

From Inquiry to Critical Inquiry
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With the advent of SIGMAA on IBL there is increasing convergence on the following three principles that characterize inquiry based learning and teaching: deep engagement in the mathematics, peer to peer interaction, and instructor interest in and use of student thinking. These principles begin to address what students do and what instructors do in an inquiry-oriented classroom. In my own work these principles have served me well, both in my teaching and in my research. Missing from these principles, however, is explicit attention to equity. I would argue that these three principles are strongly aligned with equitable teaching practices, but issues of equity remain implicit and hidden. It is all too clear from today's political rhetoric and need to diversify the STEM workplace that we cannot afford to allow issues of race, gender, sexual orientation, or disability to remain implicit in both our professional and personal lives.

My goal in this contribution is therefore to reflect on how we can make explicit issues of equity in relation to inquiry. In doing so I hope to voice the values and dispositions that define who we are and what we care about. While there are many ways that our community can attend to issues of equity, I will focus my reflections on the local classroom level and on the broader public level. Common to both levels is a call for developing a *critical stance*. Developing a critical stance includes paying attention to whose voice is foregrounded or whose is silenced; being aware of who has agency to develop ideas, communicate ideas, and constructively question and critique ideas; and embracing opportunities to reflect on and question past, current, and future practices. These features of a critical stance are not meant to be all-encompassing, but rather reflect the central role of discourse in inquiry based learning. Broadening inquiry to encompass a critical stance suggests we make a change in language – from *inquiry* to *critical inquiry*. If it is true that labels define who we are for others, even partly so, then the label critical inquiry has the potential to foreground and embrace equitable practices.

What might it mean to embrace a critical stance at the classroom level? A first step to developing a critical stance involves paying attention to and being aware of differences in whose voice, whose image, and whose identity is foregrounded. In other words, in what ways do instructors consciously attend to equitable participation in classroom discourse? This would include authorship (whose ideas get public attention?), reflection (who is invited to comment on or constructively critique others' ideas?), and summary (who is invited to pull ideas together?). These are issues over which instructors have control, especially when they are conscious about differences in who is or is not being called on in class, who gets to come to the front of the class to share their group's mathematical progress, and whose ideas are revoiced and valued. These are also issues that researchers can pay attention to. In some of my previous research I have investigated different

classroom discourse patterns and how these patterns relate to student beliefs about their role in a mathematics classroom, others' roles, what it means to understand and do mathematics, and the general nature of mathematics itself. Missing from this work, however, was explicit attention to possible different patterns of participation by gender or ethnicity, for example. Taking a critical stance towards my own research piques my interest and desire to explore how I might enlarge my research interests to include an explicit focus on equitable participation.

I posited that a first step toward critical inquiry is to engage students in equitable discourse practices—but while I see this as a necessary step, I also see it as insufficient. A second step is to provide students with opportunities to critically reflect on past, current, and future practices. Inquiry classrooms typically offer learners an educational experience that is markedly different from their previous experiences. As instructors and researchers we can consciously capitalize on this to give assignments or other opportunities for students to critically reflect on previous ways they learned mathematics, on the previous ways they were taught mathematics, and on the depth at which they previously learned mathematics. A critical stance would necessarily also involve reflection on current, inquiry-based practices, for it would be shortsighted to assume that inquiry-oriented practices eliminate all forms of inequities. For example, what potentially incorrect inferences might a researcher make of a student who prefers to be silent in a class with considerable student talk? In terms of reflecting on future practices, prospective mathematics teachers or engineers might be invited to reflect on how they see their future selves as mathematics teachers or engineers and what their equity-related goals might be.

This sketch suggests what a critical stance might look like at the classroom level, but what might it mean to embrace a critical stance at the broader public level? I begin with an anecdote from a small conference of about 30 people that I attended last year. One of the speakers focused on ways to motivate students regarding the creativity and beauty of mathematics. He detailed how one could do this using historical examples. In the ten or more examples tendered, all but one included photos of white men. The one exception was an Asian man. During question and answer time, someone in the audience noted the gender and racial imbalance and asked the presenter if he thought this was a potential problem, given that the point of his talk was on motivating students' appreciation of mathematics, presumably for all students. This question engendered a lively discussion that otherwise might not have happened. As a result of this discussion, the next day one of the presenters changed her slides to include several photos of women mathematicians and mathematicians of color. In such ways, being public about issues of equity can foster a discourse on equity, disrupt gender- and color-blind practices, and promote new practices.

I end with a final thought about what we all can do to promote a critical stance at the broader public level. As academics, teachers, and researchers we can use our knowledge of

classrooms and research to affect public perception and state and federal policy. Writing newspaper editorials, visiting K-12 classrooms to talk with the next generation of STEM students, contributing to the AMS blog on education, contacting NSF program officers and asking to be on grant review panels, and pestering our local politicians are all ways that we can help foreground equity and move from inquiry to critical inquiry. To be quite honest, these are actions that I have not regularly taken up before and which take me out of my comfort zone. And therein lies the purpose of a critical stance – to challenge our dispositions and practices with an eye toward a more just educational system.

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