 2021).

Piper's idea to increase wait time is another method teachers often cite to attenuate inequity. Increased wait time between posing a question and nominating a student can increase the number of raised hands, and PTs would have a broader pool of students from which to solicit participation. However, increasing wait time in general does not guarantee that more participation opportunities will go to minoritized students (i.e., a teacher could still just call on students from dominant groups). Both this method and “equity sticks” are limited in their ability to redress inequity because they are not specific to the social markers around which those inequities are rooted.

Among those PTs who proposed responding in social marker-specific ways, our analysis reveals that PTs grappled with two main challenges: (a) how to prioritize minoritized student's participation without publicizing their intention to students; and (b) how to manage dominant students who are persistent in their bids for the conversational floor. Regarding the first challenge, consider this excerpt from a group reflection between Grayson

(excerpt provided earlier in this section) and Rachel about the tensions they felt in responding to racial inequities:

Rachel: If I tried to be a little more equitable in that classroom, it would be a lot of calling on specific people. Which I think it would've been weird for me to do as a teacher coming in. [Grayson agrees with Rachel.] And especially how close your and I's Number Talk were, it would've been weird if we all called on the same people cause we only have like one student who is Indian and one student of Asian descent. So it would've been weird if we both called them, those people.

Rachel anticipated that specifically calling on two students of color in her class “would've been weird.” As Grayson stated in his written reflection, PTs “try not to make it an obvious thing,” thereby not making their race-conscious effort public. One reason for their hesitance could be that they worry about exacerbating the public racialization of students of color. Selecting a student solely based on their race and/or gender may lead to tokenism in ways that do not fully honor their intellectual contribution to the class. On the other hand, from a critical standpoint, this hesitancy could also be another manifestation of color-evasiveness, where actively attending to racism is itself (erroneously) seen as racist.

Regarding the second challenge of managing dominant students' participation, PTs were again reflecting deeply on the occasionally zero-sum nature of participation opportunities in certain classroom scenarios. Indeed, tamping down participation by dominant students is sometimes necessary to make room for minoritized students. Recall Madison's statement presented earlier exhorting certain students to “stop raising your hand!”

Facing this issue of relative participation may require PTs' complex decision-making. In this excerpt, Morgan reflects on a situation where she ended up calling on a White student raising her hand despite her intent to call on a student of color:

Morgan: Well, I mean people who normally don't talk at all, [if] any of them like Benjamin [a student of color] had his hand up, I would've called on him. But Lydia [a White student] had her hand up and she also never contributes, so I am not going to call on someone who doesn't have their hand up versus someone who does.

For Morgan, enacting her race-conscious goal to redress racial inequity would involve calling on Benjamin to speak. However, Benjamin did not raise his hand while Lydia raised her hand. This momentary situation seems to complicate Morgan's decision-making. Morgan nominated Lydia instead of Benjamin, honoring Lydia's raised

hand. Although this group reflection did not lead to a satisfactory way to navigate such situations, it is still noteworthy that Morgan appears to be thinking deeply about this problem of practice situated in her teaching.

Discussion

Redressing inequity requires teachers to first notice inequity. In this study, we sought to contribute to the literature on equity-oriented teacher noticing by exploring how the practice of EQUIP-ing aspects of mathematics classroom activity—in this case, a Number Talk—can support PTs' learning of sociopolitical perspectives on classroom-level inequities and how to redress them. Our findings demonstrate the potential of EQUIP-ing to support certain aspects of PTs' noticing. At the same time, though, they also highlight limitations and dangers in this iteration of the practice. Here, we discuss both issues and consider ways to improve EQUIP-ing in the future, particularly regarding stronger supports for PTs' interpretation of and responses to inequity.

Potential of EQUIP-ing: A Social Marker-Focused Way to Draw Attention to Inequity

Prior research shows that White PTs tend to avoid engaging in certain inequities, particularly those related to race (Haviland, 2008). Here, we offer an empirical account of how EQUIP-ing a mathematics-focused teaching activity could have supported PTs in explicitly naming racialized participation patterns. This effect is exemplified by Hailey's comment that “only the people who were contributing are White.” Would Hailey have recognized this pattern or named it as racial in the absence of EQUIP?

Antibias workshops—usually a few hours long—have become a common way for teachers to learn about racist phenomena like White privilege or color-evasiveness. Typically, however, they leave teachers with the difficult work of then applying those ideas to the classroom, which makes it less likely that teachers will change their practice to redress racial inequity. In this case, EQUIP-ing her Number Talk generated graphs and analytics where race (and Whiteness, specifically) were front and center. Whereas Hailey might have dismissed an antibias workshop, data of this kind seem harder to ignore—especially when the data came *from her own classroom*. In other words, EQUIP-ing seems to heighten the necessity of equitable teaching practices and help bridge what they learn in the methods course with what they experience in field-based teaching. This affordance of EQUIP-ing can be instrumental in orienting practicing teachers toward equitable teaching practices in a professional development setting (Herbel-Eisenmann & Shah, 2019).

We can also speculate whether Hailey would have attended to White domination through video analysis alone. It is certainly possible that with race-focused prompts (e.g., “Which racial groups do you see participating more and less?”) that Hailey might have come to the same insight. What may be distinct about EQUIP-ing, however, is that the social marker lens is not something layered on after the fact. Instead, because of the design of the EQUIP tool, social marker specificity is baked into the EQUIP data made available to teachers. In our view, though, it is not a matter of whether one approach is better than another. In fact, in our collaboration with practicing teachers, we have found considerable value in having teachers grapple with their EQUIP analytics and watch raw video footage of their teaching—both provide complementary insights (Shah et al., 2020). For teacher educators, the question is: *How can we support sociopolitically grounded noticing while avoiding counterproductive “for all” approaches to inequity?*

Broadly speaking, we found that even when their interpretations were problematic or their responses were incomplete, EQUIP-ing seemed to immerse PTs in deep dives into problems of practice related to participation. They were compelled to ask deep questions about themselves regarding their personal and professional values regarding student participation, and whether and how to prioritize the participation of minoritized students. In the case of race, some PTs began to see how racism is entangled with mathematical learning. In the case of gender—a social marker that White women PTs do not typically avoid—we found that EQUIP-ing facilitated more nuanced attention to gender inequities. These findings suggest value in thinking about the potential for EQUIP-ing other mathematical activities in PTs’ learning journeys. For example, how might EQUIP-ing small-group work shape PTs’ learning about equitable design in that setting, or a Chalk Talk where participation is nonverbal but no less consequential for student learning?

Limitations of EQUIP-ing and Future Improvements

Alongside the potential benefits of EQUIP-ing, this study also surfaced several limitations of this iteration of the practice. Specifically, we found a gap between PTs’ attention to inequity and how many of them interpreted and responded to inequity. Recall how some PTs like Hailey interpreted their EQUIP data in ways that invoked deficit views of minoritized students, which is reminiscent of unjustly blaming minoritized communities for school failure (Ladson-Billings, 2007). It is likely that coming into the Number Talk, Hailey did not consider actively soliciting “unwilling” students’ participation part of her professional responsibility. However, the EQUIP analytics may have inadvertently reinforced this stance.

Part of this issue concerns the dangers of utilizing quantitative data in equity work. In general, quantitative data are thought by many to hold an inherent epistemological authority. We do not agree. Instead, as Gillborn et al. (2018) noted, such data—particularly in relation to sociopolitical issues—never speak for themselves and always require a critical orientation. By quantifying certain aspects of student participation, EQUIP-ing does simplify some of the nuances of student participation. However, we believe this tradeoff can be powerful for teacher learning, as long as the quantitative data become a launching point into deeper inquiries by teachers into social marker-specific ideologies and how they participate in maintaining oppressive structures. What emerges is a new problem of practice: *How do teacher educators support PTs to grapple with analytics in generative ways, while simultaneously holding a reasonable skepticism about them?* What do the numbers tell us, and what do they obscure? How should we triangulate with other sources of data, such as minoritized students’ subjective classroom experiences?

The challenge we document here with asset-based interpretation and responding underscores the need for sociopolitical perspectives on noticing. For instance, our findings highlight what Louie et al. (2021) called *sociopolitical framing* as an additional component to attending, interpreting, and responding (Louie et al., 2021). EQUIP-ing seems to “frame” what PTs attend to, especially gendered and racialized participation patterns, and also frame the teacher learning space for PTs to explicitly discuss those issues. Also, the side-by-side visualizations of teacher question types and student talk length shown in Figure 1 seem to highlight the intricate relationship between teaching practices and (in)equitable participation patterns in Adeline’s classroom. That is, EQUIP analytics that include teacher actions (e.g., questioning) can shape PTs’ interpretation of inequitable participation patterns as a potential outcome of PTs’ actions, something that PTs can work to improve on as part of their professional responsibility.

A number of interpretations, however, attributed low participation to students’ perceived deficits (e.g., shyness, lack of confidence), which obscures systemic barriers minoritized students face. This finding suggests that EQUIP data by themselves are not enough, and that EQUIP-ing should be coupled with other teacher learning opportunities that promote asset-based noticing (e.g., Jilk, 2016). Mathematics teacher educators can also participate in the meaning-making process by modeling asset-based interpretations (Byun, 2023) and connecting broader systemic forces to the everyday practices of teaching mathematics (Gutiérrez, 2015). The same call for stronger support structures applies to exposing PTs to a wider

range of ways to respond to inequity. Responding requires managing a conflicting set of responsibilities, such as keeping dominating students in check while maintaining a supportive relationship with them, and soliciting minoritized students' participation without tokenizing them. Therefore, we view EQUIP-ing as a good first step toward more equitable teaching practices, which allows PTs to face problems of practice as they attempt to respond to inequity.

Finally, a more subtle theme in the data is PTs' lack of attention to intersectionality in their noticing. For example, while they often spoke of either students of color or girls, they rarely talked specifically about girls of color as a group. This practice is problematic because it renders invisible intersectional groups and exacerbates oppressions like misogynoir (Collins & Bilge, 2020). We see this lacuna as less the fault of the PTs, and more about limitations in our reflection prompts, which did not ask them to explicitly engage the data in intersectional terms. The early version of the EQUIP tool itself generated analytics on only one social marker at a time. Since then, we have redesigned the tool to include data visualizations that make intersectional analysis possible, and we continue to pursue ways to incorporate this functionality across the app. Also, some PTs did not track race as a social marker in EQUIP because they taught in all-White classrooms. Applying intersectional lenses could make racial dynamics more relevant while considering other forms of oppression (Bullock, 2017), thereby challenging the false narrative that race matters only in spaces with people of color.

Conclusion

Equity-oriented noticing with a strong sociopolitical grounding has the potential to attenuate inequitable participation in mathematics classrooms. We have argued here for the potential of EQUIP-ing certain classroom activities as a practice to support teacher learning in this area. Although our study does suggest some hopeful possibilities, we also strike a note of caution—that EQUIP-ing without appropriate supports for asset-based noticing can inadvertently exacerbate harm to minoritized students. We encourage the field to iterate and improve on our approach as we continue to seek ways to prepare teachers to center equity in their classrooms.

Acknowledgments

We thank the prospective teachers who generously allowed us to study their learning experiences. We also thank associate editor Dr. Kate Johnson, the *MTE* editorial team, and three anonymous reviewers for their insightful comments and support.

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doi:10.5951/MTE.2022.0018

Appendix A: EQUIP Analytic Part of Number Talk Assignment

Instruction

Use EQUIP (<https://www.equip.ninja/>) to analyze the **entire** Number Talk.

- **Discourse Dimensions:** For this assignment, you will track these two discourse dimensions, using the following coding categories.
 - **Teacher Question (Quality): Why, How, What, Other, N/A**
 - Note: “N/A” is for when a student participates without being called on.
 - **Student Talk (Length): 1–2 words, 1 full sentence, 2+ sentences**
- **Social Markers:** For this assignment, you will track two social markers of your choosing.
 - To help you decide, ask yourself: **Along what social markers might hierarchies exist among students in my classroom?**
 - Also, consult with your mentor teacher about which social markers might be useful and interesting to track, as well as the coding categories for each social marker.

Prompts for Written Reflection

- What did you learn about equity patterns from the EQUIP data?
 - How did participation patterns in this small sample compare to what you have seen in this class during the school year? (e.g., did the same students participate/not participate?)
 - What patterns did you notice by your two social markers?

Appendix B: Debrief Small Group Discussion

Guiding Questions

Number Talk Assignment:

EQUIP Analysis

Keeping in mind the small sample size,

1. What patterns did EQUIP reveal? For example:
 - Number of students who participated?
 - Social marker patterns?
 - Domination by 1–2 students?
2. How do you explain those patterns?
3. On the basis of these data, what do you think you did well in orchestrating equitable participation patterns? What would you change for next time?