Journal of Urban Mathematics Education
December 2010, Vol. 3, No. 2, pp. 25–33

RESPONSE COMMENTARY

"Both And"—Equity *and* Mathematics: A Response to Martin, Gholson, and Leonard

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In the commentary "Mathematics as Gatekeeper: Power and Privilege in the Production of Knowledge," this issue of *JUME*, authors Danny Martin, Maisie Gholson, and Jacqueline Leonard (2010) react to editor Kathleen Heid's (2010) statements in the March 2010 issue of the *Journal for Research in Mathematics Education* (*JRME*), and to a panel presentation during the 2010 National Council of Teachers Research Presession (Harel, Ball, Battista, Thompson, & Confrey, 2010). I was the discussant for that panel. In summary, Martin et al. argue that by posing the question "Where's the math in mathematics education research?" the scholars on the panel and the editor of *JRME* marginalize scholars who wish to study deep and complex factors that concern issues of identity, language, power, racialization, and socialization in mathematics education. They state that a call for more attention to mathematics content in mathematics education research is closely aligned with a "back to basics" agenda. Warning that focusing too heavily on the mathematics may sustain a tradition of deficit thinking about minority and indigent children, they intone that this focus fails to acknowledge the complex factors that limit these children's access to rich opportunities to learn mathematics with the cultural resources that they bring to school.

Further, Martin et al. (2010) observe the limited diversity in terms of race and to a lesser degree, gender, in many areas of mathematics education such as among the scholars who have focused on research on whole number concepts and operations (Nesher, 1980); rational number concepts (Confrey, 1988, 2008; Empson &Turner, 2006; Lamon, 2007; Steffe, 2002); proportional reasoning concepts (Behr, Harel, Post & Lesh, 1992; Confrey, 1995; Hart, 1988; Lamon, 1993; Lesh, Behr, & Post, 1987; Karplus, Pulos, & Stage, 1983; Noelting, 1980); algebra, problem solving, and proof (Harel & Sowder, 1998, 2007); and geometric and spatial thinking (Barrett & Clements, 2003; Barrett, Clements, Klanderman, Pennisi, & Polaki, 2006; Battista, 2007; Clements & Sarama 2009; Clements, Wilson, & Sarama, 2004; Hollebrands, 2002). They seem plainly offended by and critically challenge Harel's assertion that the questions addressed by the presession panel were apolitical and neutral; they characterize the questions instead as

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"displays [of] power and privilege" (p. 13). In their conclusion, they warn that to interpret their criticisms as personal rather than professional "would be disingenuous and misses the point" (p. 21).

I welcome Martin et al.'s (2010) highlighting these issues, and their challenge of whether a call for a focus on mathematics content results in a call for the exclusion of broader issues of equity. I acknowledge some of the points raised by the authors and disagree with others. First, I outline my points of agreement with the authors:

1. Equity is not a "special issue" facing us in mathematics education; it is "the central issue" (Darling-Hammond, 1994, 2010; Bennett et al., 2004). In my opinion, the math wars (Wilson, 2002) have been a distraction from these fundamental issues just as the current media focus on the culture wars often distracts from more fundamental underlying perspectives on the distribution of wealth, corporate influence over democracy, and everyday injustices to people.

2. The tendency for educational professionals to treat children of color and of poverty solely in deficit terms is a devastating problem that severely constrains our discourse and understanding of how to generate robust solutions to differences in performance and high failure rates in mathematics.

3. To address the magnitude of the inequity, one must understand how the entire education system, as a component of the larger system of human services, fails to provide fair and equal opportunities to learn for large segments of the population. Marilyn Frye (1983), a feminist scholar, describes a bird cage analogy, noting that if one looks at any single wire of a bird cage, one wonders why the bird does not fly away. Only by observing the whole configuration of wires does the inherent confinement of the cage become apparent.

4. The field of mathematics education needs to be more diverse—who *does* the scholarship does matter—due to differences in experiences, priorities, interpretive frameworks, and identification. When I recently hosted a discussion of Martin et al.'s (2010) commentary, of the women who participated (African American and Caucasian, and all them professionals in educational research), more than half, including myself, had been at one time or another explicitly counseled *not* to study issues of race or gender as a scholarly enterprise for risk of being pigeonholed, and hence restricted in our subsequent professional opportunities. Therefore, I agree that the marginalization of scholarship referred to in the commentary is a widespread and unfortunate phenomenon reinforced by different forms of mentoring.

The concerns raised by Martin et al. (2010) clearly have merit. However, there is also merit in the perspective that the field of mathematics education research has drifted too far from close and careful attention to the mathematics we seek to have students learn. My advice to scholars interested in equity agendas can be communicated in relation to four particular issues; each focuses on the centrality of the mathematics in the agenda.

1. **It is essential to stay current with research on cognition to be certain that the students one seeks to help are getting the most up-to-date access.**

   For example, the Algebra Project (Moses & Cobb, 2001) quite properly and significantly asserted that algebra is a civil right; under the leadership of Robert Moses, the Algebra Project created community-based approaches to improving access and success. However, their curricular materials were slow to transition to a functions-based approach to algebra, and instead concentrated on algebra as expressions and equations. I would argue that the delay in updating the Algebra Project's approach constituted a disadvantage to students when the functions-based approach gained purchase in many introductory college mathematics courses.

2. **Serving the needs of *all* students requires one to stay abreast of, and make one's opinions known concerning, the full range of mathematics that is of most importance and value to the communities one serves—from topics of basic arithmetic proficiency, to competence with fundamental tools (Excel, statistical software, graphing software and hardware), to critical maths, to "Career and College Readiness," and to twenty-first century skills (Confrey, 2009).**

   During the development of the voluntary-state *Common Core State Standards for Mathematics* (CCSS, 2010), a highly political decision was made to drop probability and statistics from the elementary curriculum. As a member of the National Validation Committee for the Common Core State Standards, I had access to many, but not all, of the comments. I witnessed a strong response from the learning scientists and the curriculum writing communities: vigorous evidence-based arguments to strengthen the statistics and probability content in the early grades—that research demonstrates children's early rich probabilistic awareness, that these topics must be developed over extended time, and that probability and statistics are critical mathematical topics for the 21st century. To what degree did the scholars on critical theory register concerns that the CCSS writers' decision would increase students' alienation from mathematics and weaken students' ability to reason critically and quantitatively about the world around them? It is not clear, for all comments were not made available, even to the validation committee. The writers' final decision, however, to reduce the opportunity for all children to learn that they live in a world of probability, to incorporate probability into their mathematical reasoning, and that fair opportunity is an issue of improving one's odds, seems to me to reinforce an implicit impression communicated within the CCSS that mathematics is apolitical and objective.

Scholars to whom Martin et al. (2010) refer, including M. Frankenstein, A. Powell, R. Gutiérrez, E. Gutstein, S. Lubienski, and others have raised active concerns about the role of critical mathematics and the effects of reform programs in high poverty settings. Martin et al. ask the question: "Is *this* the mathematics to which Heid, Harel, and perhaps the panelists might be referring?" (p. 14). My answer would be yes, *this* and *more*. A continuation of the lines of research represented by those scholars, research that involves direct attention to the interaction of the mathematics and the lived experience of the student, is imperative. The work of some of the Centers for Learning and Teaching (CLT) such as the DiME (Diversity in Mathematics Education) Center and CEMELA (Center for the Mathematics Education of Latinos/as) keeps these linkages central to their work. It is also essential to recognize that the mathematics one learns, the tools one has with which to learn, and the expectations and opportunities expressed in the schools are part of the lived experience of the student, and matter greatly. My question therefore is whether, in the research on increasing students' success in mathematics and lessening the achievement gap, has there been enough attention paid to: (a) ensuring increased awareness of learning technologies and twenty-first century skills, (b) the development of career awareness and preparation, and (c) the intensification of topics like statistics and modeling? I emphasize the importance of this development, not so much for the identification of research mathematicians, but for the education and empowerment of *resourceful* mathematicians (Confrey, 2007, 2010). To my mind, these topics are consistent with a call for more focus on the mathematics in mathematics education *and are also central* to a more effective equity agenda.

3. Good teaching that fosters rich classroom interactions and engagement is a key to a successful equity agenda.

Many mathematics educators share with me the belief that good teaching and fair access to qualified teachers is the key route to increased equity. While improved teaching entails policy dimensions and actions at the systemic level, it also requires significant work in understanding teaching, interpreting classroom interactions, and improving professional development.

Much of the work around creating and supporting discourse communities (Hufferd-Ackles, Fuson, & Sherin, 2004; Thomas, 2010), building teaching capacity (Allen et al., 2006; NPTARS, 2005), and strengthening curricular implementation (Grouws, Reys, Papick, Tarr, & Chavez, 2010; McNaught, Tarr, & Sears, 2010) can transform students' school learning experiences and enhance their opportunities to learn. This work requires precise, creative, and extended attention to what happens within mathematics classrooms and how students develop their understandings over long periods of time. It could be further strengthened, to the benefit of students *and* teachers, by increased attention to the cultural resources students bring to school, sensitivity to differences in linguistic nuances of region, culture, and class, and leveraging these characteristics for improved student mathematical understanding. This is an arena in which scholars across mathematics education communities could help to produce massive change in children's experiences in schools.

Similarly, related development of uses of assessment to promote fair and engaging opportunities to learn would benefit from a more active role from the larger community committed to increased equity (Black & Wiliam, 1998). Formative assessment (assessment for learning) is one classroom process in which the imperatives of mathematical content, student engagement, and student ownership of their own learning intersect to the benefit of all students, and thus could itself be a productive focus for collaboration of mathematics educators of various subspecialties and perspectives. For instance, McManus (2008) studied how to instill formative assessment practices in low-achieving schools. She identified three essential conditions for successful implementation of formative assessment: high level of content and pedagogical knowledge by the teacher, students trusting that they are partners in learning in the classroom environment, and dialogic mathematical content discourse. These elements, along with the essential steps of formative assessment, were the basis of successful formative assessment leading to increased student motivation, ownership of their own learning, and improved self-efficacy. My own research team is undertaking designing new forms of classroom-embedded diagnostic assessment based on learning trajectories to help all students to participate more fully in classroom activities (Confrey & Maloney, in press).

4. **A lack of significant attention to *mathematics* in mathematics education research results in the marginalization of the entire field, threatening the preparation of the next generation of scholars and teachers.**

While I fully agree with Martin et al.'s (2010) view that Harel's characterization of the issues as apolitical (during the panel) was in error, I do believe that the advice of the collective group of mathematics education scholars—to pay closer attention to the mathematics—represents wise and pragmatic counsel to which all members of the mathematics education must attend. Mathematics educators have been effectively sidelined in many policy decisions and related expert panels. The worst example was reflected in the National Mathematics Advisory Panel Report (National Mathematics Advisory Panel, 2008), in which the chapter on learning and serving the needs of special education students virtually mandated direct instruction; the whole document severely limited attention to context, technologies, and modeling (Kelly, 2008). Some of those problems may turn out to be amplified in the Common Core State Standards (CCSS, 2010), which virtually eliminated statistics and algebra in the early grades, and in which the consequent intensity of the mathematics assigned to middle school is likely to have negative consequences for impoverished schools that lack sufficient teaching capacity. Scholars as well as policy specialists need to keep a very close eye on this development.

One can argue that the displacement of the mathematics education community by mathematicians and cognitive scientists (primarily experimental psychologists) was simply a product of the prior federal administration's biases. But this marginalization continues in the current administration, and attacks on colleges of education continue. In light of these developments, the counsel to keep mathematics central in our work seems to me to be wise counsel.

Concluding Remarks

We must not underestimate the value of the type of debate and discussion that Martin et al.'s (2010) commentary facilitates. The group mentioned previously who took part in the discussion at North Carolina State University left in a state of excitement and an increased sense of community, which resulted from spirited debate and attempts to discuss the "wicked problems"[1] raised by the commentary. The exercise of debate, strong calls for self-examination, and emphasis on inclusion are key values, particularly in a national culture in which enlightened thought and debate seem to be increasingly attenuated, and local policies that increase segregation, attacks on public schooling, bullying on sexuality, and excessive blaming of teachers for societies' woes are rampant. I can understand the undertone of anger, urgency, and critical concern in Martin, Gholson, and Leonard's commentary. However, I would have preferred to have seen less

[1] For an explanation of wicked problems, see http://en.wikipedia.org/wiki/Wicked_problem#Formal_definitions.

rhetorical devices, such as the link to "back to basics" which was relatively unfounded and implies an unduly conservative agenda, and more emphasis on the fact that the statement represents differences in opinions among scholars all of whom are exercising leadership. While critical theory is essential in raising consciousness, there is also a need for heavy lifting on the practical problems that cause inequity to persist. My voice in this debate is to call for "both and." We certainly need attention to *both* equity *and* mathematics, and in some critical areas with the potential to improve the situation, we have too few hands to lift and too few scholars gaining the technical know-how of methods and technological advances to be keeping pace with the opportunities that are arising. A new synthesis of research methodologies that combines attention to equity *and* mathematics has the potential to benefit more children and teachers as well as to improve the strength of mathematics education.

Acknowledgments

I acknowledge the contributions of Alan Maloney, Allison McCulloch, and Kenny Nguyen in reviewing and commenting on this commentary. All opinions expressed in the paper are solely the responsibility of the author.

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