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# Shift the default in "broadening participation" in STEM equity research

***Alice L. Pawley***

***Purdue University, USA***

**ABSTRACT**

There seems to be a disconnect between the purported goal of engineering education (and perhaps STEM education broadly) to become a more inclusive discipline, and the means by which this is accomplished. Efforts from thousands of dedicated researchers and program directors around the country continue in full force to develop theory and programming to better recruit, hire or admit, retain, promote, and sustain underrepresented women and men in engineering education, and yet overall the needle budges little.

In this perspectives paper, I join with others in thinking through a new way for thinking about gender and race in engineering education research. While the careful investigation of psychological constructs in education have brought great value to the broadening participation in STEM research space, less interrogated are the structural aspects of how gender and race are baked into the very institution of higher education and of engineering education into which we are hoping to recruit, hire or admit, retain, promote, and sustain underrepresented women and men. This paper draws on feminist and critical race theory to help us collectively continue to "shift the default" away from the White male backdrop of higher and engineering education, and join our research voices with those who have been in this space a while to more insistently question how Whiteness and maleness has been baked into the structure of our educational institutions.

**KEYWORDS**

engineering education, feminist theory, critical race theory, ruling relations

# Shift the default in "broadening participation" in STEM equity research

In the summer of 2017, I was inspired by both a professional development program called *Playing Big*, by Tara Mohr (2015), and a keynote at my disciplinary conference ASEE. In the first, Mohr focused on women engaging in leadership in new ways, coaching them how to stop letting their "inner critic" or sexist societal expectations limit how they contributed to the world. One chapter was focused on the idea of "self-discipline" and how that didn't work for changing behaviours that one might want to change. Instead, she offers the idea of setting up a "success architecture" to let changes be "as easy as water flowing down a hill." One of the parts of a success architecture is to set up conditions to "shift the default", where you make the default action easier to do than the current pattern (Mohr, 2017).

The second inspiration was at my disciplinary conference, where I listened to Dr. France Córdova, director of the National Science Foundation, talk about the value of diversity in order to explain the existence of the INCLUDES program by emphasizing scientific productivity, advancing the national interests, and so on. From this talk, I was disheartened; I reflected on how often I heard or read a similar argument, and wondered why we still needed to take time out of our talks to make it.

This perspectives paper is situated in the context of the national and international project of broadening participation. Reading Mohr and listening to Córdova made me realize a default that we could shift within this large-scale project on broadening participation, prompting me to think and write about others that we could shift (Pawley, 2017). This perspective paper introduces three defaults we should shift.

**SHIFT #1: broadening participation is not just about the underrepresented folk, organized by gender and race.**

When I review papers, one of the most common issues I see is a lack of gender or race theory on the ideas of gender and race themselves. Authors mostly take for granted that gender and race are commonsensical and uncontroversial, and all researchers need do is notice various demographic patterns in participation or assessment or behavior, and figure out if they are statistically significant across gender and race (again, using uncontroversial indicators of these); they then have something worth reporting. Gender is equated to understanding "women," a natural uncontroversial category of identity that is obvious to everyone, and which exists in binary to "men," while race is usually operationalized as a mixture of skin colour and family geographical provenance, even in international research, despite how different countries have different racialized histories.

But there are important critiques of this kind of approach. I draw on two for this section: insights contributed by intersectionality theory, and challenges offered by the social construction of gender and race.

First is the burgeoning educational literature that uses intersectionality as an analytical framework. While work that was intersectional in nature has been going on for decades (Hill Collins & Bilge, 2016), particularly by Black feminists, I think it is fair to say that Kimberlé Crenshaw's naming of intersectionality has made the concept more accessible to more researchers. In her germinal article (Crenshaw, 1989), she noted several key legal cases where Black women were claiming discrimination in their work, but did not receive justice. When the women claimed racial discrimination, if Black men were not also experiencing discrimination, they were denied justice. When they claimed sex discrimination, if White women were not also experiencing discrimination, they were denied justice. But it was clear that they were experiencing discrimination, yet the law as constructed did not support their claims for justice.

I use here two points from Crenshaw's 1989 articulation of intersectionality. The first stems from these cases of injustice: one can't understand the experience of Black women by looking first at race and then at gender, or even the reverse; they must be considered *together.* To generalize, we cannot understand human experience of oppression through one dimension of identity without taking other identities into the same context and analytical frame. Let me be clear: it is established ground that researchers cannot adequately understand gender without studying how race interacts with gender, let alone other dimensions of social identity. Yet, I keep reviewing articles where researchers say, functionally, "I am studying gender and can't do any analysis on race because there aren't enough of women of colour to be statistically significant. So, I am justified in lumping women of colour in with the White women, or in with the men of colour for my analysis." This logic is problematic now, and has been articulated as such for decades! Such a methodological decision is not justified by theory on gender or race; yet it persists. (I return to this point shortly to recommend alternative logics and methods.)

Crenshaw's second point helps us interrogate why this practice persists. From her legal context, she argues we need to understand why the law is set up, and continues to act in ways, so that Black women don't receive justice. In the context of research informed by intersectionality, the second point is that we need to understand how structure functions in ways to make doing theoretically-informed research on gender and race difficult. In other words, how do social and institutional structures work to enable researchers to keep doing theoretically under-supported research as credible research, to keep allowing researchers to overlook the lived realities of women of colour or people living at the intersection of other marginalized identities as research participants? One might draw on critical race theory to say this logic's persistence is evidence of how racism is baked into the structure of academic research. (I will come back to this question of structure in my third default to shift.)

The second critique of framing gender as "women" and race as "people of colour" is the challenge that these constructs of gender and race are socially constructed in important ways, implying they are not "real" and yet the world is fundamentally organized by them. How do we manage the acknowledged reality that gender and race are social constructions, while trying to advance equity projects? How do you

actually DO research on gender and race in order to increase the number of women or of people of colour when theory shows us that the very notions of what constitutes a "woman" or a "person of colour" is relational and socially constructed (Connell, 2009; Hill Collins & Bilge, 2016; Omi & Winant, 2015), that the categories are not always clearly defined, while *at the same time* acknowledging as absolutely real the history of gender and race oppression and of colonialism, and the daily lived experiences of oppression of people identifying with these terms? How do you manage to advance gender and race theory while also feeling like you're making some practical difference in the world in terms of STEM equity?

Historian Amy Slaton and I have written about our grappling with this challenge (2018). We talk about the difficulty in managing theoretical commitments that resist boxing people up into constellations of demographic categories. We use queer theory (Fifield & Letts, 2014) to remind us of identity's fluidity and messiness, that identity may not be as stable or knowable as we might prefer as researchers. We use crip theory (McRuer, 2006) to note how the idea of "normalcy" is produced in bodies in context, and how the generation of categories of interest co-produce some kind of norm. So when we are looking for measures of engineering ability or talent, for example, can we notice how that measuring co-produces a norm in problematic ways? If demographic categories are as problematic as this, then we must be particularly sensitive to theory when we use the concepts of gender and race in our equity research.

One way to advance the equity project in STEM education given these realities is to embrace the small numbers-ness. If the numbers of women and people of colour are too small to statistically think about gender and race together, then use methods that *do* allow you to keep those dimensions together. I have a project called "Learning from Small Numbers," where I collected stories from White women and women and men of colour who were or had been at the time been undergraduate engineering students, and I asked them one opening question: "how did you get to be where you are?" After they had shared their stories, I didn't go through and code them to link the frequency of instances of various ideas to their self-identified gender and race. Instead, I used narrative methods to look for the places of friction in their experience, and I use them to probe the institutional structures that produced that friction. In other words, I chose an analytical method that helped me to keep some more of the complexity of intersectionality theory intact. I have written about this analytical work elsewhere (Pawley, 2013; Pawley & Phillips, 2014; Pawley, 2019).

This effort to use narrative methods from small numbers of participants also affords opportunity. I am unconvinced that presenting people in positions of institutional authority with amazingly thoughtful data analyses about inequality, about bias, about social injustice, is effective at convincing them to action. George Lakoff would blame this on "enlightenment reason" (Lakoff, 2004; Morrison, 2018). Maybe there are places where this happens. What might be more effective is making use of story in the way that, say, journalism does. In STEM equity efforts, we need both numbers and stories, because stories can teach in ways that numbers can't. We as

researchers need to get better at using them, and as we as reviewers need to start asking for them. I will come back to this point in the conclusion.

**SHIFT #2: broadening participation is not just about focusing on the "underrepresented" folks.**

The second default we need to rethink is how, when we want to "broaden participation" in STEM, we focus on the people who seem to be missing from STEM. This is in part because the experiences of women and men of colour and of White women have been erased in so much intellectual work, and are worthy of being re-included. But the current focus, while also filling that gap, also allows the majority group to remain invisible as the default group.

If we don't have large enough numbers of White women and women and men of colour to be able to analyse their experiences intersectionally, then by default, what we have are large numbers of White people, and of men. Probably White men, frankly. So instead, we could study the people present, rather than absent, in engineering. We should use research methods that reveal, or unhide, the majority and investigate how it maintains itself as a majority. Let's investigate gender and race by looking with a critical eye at the history and experiences of the folks who have set up STEM culture from the beginning, and who have set up a structure to present themselves and this situation as normal and default. How can we as STEM equity researchers come to understand Whiteness and masculinity? How do we help administrators come to understand it, or program developers? How can we contribute to a broader conversation about Whiteness and masculinity, developing and extending general theory about gender and race with colleagues in other fields, and then how do we use those to put the small numbers of women and POC in context?

The first thing we need to do, then, is label the majority as such (Pawley, 2017). While publishing demographics no matter what the research questions are may be *de rigeur* in many educational journals, I think less frequent is requiring publication of *disaggregated* demographics by gender and race together. Often the same justification as I articulated earlier is used for this lack: there are too few women of colour in the sample, so disaggregating them would problematically result in identifying them. But if there are too few women of colour, that means most participants are White and/or male, and we can still identify *them* as such. Then additional important labeling should come at the end of the journal papers where we articulate limitations: if research is based on demographically limited populations, like predominantly White men, then the conclusions need to be limited to them also, even if the authors have not found differences by race to be statistically significant. This should be explicit, not left to the interpretation of the reader. We need to start making visible all the places where, when we're not explicitly talking about gender and race, we are still actually doing research on gender and race, as gender and race remain as fundamental ways we organize society. Ultimately, we need to build up a vocabulary and theoretical language in our research communities around masculinity and Whiteness that can help us with the broader issue of equity in STEM education.

**SHIFT #3: broadening participation is not just about research subjects themselves.**

The third default we need to rethink has to do with making underrepresented *individuals* the subjects of broadening participation research. Instead, we need to use research methods that prompt us to interrogate social and institutional *structure*. In other words, how is it built into our structure that STEM maintains itself as predominantly White and male?

A large fraction of research I see in engineering education equity research spaces strongly acknowledge that we collectively don't just want to "add" women and people of colour to engineering and "stir;" researchers explicitly reject the idea that all we need to do is change the demographic proportions of who participates in engineering, and we're good to go. They also acknowledge the idea that we don't want to "blame the victim", or use deficit frameworks, which are frameworks that position women and people of colour as deficient compared to the majority male or White population. They would agree that we should not just try to train up women and people of colour to have the same or same level of skills we give White men to "solve" our broadening participation problem.

But so much research still holds as its focus the experiences of those same women and people of colour as *individuals*. It does not tend to turn the gaze of the reader to the structure, let alone the majority people who have historically produced it. But it could. As an example, Beth Holloway and colleagues (Holloway, Reed, Imbrie, & Reid, 2014) did important research that interrogated how undergraduate engineering admission criteria were weighted in such a way as to disproportionately admit men. When the university shifted the weighting of the admission criteria of domestic students, there was a step change in the number of women admitted to engineering, increasing 26% from the previous year, making the share of women in first year engineering go from 21% to 26% in only one year. So, how is it that we have produced an educational structure where the admission criteria weight different variables to produce an admitted class of undergraduate engineers that are predominantly White and male?

There are, of course, many frameworks that can help us think about how gender and race are built into structure. One I have found helpful is the ruling relations theorizing that feminist sociologist Dorothy Smith has developed (2005; 1990). She asks, how is it that social relations come together to produce similar types of experiences in different parts of the country, or to some extent, the world? How is it that, in our context, "going to college" or "working in a university" has fundamentally similar features at Purdue, or University of Oregon, or at University of Texas – El Paso as an HSI, or University of Puerto Rico as a university in a Spanish-speaking colony of the US, or at Diné College as a tribal college, or at Princeton as a small private university, or at Ivy Tech as a community college system in Indiana? There are so many social arrangements at these different schools that are similar across contexts – there are instructors and students, instructors give grades in structurally similar ways, there are HR departments and custodial services, and libraries and computer labs… how did this all come about to look so much the same? How is this structure coordinated, and produced and

reproduced over time? Her argument would be that the coordination of social relations occurs through texts that govern social relations translocally, and it is important to trace how people activate texts to accomplish the interests of the institution of higher education (not at a specific university or college *per se*, which would be an organization as part of this bigger institution).

Smith describes *ruling* relations then as "that internally coordinated complex of administrative, managerial, professional, and discursive organization that regulates, organizes, governs, and otherwise controls our societies. It is not yet monolithic, but it is pervasive and pervasively interconnected." (1999, p. 49) This complex is operationalized through text which needs to be activated by actors acting in a network of texts and other actors. What makes them *ruling* is that actors act in the interests of rulers rather than in their own interests. Smith has us ask, therefore, how do texts, whether they be formal policy, or forms, or *ad hoc* standard operating procedures and so on, get produced and activated to organize social relations in a way that maintains engineering education as a predominantly White, male space? How is engineering education maintained as White and male as a function of the interests of the rulers over the interests of the people in engineering? (I have written about this further elsewhere; see for example, Pawley, 2019). In Smith's type of research, the research subjects are not the participants, one's interviewees, but the institution of higher education itself, or of engineering education itself. This methodological shift refocuses our research gaze away from the actions of individuals to the structure of institutions themselves.

## CONCLUSION

Even if we shifted all these defaults, STEM fields will not suddenly become a bastion of equity and justice. These are not *instead of* what might be the current default, creating a new default, but instead problematizing the default position. However, it seems to me these are areas where research is thin on the ground.

We still need to figure out what to *do* with our research findings. I have two thoughts here: first, we need compelling ways to talk about our research findings with those people who are in power, and whose interests are being served by the existing structure; and second, we need to find better models of working together in community to advance change.

I think our current model of change is based on the idea that if we have compelling enough data, presented under the guise of objectivity that people in power will be convinced to make changes. Perhaps there are places where this has happened, but in my work, what I see over and over is people with the data, and then people in power finding reasons why that data isn't persuasive, or we don't have the funds, or whatever it is. As I mentioned earlier, Lakoff talks about this as "enlightenment reason" (Lakoff, 2004; Morrison, 2018) and says it is a reliance on this logic that has politically hampered US progressives compared to conservatives. He argues for a shift towards a moral compass of reasoning, talking about values rather than just reason.

I think this misguided reliance on enlightenment reason as a way to convince people in power that they should give up some of their privilege is related to engineering's historical development and relationship to the modes of production; this relates to my second point about what to *do*. Engineers have come to adopt a strong meritocratic model of the world, one about bootstrapping your way into success that comes to position oneself as management rather than labour. The result is that engineers learn models of individual accomplishment rather than collective action. But maybe we could benefit from learning some models from social movements, that could perhaps help us make more progress than relying on enlightenment reason. There are some efforts to this effect, including the Relational Organizing/Action Research (ROAR) Project (Foster, Karlin, Quiles-Ramos, & Riley, 2019).

I close with one of the things that Tara Mohr ends her book and workshops with as an invitation to you. She talks about seeing the reader as part of the transition team, where the world is transitioning from one governed by men to one governed by men and women. If we're going to transition to a place where STEM fields are not so male, White, heteronormative, settler-oriented, classed, ableist or other characterizations, then we're part of the transition team. Thank you for your time and efforts, and I look forward to our continued work together.

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