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## Risky Research Business: Mathematics Education Research on the Margins

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**Abstract:** Although we would like to believe that decisions about what research to conduct and how to conduct it are based solely on researcher interest and societal need, the reality is that external political and disciplinary factors do play a role. Scientifically based research (SBR) is one example of external political pressures that shape researcher choice both directly and indirectly. Additionally, disciplines like mathematics education operate under hidden curricula that have the potential to marginalize particular research foci. The purpose of this paper is to consider the implications of such a narrow focus on a young mathematics education researcher's choices about the lines of inquiry that she or he pursues and the ways that she or he manages the risk associated with asking and responding to questions in ways that align with SBR and other disciplinary priorities.

*Keywords:* mathematics education research, scientifically based research, qualitative research, research methodology, theory in research, early career research.

Scientifically based research (SBR) has been institutionalized in the United States through the United States Department of Education and the Institute for Education Sciences (IES) as the only valid or valued approach to—or the gold standard for (Lather, 2010; Schoenfeld, 2008)—education research (Popkewitz, 2006). SBR—mentioned more than 110 times in the No Child Left Behind Act of 2001 (Ritter, Anderson, Koedinger, & Corbett, 2007) and explicated by the National Research Council (2002)—is a conservative approach to education research in which social science follows a more positivist natural science model based on large-scale, double-blind, randomized, controlled trials (Lather, 2010). Eisenhart and DeHaan (2005) summarize the National Research Council's guidelines for SBR:

1. To pose significant questions that can be investigated empirically;
2. To link research to relevant theory;
3. To use methods that permit direct investigation of the question;
4. To provide an explicit and coherent chain of reasoning;
5. To replicate and generalize across studies; and
6. To make research public to encourage professional scrutiny and critique. (p. 3)

The stringent criteria used to evaluate SBR define “relevant [educational] research” as “only studies involving experimental design” (English, 2008, p. 5). These criteria dictate what programs and practices can be used in education (Shealey, 2006) and require that they be catalogued in the What Works Clearinghouse (WWC; Schoenfeld, 2008). The WWC operates, then, as a repository for interventions and strategies vetted through SBR. These strategies bear the stamp of *evidence-based*, which implies adherence to the principles of SBR. Their inclusion in the WWC positions the strategies as proven solutions to educational problems that *work* as the WWC name affirms. Thus, SBR operates under the guiding principle that the purpose of education research is to set forth solutions to education's problems (whether real or perceived) that have passed political muster, thus supporting a political agenda in education (Biesta, 2007).

The loom of SBR does not imply a dictatorial regime in which education researchers must restrict their work to prescribed methods. In fact, under SBR education researchers can pursue research

questions and hypotheses in any manner they choose. However, the pursuit does entail a measure of risk as standardizing SBR necessarily marginalizes forms of research that fall outside its bounds and limits opportunities for those who do work in those forms. Mechanisms like the WWC represent the establishment of federal priorities related to the type of educational research it will support, which, by extension, dictates what types of research funding agencies will support (English, 2008). With research institutions relying more on external funding as a significant portion of tenure and promotion criteria, federal funding agencies' preferences for SBR are of particular concern to junior faculty. Ironically, as NCLB has narrowed standards for quality in education research to focus on SBR, pockets of education researchers have begun, almost simultaneously, to take up theories and methodologies that ask new questions and seek to examine old questions in new ways (Bullock, 2012; English, 2008; Hiebert, 1999). Most often, these approaches do not align with SBR's focus on uncomplicated—"too many 'on-the-other-hands' and too much attention to contextual variation and alternative possibilities produce immobilization" (Donmoyer, 2012, p. 802)—and generalizable answers to educational problems.

SBR has met little resistance in the mathematics education research community perhaps because SBR reflects the historically dominant paradigm of mathematics education research (Stinson & Bullock, 2012), a rather young and narrow research domain that has struggled to establish its identity (Kilpatrick, 1992; Schoenfeld, 2008). Although the mathematics education research community has embraced some more conservative forms of qualitative research and some use of critical social theories, the canon of mathematics education research still aligns with a more post-positivist model. SBR's pattern of establishing strict criteria for judging what is good or valid in education research resonates within mathematics education research. Recently, Heid (2010) positioned the *Journal for Research in Mathematics Education (JRME)* as a space where mathematics is an "essential component rather than being a backdrop for another area of inquiry" (p. 103). While she did not explicitly disparage any particular mode(s) of inquiry in the brief editorial, the studies and areas of inquiry that she highlighted as exemplars painted a picture that reifies the historically myopic focus of mathematics education research.

Like SBR, such a statement from the then-editor of the flagship mathematics education research journal in the United States has broad implications within the field. At the time, I was a doctoral student preparing to conceptualize my dissertation research—a Foucauldian historical analysis of the National Council of Teachers of Mathematics' (1989; 2000) *Standards* documents (Bullock, 2013). I knew that I wanted to pursue an academic career and was aware that I would face certain challenges as a Black woman academic (Rockquemore & Laszloffy, 2008); I felt prepared for those battles in many ways. However, Heid's (2010) editorial comments revealed for me a new set of challenges about which I was not as confident. My research agenda did not, and still does not, align with the priorities Heid outlined for the field. "Do I have to change my interests in order to be successful?" I wondered. "Is it possible for me to achieve my goals as a mathematics education researcher as I am?" These questions continue to haunt me in waves of different concentrations. I am grateful for mathematics education scholars like de Freitas and Nolan (2008) who have provided spaces for mathematics education researchers "to take risks in their writing, to critique and disrupt cherished notions embedded in the field", thus "[troubling] many taken-for-granted assumptions about mathematics education and research" (Nolan & de Freitas, 2008, p. 1).

Early career mathematics education researchers, like me, must navigate this context of disciplinary privilege assigned to certain forms of research in order to be successful and to achieve success in the professorate as measured through high-impact publication and grant funding. We must balance a need to pursue research questions in ways that are considered valuable and fundable with a desire to do research that addresses the issues that are important to us in ways that do those issues justice

and honor the communities we represent. Depending on the location of our research passions, this balance may be more difficult to locate for some researchers than others. The purpose of this paper is to consider the implications of such a narrow focus on a young mathematics education researcher's choices about the lines of inquiry that she or he pursues and the ways that she or he manages the risk associated with asking and responding to questions in ways that align with SBR.

### **Marginality as Practice in Mathematics Education Research**

Marginalization is a process of assigning “outsider status” to anyone who “[deviates] greatly from the norms of the social organization the person is participating in or is observing,” thus creating “inevitable socio emotional, political, cultural, and economic tensions” (Stanfield, 2011, p. 272). In mathematics education, we most often discuss marginalization in terms of students who experience some form of miseducation (Woodson, 1933/2008) based on race, class, gender, socioeconomic status, sexual orientation, or other factors. However, mathematics education scholars experience similar—although not nearly as grave—effects when facing external and internal structures that attempt to direct mathematics education research by establishing norms shrouded by “the myth of neutrality” (Martin, Gholson, & Leonard, 2010, p. 13).

#### **Constructing Margins from Without**

The increased acceptance of qualitative methodologies in mathematics education research combined with mathematics' firm position at the center of education policy conversations for several decades (Steiner, 1987) have brought external challenges to the “quality and usefulness of mathematics education research” (Simon, 2004, p. 157). Legislation such as NCLB and stipulations like SBR place constraints on the types of research that education researchers conduct. As the government dictates to education researchers what qualifies as science, these constraints force scholars to make a decision about whether they will (a) move in lockstep with governmental priorities; (b) resist the pressure to embrace SBR and continue to do research as they see fit; or (c) find ways to negotiate SBR's constraints.

Federal funding agencies such as the United States Department of Education and the National Science Foundation align their funding priorities with legislative priorities. For example, these agencies have established initiatives to support colleges of education in training doctoral students explicitly in SBR (Eisenhart & DeHaan, 2008), thus influencing how researchers are trained. In addition, the funding environment influences how researchers do their work (Zoller, Zimmerling, & Boutellier, 2014). In an era of increased pressure for university faculty to secure external funding as part of tenure and promotion requirements, the priorities that these agencies establish can serve as drivers for the ideas that junior faculty pursue in order to secure a tenured position in the academy. A junior scholar may ask of her or his original idea “Is this idea fundable?” and, if the answer is no, choose to set the idea aside for later investigation, possibly post-tenure. Alternatively, she or he may use funding guidelines and priorities as the framework within which she or he asks questions by asking, “What ideas are fundable?” and choosing research projects accordingly. Although neither of these scenarios is dire, the potential for delayed pursuit or abandonment of questions that are important to the researcher and to the field is a loss for both.

#### **Constructing Margins from Within**

Although external factors such as federal education policy contribute significantly to the marginalization of research outside of SBR's purview, marginalization within mathematics education has not been the sole work of external forces. In many ways, mathematics education has participated in its own exclusionary practices. In recent years, prominent mathematics education scholars have

addressed some of the discipline's exclusions. The three scenarios that follow represent current and persistent tales of marginalization occurring within the community of scholars interested in mathematics teaching and learning.

First, Parks and Schmeichel (2012) investigated the limitations of *JRME* in addressing issues of equity—and particularly race and ethnicity—as a central issue within mathematics education. The motivator for the commentary was a review of literature in *JRME* that revealed minimal efforts to address race and ethnicity in substantive ways. They conclude:

The marginalization and exclusion of attention to race and ethnicity in mathematics education discourse is problematic because what we write both reflects and shapes what we know and believe to be true about the field. The absence of engagement with ideas of power, identity, and equity in mathematics education research reiterates a regulatory schema (Butler, 1993) that inhibits thinking about these forces as relevant to learning in the mathematics classroom and, by extension, limits our capacity for thinking about power and identity in ways that can make a difference for students. (p. 250)

These observations demonstrate a lack of willingness to engage the ways in which power and privilege operate within mathematics education.

As a second example, Heid's (2010) *JRME* editorial "Where's the math (in mathematics education research)?" mentioned earlier prompted a response from Martin, Gholson, and Leonard (2010)—and subsequent response from Battista (2010) and Confrey (2010)—that pointed out some of mathematics education's exclusionary practices and its reluctance to acknowledge the inherently political nature of *all* inquiry in mathematics education. Heid (2010) argued that research in mathematics education should "focus on critical features of mathematical understanding" and that "*JRME* publishes research in which mathematics is an essential component rather than being backdrop for another area of inquiry" (p. 103). According to Martin and colleagues (2010):

[Heid's] statements also represent very public displays of power and privilege. The implications for such exercises of power, under the auspices of an institutional and organizational entity such as the NCTM [National Council of Teachers of Mathematics], are profound, as they have the potential to marginalize scholarship within particular areas of focus as well as to marginalize scholars who devote themselves to this work. Young scholars and graduate students are particularly vulnerable if the subtext of these statements is on pursuing what is valued in the field, as decided by those in positions of power, versus choosing what they want to make their life's work. (pp. 13–14)

Battista (2010) asserts that inherent to Heid's and Martin and colleagues' arguments could be the question "What is mathematics education research?" (p. 37) but even this question is insufficient as it ignores the research in policy, cognitive psychology, and other areas that allow a better understanding of mathematics education and its elements. Thus, he proposes a more appropriate question: "What kinds of research is [*sic*] needed for mathematics educators to understand and improve mathematics learning and teaching?" (p. 38). This question opens up more possibilities for mathematics education research, but it does not seem that the field has taken up these questions in earnest.

Finally, Boaler's (2012) discussion of marginalization reveals direct attacks from mathematicians who attempted to discredit her work. She outlines the disagreements that two mathematicians registered with her work and a history of moves on their behalf to discredit that work. Boaler garnered support from the mathematics education community around the globe, as evidenced by the more than 1,000 signatures on a petition demanding action from Stanford University and decrying the mathematicians for

undermining the integrity of the academy.<sup>1</sup> Although Boaler's case represents a reprehensible act of academic bullying (Stinson, 2012), it also brings to light lingering tensions—or math wars—between the mathematics and mathematics education communities about who has the authority to make recommendations about school mathematics (see e.g. Jackson, 1997; Schoenfeld, 2004; Stinson, 2012).

### Opportunity Amidst Chaos

Schoenfeld (2008) described mathematics education as a young discipline that is going through a chaotic period as it works to locate its identity. There are two options for mathematics education researchers to respond to this chaos. We can perceive the chaos as a negative consequence of an unfortunate growth period and hope that the field quickly settles into a sense of “normal.” The alternative is to view the chaos positively as an opportunity to create mathematics education in various forms in response to the issues that face the discipline and to hope that chaos becomes accepted as “normal” in the discipline. I choose the latter; I see the chaos and instability as a window of opportunity, albeit narrow, to think of the “network of mathematics education practices” (Valero, 2012, p. 374) in new and different ways. The chaos excites me and propels me forward as a scholar in mathematics education, but that excitement is tempered by an ever-present reality that the questions I want to ask and the theories and methodologies I want to use in response are not necessarily commensurable with the discipline's current priorities.

It has been written that in this current state of chaos, mathematics education research is driven by the researcher's whims (Lesh & Lovitts, 2000). I would prefer to assign the motivation for inquiry to researcher experiences and curiosities. Like many researchers, my research questions come from my experience as a mathematics student, teacher, and education researcher. As a secondary mathematics teacher in schools where students were labeled as *at risk* and isolated from high-quality mathematics experiences, I often wondered how mathematics education came to the point where we fought rhetorically for *mathematics for all* (Martin, 2003), yet classrooms like mine were filled with Black students that were locked out. These questions and experiences shape my research agenda. My dissertation research (Bullock, 2013), for example, began with a question of how one organization was able to provide recommendations for school mathematics (i.e., the NCTM [1989; 2000] *Standards*) that shaped approaches to mathematics throughout the United States for two decades or more. This work provides a historical backdrop and has generated new questions. Conceptualizing urban mathematics education—my current research focus—has become a passion that drives me toward urban sociology, critical geography, urban planning, and other disciplines to begin to better understand how the urban space shapes students' mathematics experiences. I know as a teacher and teacher educator that there are nuances to urban education and believe that it is important to engage these nuances within mathematics education (Howard & Milner, 2013; Martin & Larnell, 2013; Tate, 2008). My research is neither traditional nor aligned with SBR, but it is a contribution. Therefore, describing it as a result of whims or unexplained desires devalues these experiences and encounters. It reduces non-traditional approaches to mathematics education research to the object of researcher self-interest rather than efforts to advance the discipline through substantive inquiry.

Unfortunately, mathematics education's position of importance related to education policy in the United States (Steiner, 1987) subjects mathematics education research to political pressure. Therefore, issues important to federal agencies rather than those important to researchers drive inquiry in

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<sup>1</sup> Jeremy Kilpatrick, University of Georgia started the petition: [http://www.change.org/p/the-community-of-mathematics-educators-join-in-defending-fundamental-values?utm\\_campaign=action\\_box&utm\\_medium=twitter&utm\\_source=share\\_petition](http://www.change.org/p/the-community-of-mathematics-educators-join-in-defending-fundamental-values?utm_campaign=action_box&utm_medium=twitter&utm_source=share_petition)

mathematics. When we reduce novel research approaches to researcher whims, attempts to bring attention to the dearth of alternative literatures are likened to the complaints of an irritated child rather than a call for open and inclusive scholarly discourse.

Early career researchers in mathematics education must measure the internal and external marginalization of ideas with institutional demands. Increasingly, universities expect junior faculty to secure external funds as a prerequisite for tenure, particularly in fields like mathematics education in which these funds flow more freely than others. Additionally, tenure-seeking faculty are expected to publish research in the leading journals of the field. Facing the restrictions of SBR on funding priorities and the internal pressure to conduct research that can be considered more internally valid, what is the early career mathematics education researcher to do when she or he finds her or his work to be in the margins? As mentioned early, there are three options: (a) follow along with governmental priorities; (b) resist the pressure to embrace favored approaches; or (c) negotiate the constraints. The first option can constitute a denial of the researcher's interests and passions. The second option can cause the researcher to experience unfavorable tenure and promotion decisions. The final option, negotiating the demands and preferences for traditional research with the researcher's desire to ask new questions, seems to be the most reasonable response. This process of negotiation requires the mathematics education researcher to frame her or his research in ways that are more palatable to external funders. Her or his publication strategy must include interdisciplinary journals that embrace the work without avoiding mathematics education venues. The only way that publication venues in mathematics education can expand their boundaries is if scholars continue to submit good work. Eventually, the opportunity will come. Choosing to play in the proverbial sandbox of mathematics education instead of relegating oneself to the margins is not easy. It requires patience, persistence, high tolerance for rejection, and a willingness to redefine success. However, I believe that the greatest motivator is love.

### **With Love for Mathematics Education**

In a seminar with early career faculty mathematics education during the Association of Mathematics Teacher Educators' Service, Teaching, and Research (STaR) mentoring institute, Sandra Crespo (2014) asked participants to consider how love motivates our research. After some thought I realized that my love of mathematics and mathematics education motivates my scholarly approach; I love mathematics education as a discipline too much to allow it become stagnant in any way. I love mathematics and mathematics education too much to allow it to be deprived of the creative energy that those who have been historically excluded from full access can bring. I love mathematics and mathematics education enough to pursue any and all intellectual means to contribute to its expansion and improvement. I love mathematics and mathematics education enough to push in an effort to shore up its weaknesses and to reveal its potential.

But love is not without risk. My love for mathematics and mathematics education prompts me to ask questions and to use methodologies that may not align with the canon of the discipline and may position me in the margins. These questions and methodologies do not always fall on the right side of the "Where's the math?" (Heid, 2010) questions asked within our most prominent publication venues or engage the types of research design favored by funding agencies that prioritize SBR. Unfortunately, love of mathematics and mathematics education is not enough to guard against calls to justify the scientific value of investigating the power relations at work in curriculum and policy making or proposing different theoretical and methodological approaches for mathematics education research. Love of children is not enough to address the persistent inequities that mar their mathematics experiences *by any means necessary*. But perhaps it should be.

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