

Advocating for Equitable Mathematics Education: Supporting Novice Teachers in Navigating the Sociopolitical Context of Schools

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In this essay, the authors situate elementary mathematics teacher preparation in a broader, sociopolitical context, one that includes historical patterns of educational privilege and oppression. The authors attend to the effects of “reform” movements that encompass a vast array of stakeholders and interests as well as the growing significance of federal education policy on mathematics teacher education. In particular, they highlight the tensions involved in prospective teachers’ first experiences in attempting to make sense of how research-based theories of learning and practice intersect with local schooling realities. The authors present questions that novice mathematics teachers might ask at the personal, interpersonal, institutional, and cultural levels; questions which hold the potential to disrupt dominant discourses and initiatives in favor of discourses that reframe mathematics education opportunities for oppressed youth in the United States.

KEYWORDS: mathematics education, novice teachers, oppression, sociopolitical context, urban education

A mathematics education class for pre-service teachers (PSTs) reads “Exploring Area and Perimeter – The Case of Isabelle Olson,” a chapter in Smith, Silver, and Stein’s (2005) book *Improving Instruction in Geometry and Measurement: Using Cases to Transform Mathematics Teaching and Learning*. The particular case of Isabelle Olson portrays the story of a teacher who is committed to providing her seventh-grade students with rich mathematical tasks (i.e., tasks that do not clearly indicate immediate solutions to students). Thus, the story also is about the students’ experiences of mathematical disequilibrium, which charac-

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terizes the state of confusion felt by students as they engage in “productive struggle” (Schoenfeld, 2013; Warshauer, 2011) and persist with novel, multi-faceted problems. Below is the mathematical task given to students in the case:

Ms. Olson’s 7th-grade class at Roosevelt Middle School will raise rabbits for their spring science fair. The class will use some portion of the school building as one of the sides of its rectangular rabbit pen and will use the fencing that was left over from the school play to enclose the other three sides of the pen.

If Ms. Olson’s class wants its rabbits to have as much room as possible, what would the dimensions of the pen be? Try to organize your work so that someone else who reads it will understand it. (pp. 24–25)

Details provided in the case clearly describe the tensions experienced by the teacher and her students: the students crave more assistance and guidance, the teacher struggles to construct questions that provoke thought but do not steer students in a pre-determined direction. In essence, Ms. Olson struggles to support students’ development of critical, mathematical habits of mind while working with urban students who have been strongly socialized in a particular set of socio-mathematical norms and values.¹ For example, it has been our experience working with urban fourth-graders that children have often internalized the following protocol when presented with a word problem: (a) isolate and pull out the numbers (if those numbers are not already provided to them in the form of an equation), and (b) identify key words that index the operation that is to be performed on these numbers. This approach may or may not have been explicitly taught by the teacher; nonetheless, it is the net effect of thousands of mathematical experiences in the students’ first years of formal schooling (Kamii & Dominick, 1998), especially in classes with high percentages of students of color (Brenner, 1998; Ladson-Billings, 1997; Lipman, 2004).

As mathematics teacher educators, we have seen many PSTs—particularly those preparing to teach in urban schools—share Ms. Olson’s will to implement a mathematics program that represents a radical departure from the mathematics instruction with students of color that predominates nationwide in their attempts to re-define what it means to do, learn, and be good at mathematics. They aspire to ground their curriculum in realistic problem contexts, ones that necessitate that students work together, thus pushing against the math-as-individual activity paradigm. The problems, PSTs often proclaim, should be intentionally designed so that kids are not just maneuvering mathematically through the problem’s various

¹ Mathematical Habits of Mind: to understand the nature of a problem, develop conjectures, test conjectures, disprove conjectures with counterexamples, collect and organize data, generalize, and so on. Mathematical habits of mind are consistent with the Standards for Mathematical Practice advocated for in the Common Core State Standards Initiative (see <http://www.corestandards.org/Math>).

steps, neatly laid out in parts A–D, but instead are living the problem, determining the parameters of the problem, and collaboratively determining the most sensible approaches. The nature of the mathematical activities demands that students dialogue, organize their work, and make impromptu presentations to either the teacher or their classmates. Simply put, this is mathematical activity re-defined, and this re-definition of mathematics and mathematical processes has important implications, particularly for historically marginalized students.

This commitment, however, requires flexible time—perhaps not conforming neatly to existing curriculum pacing guides. Despite an awareness of the kinds of mathematics learning experiences that ought to be afforded to students, the current context of schooling—steeped in traditional structures and practices and simultaneously experimenting with impactful (and restrictive) curricular and pedagogical interventions and mandates—provides teachers with few opportunities and resources to alter the way mathematics might be experienced in their classrooms. There is a significant tension between the will of the PSTs (supported by Ms. Olson’s example and the Common Core State Standards for Mathematical Practice) and the pragmatic realities of schooling today. As PSTs experience their first field placements, this tension is often revealed in comments such as:

- *I’m not sure we could spend two or three days on this activity given all that needs to be covered [for the standardized test].*
- *I would be surprised if students would persist, or have the stamina, to work on a problem like this for two days. I would have given up right away.*
- *My students have never shared their strategies before.*
- *I think the teacher should have offered more guidance to the students, maybe have gone over area and perimeter before the problem.*
- *I do not see problems like this in my classroom’s mandated curriculum materials.*

These kinds of comments, which invariably surface each semester, represent particular mathematics ideologies and a struggle to envision mathematics teaching and learning in ways that are significantly different than the ways in which PSTs experienced mathematics as students. This gap between the ways in which PSTs learned mathematics and the ways in which they are being asked to teach mathematics is not new (Ball, 1990). However, what is new—or at least exacerbated—in the current sociopolitical context is that the kind of teaching exemplified by Ms. Olson is simultaneously promoted by the adoption of the Common Core State Standards for Mathematical Practice and, at the same time, constrained by a number of other federal, state, and local education mandates related to curriculum, instruction, and assessment. This tension created by simultaneous and conflicting

policies is particularly acute in urban schools and classrooms; that is, while the mathematics education field is getting more articulate as to what constitutes strong mathematics pedagogy and corresponding student activity, the increasing pressures of punitive accountability structures are felt disproportionately on urban schools, resulting in a compromised curriculum and pedagogy and an often unstable school culture that revolves around test performance (Lipman, 2004). Moreover, when we consider the distinct ideologies that prevail around what is needed to remediate students who register achievement levels below grade level—disproportionately Latina/o and African American students—we complicate matters even further.

With a focus on the tensions experienced by PSTs and novice teachers, this essay aims to highlight the struggles currently endured by urban schools as part of a larger “reform” movement that encompasses a vast array of stakeholders and interests as well as the growing significance of state and federal education policy on mathematics teacher education. We suggest that the current political climate exacerbates schooling practices that already have the effect of sorting students into mathematical proficiency groups, ultimately contributing to lasting mathematical identity formations, many of which are negative. We claim that this context is oppressive not only for pre-K–12 students but also for PSTs and practicing teachers. Given this reality, we aim to equip PSTs and novice teachers with ways they can disrupt oppressive mathematics teaching and learning arrangements by asking pointed questions of themselves, their peers, administrators, and lay people—all in an effort to shift the discourse and highlight the tensions that exist at various levels of the educational system around quality mathematics learning and teaching.

Background (Briefly) on Inequitable Mathematics Experiences

Critical, or anti-oppressive, mathematics education has been an emergent topic for both researchers and practitioners for decades (see, e.g., Frankenstein, 1989, 1992; Gutstein, Lipman, Hernandez, & de los Reyes, 1997; Khisty, 1995; Secada, 1992). Yet, achieving the vision of equitable mathematics teaching and learning practices remains elusive, especially for Black and Latina/o youth. The last thirty years or so have proven to be an intense struggle to push against prevalent beliefs around who can learn mathematics, elevate the realities of Black and Brown students in mathematics classrooms, and advocate solutions to address their mis-education (Gutiérrez & Irving, 2012; Martin, 2009). Gutiérrez (2012) argues this work is still “in its infancy” (p. 26).

In general, a large portion of the field’s attention has been committed to understanding and improving pre- and in-service teachers’ mathematics content knowledge (Ball, Lubienski, & Mewborn, 2001). While teachers’ mathematics

content knowledge and mathematics knowledge for teaching (Hill et al., 2008) are certainly important in the context of urban students' mathematical achievement, some researchers have proposed that we might be overlooking other significant factors contributing to the mathematical success of youth of marginalized populations (e.g., Milner, 2013). Martin (2007, 2009), for example, raises serious questions about what makes a "qualified" or "effective" mathematics teacher of Black students. Assuming that mathematics learning is a racialized experience (Martin, 2006), it is not appropriate to treat mathematics as a neutral body of knowledge or set of skills to be acquired indiscriminately. Surely, issues of relevance, meaning making, and interaction need to be considered and scrutinized.

With respect to Latina/o learners, many of whom are learning mathematics in a second language, issues of language and discourse are just now beginning to capture the attention of wider audiences (Moschkovich, 2012). It has been a difficult journey to illuminate the mathematics learning process as language intensive and to dispel myths that mathematics is a "universal language." Certainly, with the rise of the Mathematical Practice of the Common Core State Standards, attention to the role of mathematical communication has increased. As we also consider the fact that schools historically do not recognize nor capitalize on Latinas/os' lived experiences, this attention to the dynamics and complexities of language holds great promise to reverse the dismal state of mathematics education amongst Latinas/os (Gándara & Contreras, 2009).

Though this picture of inequitable mathematics and schooling opportunities is becoming clearer, issues of privilege and oppression (i.e., neglecting students' cultural and intuitive mathematics knowledge; granting mathematical authority to only the teacher, the textbook, or a few outstanding students; leaving unchallenged current constructions of what it means to do and learn mathematics) are still too infrequently included in mathematics teacher preparation programs to help novice teachers understand—and develop agency within—the sociopolitical complexities of mathematics learning environments. It is this agency we hope to ignite through this initial attempt at developing a meaningful line of questions for PSTs and novice teachers to use to disrupt current discourses around mathematics, youth, and educational reforms (i.e., interventions) and policies.

Overview (Briefly) of State and Federal Initiatives

U.S. education policy is firmly in the Accountability Era. Though this movement started long before No Child Left Behind, this reauthorization effort of the Elementary and Secondary Education Act (U.S. Department of Education, 2001) catapulted schooling into corporate-style accountability at all levels (Anagnostopoulos, Rutledge, & Jacobsen, 2013). A distinct byproduct of this movement is a spotlight on "failing" schools—narrowly defined and grossly under-

nuanced—and a corresponding public discourse portraying teachers and schools as inadequate to help students reach pre-determined standards. The Accountability Era was ushered in long before Standards were clearly defined or metrics to assess learning were adequately designed and validated. By all accounts, we are engaged in these tasks of definition and design decades after rigid accountability systems were put in place. Nonetheless, the U.S. Department of Education is expanding its influence and elevating the role of high-stakes assessments, data, and corresponding punitive measures through the use of competitions for federal resources (e.g., Race to the Top) that, to a significant degree, depend on the adoption of the Common Core State Standards and participation in one of the two federally-funded test consortia (McNeil, 2013).

The effects of these accountability systems, based on the increased use of high-stakes tests, have been felt in schools in all corners of the United States. Scholars argue, however, that the effects are amplified in schools serving students of color and the poor (Lipman, 2004; Valenzuela, 2005). With great detail, Lipman (2004) shows what the culture of urban schools—schools that districts and private Education Management Organizations (EMOs) are eager to take over—feels like for students, teachers, and administrators when the pressures to perform on tests wholly consume all aspects of school life. In a recent blog titled “Are We Decimating the Teaching Profession?” (Sept. 11, 2012), Diane Ravitch implicates our obsession with tests and test scores as a major reason why veteran and novice teachers alike are leaving the profession, resulting in first-year teachers being the most populous sub-group of teachers. As she points out, this cannot bode well for students.

To compound matters further, there has been a dramatic increase in the educational intervention industry. With each new fad, a flurry of development and moneymaking opportunities arise, consuming a significant portion of district and school budgets (Lipman, 2004). Take, for example, Response to Intervention (RTI), a widely adopted approach “to the early identification and support of students with learning and behavior needs”; upon screening of all students, “struggling learners are provided with interventions at increasing levels of intensity to accelerate their rate of learning” (RTI Action Network, 2011). The ideas behind RTI might be reasonable, but the interventions rarely amount to more than “re-teaching” (Martinez & Young, 2011). Moreover, it often leads to the practice of segmenting and labeling both students and time (i.e., RTI time, Tier 2 intervention time, etc.), with little thought given to what we are “doing” to, for, or with children (Artiles, Bal, & King-Thorius, 2010). The point here is to highlight our complicity in implementing programs that don’t necessarily have the uniform or positive impact that is intended.

As another example—and one that is making huge ripples in the education landscape—the development of the Common Core State Standards and the two

new assessment consortia are being held up as the “silver bullet” that will achieve educational equity across and within schools. While the standards for mathematical practice hold the potential to make a significant contribution to mathematics pedagogy at scale in the United States, as foreshadowed through the teaching of Ms. Olson, the Common Core State Standards have been adopted based on a premise that the current education “problems” are a result of: (a) a lack of curricular clarity and uniformity across the nation, (b) a lack of alignment between the current education system and the needs of local and national economies, and (c) overwhelmingly poor instructional practices. While the Standards were designed to influence not only *what* is taught but also *how* it is taught, the balance between changes in content and changes in pedagogy may well be determined by the nature of the assessments that are developed. Again, this reinforces a particular type of top-down educational policy, one that uses accountability measures (i.e., standardized tests representing so-called “assessment advances”) as levers for educational change.

Given the wide array of problems that the Common Core State Standards portends to solve, it is worth our time to consider and assess its underlying assumptions. More importantly, we need to engage in a conversation around what it means for the Standards to have been developed within the context of current educational and economic institutions. Why is it that the Standards do not mention the root causes of the achievement gap, namely, racism, oppression, privilege, power, and poverty? The absence of these considerations suggests that the Standards and the corresponding assessments are not necessarily positioned well to create more equitable mathematics learning arrangements for urban and other marginalized youth.

Finally, these forces (i.e., policies controlling time and space, the growth of the education industry, the standardization of curriculum and assessment) and tensions have resulted in the implementation of new accountability systems for pre-K–12 teachers and schools and, by extension, for teacher preparation programs. As schools continue to work to comply with RTI, mandated and scripted curriculum materials, the adoption of the Common Core State Standards, and numerous other policies governing curriculum, instruction and assessment, they are, in some states, also struggling to design and implement new teacher evaluation systems. Given the constraints and tensions involved in trying to negotiate multiple mandates, teachers, schools, and districts are increasingly less willing or able to work with prospective teachers at all, much less support them in innovating in the ways exemplified by Ms. Olson. These laws and policies steering practicing teachers’ work, accompanied by external definitions of “quality” teaching, compromise efforts to prepare new, innovative teachers like Ms. Olson, the same teachers that schools and districts will be interviewing in a few short months or years. With

limited access to and participation with the daily operations of classrooms and schools, PSTs' development is short-changed.

At a time when navigating the sociopolitical landscape of mathematics teaching and learning grows increasingly complex, teacher preparation programs and school districts are looking to each other for help; new roles and responsibilities are emerging. It is becoming clearer that PSTs need a different kind of preparation, one largely anchored in the clinical experience (Grossman, 2010; Zeichner, 2010). This inevitably demands that university-school partnerships are strengthened and pre-K–12 schools assume an amplified role in teacher preparation. Without a deliberate and sustained investment in the preparation of PSTs, schools will be faced with an increased workload in terms of the induction and support of novice teachers, a challenging task given that schools and districts often “lack an understanding of the learning and needs of beginning teachers and of the resources required to create effective [induction] programs” (Feiman-Nemser, 2003, p. 25). At the same time, these partnerships are increasingly constrained by policies and mandates that reduce incentives for pre-K–12 schools to work with PSTs or for teacher education programs to work in struggling schools at all, much less in support of the development of the kinds of pedagogies exemplified by Ms. Olson.

Teachers as Disruptors: Four Levels to Influence Oppressive Arrangements

Given this reality, it is increasingly important that teacher preparation programs help teachers develop a critical consciousness about the sociopolitical context of schooling and assume an activist stance to both “play the game and change the game” (Gutiérrez, 2008). Even within a time where it feels like there is little flexibility and support to innovate meaningful mathematics teaching practices, teachers can still own a curriculum and pedagogy that is relevant to young learners and reflects different mathematical objectives and outcomes, as illustrated in “The Case of Isabelle Olson.” In this spirit, we propose that both pre- and in-service teachers consider and maximize their sphere of influence at four different levels: personal, interpersonal, institutional, and cultural (Batts, 1998; 2002).²

² These levels were highlighted for us at the convening of the Privilege and Oppression in the Mathematics Preparation of Teacher Educators (PrOMPTE) conference. Consequently, it led us to consider the ways in which they could be useful in our work with pre-service and novice teachers.

Privilege and Oppression in the Mathematics Preparation of Teacher Educators (PrOMPTE) conference (funded by CREATE for STEM Institute through the Lappan-Phillips-Fitzgerald CMP 2 Innovation Grant program), Michigan State University, Battle Creek, MI, October 2012. Any

The *personal level* refers to the ways in which we recognize our privilege and the oppression of others; it also represents how we might challenge our own deeply held belief systems (and their origins) around what it means to live in a stratified society. The *interpersonal level* signifies the ways in which our interactions with other individuals might disrupt oppressive arrangements. Particular attention might be given, for example, to the language we use with others, the authorities we invoke, and the perspectives we privilege. The *institutional level* refers to the arrangements within organizations and institutions that either perpetuate or challenge oppressive relationships. Similar to other levels, this level is likely to be met with strong resistance as we challenge seemingly “efficient” or “effective” modes of operating (e.g., transitioning to test preparation activities as standardized tests near). Seemingly benign practices need to be scrutinized for the sometimes-tacit role they play in subjugating individuals or groups of people. Finally, the *cultural level* refers not to particular groups that share customs and values as “culture” is conventionally used, but rather to the broader audiences that both directly and tangentially influence the ways in which people are either oppressed or liberated. At this level, we must ask: In what ways do I contribute to or challenge prevalent public discourses that affect privileged and oppressive arrangements?

Given the pressures described above that are particularly acute for novice teachers and in urban settings, we feel a tension in asking PSTs and novice teachers to do more by posing these questions and advocating for themselves and their students at each of these levels of the system. At the same time, part of our responsibility as teacher educators is to support PSTs in learning to disrupt privilege and oppression in mathematics education—in part through these questions—in order to be able to teach in the ways exemplified by Ms. Olson. In a job where students’ development is directly connected to teachers’ own willingness to grow; where pedagogical practices and interactional style can serve to empower or alienate students; where teachers have an important role to play in building-level, decision-making processes with serious implications; and, where teachers’ livelihood is strongly affected by the sentiments and support of the general public, it is crucial that we confront oppression and privilege at all levels. How we view and promote ourselves as teachers and teacher educators; how we resist being cast as self-serving and incompetent; how we frame and discuss urban youth, and elevate their capacity and accomplishments; these discourses matter! As Luke (1995) points out, shifts in discourses and the corresponding social movements (or vice versa) are effective vehicles to influence our own and others’ educational experiences and realities (Luke, 1995). In this vein, Freire (1985) reminds us, “As a referent for change, education represents a form of action that emerges from a join-

opinions, findings, and conclusions or recommendations expressed herein are those of the authors and do not necessarily reflect the views of the funding agency.

ing of the languages of critique and possibility” (p. 16). As such, below are some initial and representative questions that PSTs and novice teachers might ask themselves—or others—to disrupt oppression as it manifests in student-teacher interactions, classroom pedagogy, school-level policy or initiatives, and the broader public discourse.

Personal. How am I privileged? In what ways are my views of teaching mathematics to students of color influenced by my own upbringing? To what degree do I want for them what I had/have? What kinds of power am I granted as I make mathematics curricular and pedagogical decisions? How well do I understand how this privilege and power affect others? Why do I teach mathematics to students of color?

Interpersonal. How might I interact with students in a way that reflects their histories and helps promote positive mathematics identities? How might my conversations with my peers and mentor teachers acknowledge students’ social and mathematical positioning and re-frame the learner and her or his needs? How might I come to understand my mentor teacher’s (or colleague’s) history, identities, and perspective? Which critiques do I have of my mentor teacher? How might I transform my critique of my mentor teacher into thoughtful, provocative, and action-driven questions?

Institutional. Which mathematics initiatives, structures, and norms are present? Who do these initiatives and norms serve? In what ways do they reinforce or dismantle patterns of underachievement and/or student success? How might I raise awareness around mis-guided educational initiatives—or those initiatives that are well-intended, but improperly implemented or poorly resourced—that too often lead to the narrowing of the curriculum? What kinds of evidence would convincingly illuminate the mathematical practices and initiatives that do not afford students of color with the kind of mathematical experiences we would want for our own children? On what grounds do I endorse or resist proposed mathematics programs or policies at my school or within my district?

Cultural/Larger Public Sphere. How might I, through my dialogue and actions, challenge the current public discourse around the ineptitude of teachers and learners—particularly around what it means to be a mathematics teacher of urban students? How might I incorporate mathematical activity that involves and supports our community? How might I publicize my students’ mathematics work and growth (beyond test scores)? How might I articulate and defend other components of students’ mathematical achievement (e.g., identity)?

Concluding Thoughts

We have to refocus on teaching as intellectual and ethical work, something beyond the instrumental and the linear. We need to understand that teaching requires

thoughtful, caring people to carry it forward successfully, and we need, then, to commit to becoming more caring and more thoughtful as we grow into our work. This refocusing requires a leaning outward, a willingness to look at the world of children—the sufferings, the accomplishments, the perspectives, and the concerns—and an awareness, sometimes joyous but just as often painful, of all that we find. And it requires, as well, a leaning inward—inbreathing, in-dwelling—traveling toward self-knowledge, a sense of being alive and conscious in a going world (Ayers, 2006, p. 271).

As we (and others) have pointed out, there are many mathematics reform efforts occurring simultaneously in our cities, counties, states, and at the federal level. There are also many drivers: philanthropists, commerce leaders, politicians, and parents among them. Teachers carry the burden of implementing policies and initiatives, whether they have advocated for them or not, and they are held increasingly accountable for an array of outcomes, many beyond their control and representative of someone else's agenda. There are a myriad of consequential curricular and work-related decisions being made that limit the times and spaces that teachers have available to make their own decisions about what and how to teach children mathematics. For example, teachers seem to have less autonomy in how they spend their planning time, as Professional Learning Communities and their corresponding agendas tend to be determined with little input from teachers, or their instructional time, as RTI, test preparation, and mandated curricula each claim their own portion of classroom time. While we continue to work within teacher education programs to help PSTs develop and utilize innovative pedagogies and critical perspectives, we, as teacher educators and researchers, also need to be more active in supporting teachers as they move into these roles and understand the nature of privilege and oppression in mathematics teaching and learning, particularly in urban settings.

While many may argue the U.S. education landscape looks grim, we continue to recognize the importance of engaging in the struggle to envision a different paradigm of school operations and relay the crucial role teachers play in enacting the shifts we want to see. Mathematics, in particular, is entrenched in historical traditions and granted high status by society. In some ways, it makes sense that those who possess the status of being proficient mathematically, and who have voice in determining what criteria it takes to be successful at mathematics, would be vested in the status quo and reluctant to radically re-define the way we teach, learn, and use mathematics. We need to be cognizant of the ways in which privilege and oppression rear their head in our classrooms, schools, and district offices. Teachers, conscious of the limitations of their mathematical experiences, recognize the need for change, and also the challenges that come with it. Now, it is up to us all to sharpen our sociopolitical lenses in order to notice and disrupt manifestations of privilege and oppression in mathematics education.

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