OPENING SPACE FOR CHANGE AND EMPOWERMENT THROUGH PHILOSOPHICAL AND STRUCTURAL CONTEMPLATION IN TEACHER PROFESSIONAL DEVELOPMENT

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In this theoretical article, I examine the norms of teacher professional development with an eye towards modifying them to allow for genuine systemic change. I first argue that current norms restrict professional development practice to "pseudo-activity" which necessarily operates within rather than against larger societal structures. I then propose philosophical and structural contemplation of mathematics as an example of a currently non-normed practice that has the potential to effect substantive change.

Keywords: Equity and Diversity, Teacher Education-Inservice/Professional Development

> In our frenetic academic life, it is not easy to find the time and the will to contemplate. Partly because one of the necessary requisites for contemplation is the absence of a concern with the applicability of our thoughts, in these days in which time is money, some will ask: why lose money with all this philosophical/contemplative waste of time? The ethos of scientific research today makes plain that empty words are not enough; we must set to work, do it instead of just talking about it. What we need, some say, is engagement in action, quick solutions ready to be implemented, evaluated and, eventually, discarded, so that the entire process can start again. (Pais, 2012, p. 82)
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> The threat today is not passivity but pseudo-activity, the urge to 'be active', to 'participate', to mask the Nothingness of what goes on. (Žižek, 2006, p. 334)

The 40th annual North American Conference of Psychology in Mathematics Education invites us to consider the enduring challenges of the last 40 years as well as ways to enact change moving forward. With that in mind, my goal in this article is to lay out an argument that current teacher professional development norms preclude the opportunity for genuine systemic change, and to suggest a path forward that would allow for such change. Specifically, I argue for a widening of the norms of acceptable mathematics teacher professional development in the United States to allow for philosophical and structural contemplation. To that end, the purpose of this article is twofold: (1) to provide a critical analysis of the ways professional development opportunities systematically privilege forms of professional development that focus on "pseudo-activity," activity that has here-and-now implications for the classroom but preserves the hegemony of school mathematics, and (2) to illustrate a discouraged form of professional development and the power it could have to enable critique of the hegemony of school mathematics and open space for empowerment. I will first argue that current professional development practice focuses on activities that might have immediate or directly visible impacts on teaching practice, and that such practices preserve the hegemony of mathematics and narrow space for empowering the students and teachers who interact with mathematics (Pais, 2012). I will then outline how structural and philosophical consideration of mathematics could have powerful implications for teachers and students, since such consideration exposes the discipline to critical interaction while opening space for the empowerment of the people who interact with

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it. In essence, the former argument is meant to establish that the norms of teacher professional practice are narrow in some way, while the latter is an existence proof of a potentially valuable practice that currently lies outside the realm of normed practice.

Throughout this paper, I will use the phrase "structural and philosophical contemplation of mathematics" to refer to thinking about the epistemological and ontological assumptions on which the discipline is built as well as to considering the ways the discipline acts as a framing or scaffolding device that shapes how we think of other aspects of our world. The former contemplation I would call philosophical and the latter structural. The lines between these two types of contemplation are fuzzy, but since I use them in tandem as a single construct throughout this article, this fuzziness should not be problematic.

Critical Analysis of Constraints on Teacher Professional Development

> I often experience it firsthand when I am asked to speak with teachers and administrators regarding mathematics achievement and persistence among African American students. Despite insisting on the complexity of these issues, some version of the following is inevitably asked: 'What you have said is fine, but tell me, specifically, what I should do today when I go back to my school or classroom to work more successfully with African American students?' In most cases, this is a sincere request. (Martin, 2009, p. 304)

Professional development is commonly taken to refer to the learning opportunities that teachers engage in to improve their professional practice (Feiman-Nemser, 2001). Professional development thus includes, but is not limited to, mandated staff development offered by districts, reading professional journals, and attending professional conferences.

In order to argue that the norms of acceptable mathematics teacher professional development should be widened, I first contend that the current norms of practice presently exclude certain types of professional practice. In brief, I contend that teachers have limited time to devote to professional development activities, and that professional structures restrict the sorts of professional development that might be considered acceptable. None of this should be taken as a critique of teachers; instead, it is a critique of larger forces that shape the decisions that teachers might reasonably make.

Teachers work long hours during the schoolyear. The OECD's large-scale international study found that teachers in the United States work an average of roughly 1,900 hours per year, more than 30 of the 32 other countries included in the dataset (OECD, 2017, p. 388). Assuming the majority of this workload occurs during the school year rather than over breaks, it is not out of the question that many teachers in the United States might average 50 or more hours per workweek during the school year, 25% more than the prototypical 40 hour workweek. This finding is echoed by the 2011-2012 Schools and Staffing Survey which reported that public school teachers in the United States average 52.2 hours of work per workweek (SASS, 2012) as well as by numerous smaller-scale non-scientific surveys (e.g. Banning-Lover, 2016).

Given the long hours teachers work, they must use their time strategically. Teachers have many obligations, including but not limited to: (1) teaching, (2) planning and preparation of lessons, (3) review and marking of student work, (4) communication with parents and guardians, (5) supervision of students outside of teaching time, (6) teamwork with colleagues, (7) participation in mentoring or support groups, and (8) other managerial or extracurricular obligations such as serving as department head or running academic clubs (OECD, 2017, pp. 390-391). Along with all of these obligations, teachers are expected to find time for professional

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development. Given the limited time remaining for such activities, teachers are pressured to make the most efficient use of professional development time possible.

What strategic choice of how to use limited professional development time might a teacher reasonably make? As is suggested by Martin's (2009) quote at the beginning of this section, one enticing choice is to focus on activities with immediate or directly visible implications for the classroom. In many cases, this choice is made for teachers by districts, in the form of full- or half-day sessions which focus on the dissemination of teaching techniques or strategies coupled with "inspirational" lectures (Feiman-Nemser, 2001). Such mandatory professional development informs norms of teacher professional development, suggesting that it should center on activities with immediate or directly visible implications for the classroom. This norm is further reified by the professional structures that provide additional professional development opportunities for teachers.

The National Council of Teachers of Mathematics (NCTM) is perhaps the largest professional institution devoted to mathematics education and teaching, boasting more than 60,000 members and 230 affiliates (NCTM, 2017a). NCTM offers a variety of journals and meetings devoted to the professional development of practitioners as well as the practical dissemination of research (or implications thereof) to practitioners. Given the size and pervasiveness of this institution, looking at its journals and meeting schedules can offer some insight into the norms of mathematics teacher professional development practice in the United States.

In reviewing the feature articles from the most recent (as of the time of this writing) issues of every NCTM journal dedicated to K-12 teachers (see *table 1*), I found that *every* feature article

***Table 1*: NCTM practitioner journal feature articles reviewed by the author**

Journal	Teaching Children Mathematics	Mathematics Teaching in the Middle School	The Mathematics Teacher
Articles	Bleiler-Baxter, Stephens, Baxter, & Barlow (2017) Bray & Blais (2017) Earnest, Radtke, & Scott (2017) Firmbender, Casa, & Colennese (2017) Lambert, Imm, & Williams (2017) Lomax, Alfonzo, Dietz, Kleyman, & Kaxemi (2017) McCormick, & Essex (2017) Perry, & Lewis (2017) Shumway, & Pace (2017) Turrou, Franke & Johnson (2017)	Banes, López, Skubal, & Perfecto (2017) Groth, Jones, & Knaub (2017) Matsuura, Sword, & Finkelstein (2017) McNamara (2017) Oslund, & Barton (2017) Roy, Bush, Hodges, & Safi (2017)	Beigie (2017) Borkovitz, & Haferd, (2017) Dougherty, Bush, & Karp (2017) Gerver, Santucci, & Leventhal (2017) Goldenberg, & Carter (2017) Jaqua (2017) Lommatsch (2017) McCaffrey, & Matthews (2017) Samuels (2017) Taff (2017)

focused on immediate or directly visible implications for classroom practice. This review covered 10 articles from *Teaching Children Mathematics*, 6 from *Mathematics Teaching in the Middle School*, and 10 from *The Mathematics Teacher*. All of these articles either: (1) described

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an exemplar lesson or course (e.g. Earnest, Radtke, & Scott, 2017), (2) describe a pedagogical technique (Oslund & Barton, 2017), or (3) offer some guiding principles for a certain style of teaching (e.g. Roy, Bush, Hodges, & Safi, 2017). Provided the reader is teaching the relevant course, every article in here contains ideas that could be immediately implemented in class and that could be pointed out to observers as teacher practice responding to professional development. Cursory analysis of additional articles spanning the years 2013-2017 echoes this finding.

Reviewing the proceedings of the annual meeting and exposition of NCTM (2017b) produces analogous results. Reviewing all 708 scheduled talks suggests that all, save for the administrative meetings, focus on topics with immediate or directly visible implications for the classroom which could be classified under the same three broad headings mentioned above.

Taken together, I claim these results suggest that a strong, though sometimes implicit, message is being sent to teachers: professional development time should be spent on activities with immediate or directly visible implications for practice. One might propose to counter this claim by arguing that teachers simply prefer professional development activities of this sort, and school districts and NCTM are acting to meet their needs. The truth or falsity of this counter-claim, however, is irrelevant to my claim. Regardless of whether or not the counter-claim is true, the current state of district mandated professional development and NCTM's professional offerings nonetheless send a message about what type of professional development is acceptable, thus informing the norms of teacher professional practice.

Focusing on professional development with immediate implications can be very valuable. However, maintaining such a focus to the point of excluding other sorts of professional development is potentially problematic, as it restricts the ways that teachers might think about solving problems (Putnam & Borko, 2000) and risks locking us into larger structures that are themselves destructive (Pais, 2012). In particular, I note that mathematics learning is itself a destructive force when not exposed to critique (Ernest, 2016), and that "here-and-now" professional development works within the discipline rather than subjecting it to critique. Thus, if there are valuable types of professional development currently excluded from the norms of professional development that might respond to this weakness, then we should make efforts to widen those norms.

Structural and Philosophical Consideration of Mathematics as Productive Professional Development

> If mathematics is objective, it makes no sense to be concerned with learners' cultures and lived experiences. If mathematical achievement can be accurately and fairly measured with standardized tests of routinized items, it makes no sense to develop more "subjective" assessments of mathematical understanding. And if mathematics is inherently too difficult for many to master, it makes no sense to try to teach all students rigorous aspects of the discipline. (Ellis & Berry III, 2005)
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> Often these processes operate at a level below consciousness; they remain unexamined or even unnoticed, in which case the task at hand is to render them visible and expose them to critique. (Greer & Mukhopadhyay, 2012)

In order to argue that the norms of acceptable teacher professional development should be widened, I now contend that there exist potentially powerful forms of professional development that are currently excluded from the norms of acceptable professional development evidenced

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previously. In particular, this existence proof focuses on the potential power of structural and philosophical consideration of mathematics as a means to disempower the discipline while opening space for the empowerment of the people who interact with it, such as students and teachers. Noting at the outset that such contemplation falls outside of the normed space of professional development with immediate or directly visible implications for practice, my argument is structured as follows: (1) mathematics plays a large and widespread role in our lives, (2) perception of mathematics as objective and value-free empowers the discipline in potentially destructive ways, (3) substantial evidence conflicts with this perception, and (4) adopting a view of mathematics as fallible and value-full better reflects this evidence and opens space to empower people while disempowering the discipline.

Mathematics plays a powerful and pervasive role in our lives. Mathematics coursework is expected of us for a minimum of twelve or thirteen years of our lives, and many more years are required for many of jobs popularly labeled as the "best" jobs available to us (Ward, 2017). Mathematics underlies much of modern technology which has become so deeply integrated into our everyday lives. The tools of mathematics are utilized by statisticians whose work, in turn, informs policy at all levels of the government. Mathematics is everywhere, not just in the sense that anything can potentially be mathematized, but in the sense that mathematics has played some role in almost every facet of our lives.

Perhaps even more so than science (Gould, 1981/1996), mathematics is often perceived as objective and value-free (Ernest, 1991). This hegemonic perception gives power to the discipline while taking power away from those who interact with it (Ernest, 2016; Greer & Mukhopadhyay, 2012). For example, if one holds the belief that mathematics is objective and value-free, then one might take the persistent "racial gap" in academic achievement as evidence that people of color are intellectually inferior to whites (e.g. Herrnstein & Murray, 1994; Jensen, 1969), reinforcing hegemonic positioning and reifying white supremacy through appeal to the assumed nature of mathematics (Greer & Mukhopadhyay, 2012).

Mathematics is neither objective nor value-free. Focusing first on the former, Ernest (1991) identified and refuted several assumptions required for an absolutist view of mathematics, the view that mathematics is certain and unchallengeable. Without recreating the entirety of Ernest's argument, I will highlight several key take-aways in support of the opposing fallibilist view of mathematics: (1) The informal proofs that mathematicians publish are commonly flawed, (2) there now exist proofs that cannot be checked by humans for correctness, and (3) we cannot know that any but the most trivial of axiomatic mathematical systems are secure.

I focus now on the latter, that mathematics is not value-free. To that end, I make the following non-exhaustive list of some ways in which mathematics is value-full:

- Aesthetics drives all aspects of mathematics, from what mathematical questions people ask to the ways they construct argument and proof for inspection by others (Burton, 1999; Sinclair, 2009; Wells, 1990).
- Mathematics and mathematical meaning-making vary from culture to culture, indicating that mathematics itself is a cultural product (D'Ambrosio, 1985; Lipka, Wong, Andrew-Ihrke, & Yanez, 2012; Meaney, Trinick, & Fairhall, 2013; Thomas, 1996).
- Mathematics is socially-mediated and mathematical proofs are discursively constructed (Burton, 1999; Lakatos, 1976).
- The version of mathematics taught in schools and practiced by mathematicians is Eurocentric (Joseph, 1987).

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- People of marginalized backgrounds have different experiences with mathematics than white males for reasons that cannot be explained by effort or ability (Martin, 2009; Stinson, 2013)

Note that these arguments that mathematics is not value-free can be taken as further support of the fallible nature of mathematics, since these values will influence what sorts of mathematical questions are asked, what can be taken as evidence in favor of mathematical claims, and generally what counts as mathematics or mathematical knowledge (e.g. Thomas, 1996).

Adopting a view of mathematics as fallible and value-full more accurately reflects this evidence and also serves to open space for the empowerment of people who interact directly or indirectly with the discipline. Recalling the earlier example of the "racial gap" in academic and mathematics achievement, this view of mathematics allows one to ask questions such as: (1) Whose brand of mathematics is being named "mathematics," (2) what value judgements and assumptions underlie the metrics used to measure achievement in this brand of mathematics, and (3) how does the culture of the test-takers interact with the cultures and values of this brand of mathematics and the measures of achievement? Thus, rather than mathematics being empowered to marginalize people, people are empowered to critically interact with mathematics (Greer & Mukhopadhyay, 2012).

Adopting such a view of mathematics requires opportunities for structural and philosophical contemplation of the discipline itself, with no concern for immediate or directly visible actions to be taken in the classroom. Opportunities for such critical analysis of and interaction with mathematics as a structure in our lives and society can be empowering (Greer & Mukhopadhyay, 2012) and might even be necessary for the construction of a more just society (Pais, 2012), but are currently excluded from the norms of acceptable professional practice for teachers. Consequently, I conclude that the norms of teacher professional development need to be widened to allow for such contemplation.

Conclusion

In this article, I have argued for a widening of the norms of acceptable teacher professional development in the United States to allow for structural and philosophical contemplation of mathematics. I began by providing evidence that the norms of professional development for mathematics teachers currently exclude professional development activities that lack immediate or directly visible implications for practice. I then argued that such "pseudo-activity" reinforces the hegemony of mathematics in destructive ways, and illustrated how structural and philosophical contemplation of mathematics could enable productive critique of the discipline if (re)introduced into the realm of acceptable professional development practice. Taken together, I conclude that the norms of teacher professional practice should be widened to allow for such structural and philosophical contemplation.

The machinery through which these norms could be widened is nontrivial, and I make no specific recommendations for how it should be accomplished; my goal here has been to invite conversation, not dictate prescription. It could be that some individual or group in a position of appropriate influence might push school districts, NCTM, or other professional institutions to make room for structural and philosophical contemplation. It could be that teacher-educators, as individuals or as a group, might take it upon themselves to adopt discourse patterns that validate such practice. It could be the culmination of a million small acts of agency, conspiring to change our professional world.

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Given the immensity of the challenge, it would be tempting to take no action at all. In trying to do what is right, it seems rational to start with the set of things that are possible, and look within that for the things that are right; if the task of normalizing structural and philosophical contemplation is impossible, then it is discarded at the outset. However, when we are ourselves linked tightly into the structures that influence our lives, it can be hard to distinguish what is genuinely impossible and what is impossible only within the current system (Pais, 2012; Putnam & Borko, 2000). Thus, I suggest instead that we start with the set of things that are right, and find ways to make those things possible.

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