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What remains? A longitudinal study of the effects of curated field experiences for preservice mathematics teachers

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This paper examines the long-term effects of a teacher education program that prepares preservice elementary mathematics teachers to work specifically in Detroit schools. The study was designed to better understand the degree of alignment between the program's curated field experiences and the work graduates currently do as teachers; the aspects of program design that contributed or detracted from graduates' understanding of culturally relevant practice in mathematics classes; and the reasons for graduates' retention in high-poverty schools over time.

Keywords: Teachers, mathematics teachers, preservice teachers, elementary school teachers.

Objectives

This paper examines the long-term effects of a teacher education program designed to prepare teachers to work specifically in Detroit. Although teacher education programs are frequently studied for their near- and medium-term effects, this study sought to uncover the longer-term traces of the program for its graduates. The TeachDETROIT program was established in 2016, and its first cohort entered the workforce as teachers of record in 2017. The program was founded to contribute to the revitalization of the city with special emphasis on the importance of schools in their efforts to build a just educational system for minoritized people. The TeachDETROIT program welcomed its sixth cohort in fall 2021. As part of program evaluation, the program leadership along with external evaluators sought to understand the longitudinal traces of this context-specific (Matsko & Hammerness, 2014) urban teacher residency program, regarding graduates' perceptions of preparedness to teach mathematics in under-resourced schools; implementation of culturally relevant teaching practices in the context of teaching mathematics; and program graduates' current commitment to remain in under-resourced schools. The study was designed to better understand the graduates' pathway into, through and beyond the program; the degree of alignment between the program's highly curated field experiences and the work graduates currently do as teachers; and the aspects of program design that contributed or detracted from graduates' understanding of culturally relevant practice in mathematics classes.

Theoretical Framework

As one of the most important factors for improving student achievement (Darling-Hammond et al., 2009), teachers need to be prepared to offer their students the high-quality mathematics instruction they deserve and require (National Council of Teachers of Mathematics, 2000; Conference Board of Mathematical Sciences, 2012). Unfortunately, there is evidence that students in the United States are not experiencing high-quality instruction. The 2019 National Assessment of Educational Progress (NAEP) showed that only 41% of fourth-grade and 34% of eighth-grade students were "proficient" at mathematics. For Black students in large, urban school districts, those numbers fall to 18% and

13%, respectively. In Detroit, Michigan the situation is even more dire: only 5% of fourth-grade, and 5% of eighth-grade students were “proficient” in mathematics.

Researchers have long posited a connection between the quality of instruction teachers can offer and the quality of the preservice preparation they experience (Schmidt et al., 2011; Senk et al., 2012). Although the familiar mix of content, methods, and social science foundational courses, together with supervised practice teaching, has endured (Donoghue, 2006; Fraser, 2007), so has the finding that this type of preparation is disconnected from the work of teaching (Feiman-Nemser, 1983, 2001).

After decades of interest in learning to teach at some remove from classroom experience (Feiman-Nemser, 1985; Floden & Buchmann, 1993), the pendulum swung back in the early 2000s to emphasize a focus on learning “in and from practice” (Lampert, 2010). A flurry of work in teacher education called for preservice teacher education to focus on “practice” (Ball & Forzani, 2009; Grossman et al., 2009; Grossman & McDonald, 2008; Lampert, 2010; Zeichner, 2010). The emphasis in this line of work is that preservice teachers should learn “in and from practice” (Ball & Cohen, 1999), not just educational theory learned at a distance from classroom life. Today clinical residency programs abound, where preservice teacher education is predominantly a full immersion in a field placement classroom. Yet the quality and specifications of these field experiences can vary widely: the insides of the classroom environments, the quality of cooperating teachers and school principals, and the experiences that preservice teachers have can often go largely unspecified (Ronfeldt, 2012). Furthermore, there are few studies that investigate how well preservice teachers learn to do the interactive work of teaching mathematics in such programs. In this study, we describe an early field experience designed for preservice teachers to learn to carry out mathematics instruction in elementary classrooms, and we report on its relevance to participants five years later.

The curated field experience in TeachDETROIT is composed of four primary elements: 1) Highly scaffolded instructional activities in mathematics; 2) Shared classroom spaces where mathematics teaching and review of teaching is public; 3) Ongoing study and conversation about teaching mathematics to children of color living in poverty; 4) Group explorations of the city of Detroit.

In contrast to reports that the quality of field experiences is often poor (Greenberg et al., 2011; Ronfeldt, 2012), the field experiences described in this paper are carefully designed and sequenced. We have named this intentionally designed field experience the *curated field experience*, one in which the cooperating teachers and the instructional activities in field experience classrooms are highly specified and aligned, bringing together a team of teacher educators, cooperating teachers, school administrators and support staff. We used the word *curated* to refer to the careful selection and sequencing of field experiences, including the preparation of cooperating teachers for this program, the matching of cooperating teacher to intern, and the progression of field experiences where the complexity and demands grow according to the needs of each intern. Researchers designed this study to better understand how the early curated field experience was viewed by graduates of the program some five years later. In this section we provide some detail about the four elements of TeachDETROIT’s early curated field experience.

Highly scaffolded instructional activities. One important feature of the curated early field experience is that interactive instructional work is woven into the mathematics methods class from preservice

teachers' first day in TeachDETROIT. Each methods class session is held in an elementary school, and interns enter one 3rd grade classroom for 30-40 minutes during the methods class of 150 minutes. Preservice teachers work with small groups of children in the same classroom. Preservice teachers learn to conduct four instructional activities in mathematics to rising 3rd grade students in a summer school setting: teaching a mathematical game using compositions of ten; interval counting (Franke et al., 2018); modeling number facts with concrete materials; and using a variety of strategies to represent multidigit addition and subtraction. In this setting, preservice teachers learn to enact a short instructional activity by observing an experienced teacher conduct the activity, rehearsing the activity with a peer using a script, rehearsing the activity in front of the larger group of preservice teachers for feedback, and finally enacting the short activity with a small group of children. In the first weeks of the early field experience, the instructional activity is highly scripted. Although scripted teaching has been the subject of lively critique in teacher education, in the early field experience the script serves to quiet the complexity of classroom work by reducing some of the cognitive load for novices until strong mathematics teaching practices become more familiar and internalized. As the term progresses, novices rely less and less on scripted lessons and take on increasingly complex facets of planning and enactment. Preparing for teaching includes analysis of video from the previous session's lesson, reviewing and adapting lesson plans, and rehearsing for teaching enactment. The rehearsals underscore the unspoken notion that teaching is something to be studied, practiced, and constantly improved. This feature of TeachDETROIT draws on the scholarship of Lampert et al. (2013).

Shared classroom spaces where teaching is made public. Preservice teachers, host teachers, and the methods instructor are all present in one classroom for every class session, so that all teaching is always conducted in the company of others. From the very first day of TeachDETROIT, preservice teachers experience teaching as an activity that is witnessed by others, and the subject of collegial conversations towards improvement. The preservice teachers videorecord their teaching enactments and review them each day; following a teaching enactment, preservice teachers share excerpts of their recordings and write about them in journals and video platforms designed for such purposes. In this way, teaching is positioned as work that is done in the presence of other colleagues, with frequent collaboration, and guided by review of prior lessons with ongoing attention to evidence of student learning. Each lesson plan is shaped by the review of the previous day's teaching and learning as documented in video records, student work, and in consultation with peers, the instructor, and the host teachers. This feature of TeachDETROIT, making practice visible and shared, follows the work of Lewis (2007).

Teaching children of color living in poverty. In a course titled *Detroit Families, Communities, and Schools*, TeachDETROIT participants learn about the history of schooling in Detroit, and study the effects of poverty and systemic racism on families. The course is part of an ongoing open conversation in the program about working with children of color living in poverty and their families and caregivers, and promotes a strengths-and-assets view of students and their families. Curated field experiences are especially important in preparing preservice teachers to do ambitious teaching in high-poverty settings with children of color, since some preservice teachers may not have had such experiences themselves, either with children of color or with ambitious teaching practice—and the challenges of the two combined can be especially daunting. The empirical experience provided by

curated fieldwork in conducting ambitious practice with children of color living in poverty serves as a kind of existence proof to preservice teachers: that such practice is possible, that teachers and their students are capable of doing such work, and that this kind of work is what is done in “regular” schools, real-time, day in and day out. Ambitious mathematics teaching may not be the norm in many schools that serve Black children living in poverty, or preservice teachers may not imagine that such practice can be done with minoritized populations. For this reason, the curated field experiences described in this article are intentionally situated in schools that serve children of color living in poverty. This feature draws on the work of Matsko and Hammerness (2014).

Exploring the city of Detroit. The TeachDETROIT experience includes multiple excursions around the city, especially to venues and events where families are present. Experiencing Detroit as a place of vibrant cultural and social ferment emphasizes the possibilities of a city that has been portrayed in the media as a blighted, scary place. Program participants come to see Detroit as a compelling place to work; being part of the city by visiting libraries, parks, artist studios, outdoor murals, urban farms, museums, coffee shops and lectures together is part of the education that TeachDETROIT provides beyond the preparation for teaching academic subjects. The required course *Detroit Families, Communities, and Schools* features such excursions, and optional social gatherings in the city are an integral part of the TeachDETROIT experience. This feature of TeachDETROIT was introduced following the literature on place-based education (cf. Gruenewald & Smith, 2014).

“Slow food, small batches.” Although not a primary feature of the curated field experience, it bears mentioning here that an important characteristic of the TeachDETROIT program is the maintenance of small cohort size so that the preservice teachers receive individualized attention and wraparound services as needed. Each preservice teacher progresses through the program on pace with their own growing proficiency; individual strengths, resources, and interests are addressed as much as possible. For example, by knowing the preservice teachers well, the program is able to place them with mentor teachers who are matched to their needs. The program endeavors to be the educational analog to the Slow Food movement, which prizes the production of high-quality, environmentally responsible food over industrialized food production. Thus, TeachDETROIT cohorts are purposely small, and the program resists the trend to abridge the time and requirements for teacher certification 10.1111/0161-4681.00141

increasingly allowed by the Michigan Department of Education.

Methods

All members of the inaugural TeachDETROIT cohort were invited to participate in the study by external evaluators for the program. TeachDETROIT preservice teachers are eligible to join the program if they have a bachelor’s degree with a 2.75 grade point average, some experience working with children (even minimal experience), and an expressed interest in working with children in Detroit. Candidates are often returning to school after other careers or raising families, so their prior educational experience may be distant and not necessarily a predictor of success in TeachDETROIT; for this reason, weak academic history is not necessarily a barrier to entry in the program.

Program graduates received three email invitations and three phone calls to take part in 45-60-minute interviews. Study participants were offered a gift card of \$75 for joining the study, and were

approached by the external evaluation team, not program personnel, and interviewed by the external evaluators to encourage study participants to speak candidly about their experiences. Stimulated recall (Calderhead, 1981; Kennedy, 1991) using photographs of the interns themselves during their first semester of program participation was used to prompt graduate recollections about their curated field experiences. These photographs were taken for marketing purposes at the time, and show each intern engaged in the instructional activities with children as detailed above, including the conduct of small group work, writing on the whiteboard, and peering over students' shoulders as they work, for example. The photographs were not staged; they were taken during regular instruction. A structured interview was developed making use of the photographs and the memories they sparked for study participants. As mentioned above, interviewers were external to the program and had conducted external evaluation activities in years prior to the current study. The study was conducted with IRB permission.

Data sources

67% of the cohort (N=4) participated in the study. Interviews were audio recorded and transcribed; the transcripts were then coded using an approach that closely follows methods explicated by Miles et al. (2019). This approach emphasizes well-defined study variables to ensure the comparability of data and reduction of data using data displays and matrices so that the common themes can be identified.

Findings

Findings of the study are summarized here.

1. Most graduates found out about the program through their academic advisors at the University.
2. Study participants reported that memories of their preparation experiences in the field were triggered when shown a photo of themselves in the classroom. Participants recalled particular instructional routines and named them.
3. All study participants said that their mathematics lessons did not go as planned in their first months in the program, and that they had to learn to adjust to what students knew in the moment. The following exchange illustrates this finding:

Interviewer: Do you remember any of the content of the lessons that you taught?

Graduate: Oh, my gosh. Yes. Shared reading, guided reading and read alouds for reading. And then for math, we did number talks.

Interviewer: Okay. And do you remember feeling that the lessons went as planned?

Graduate: Sometimes. I mean you never know what children are going to say and they're going to throw you off, but most of it, I would say that the majority of the time, yes, with the exception of you just don't know how many children are going to respond. And, for example, when we would do a number talk and talk to children about math, your expectation is that at some point, they're going to get it while sometimes they didn't. So in that regard, no.

4. All study participants valued the interactions with peers, found those relationships to be educative and sustaining, and reported that they continue to stay in contact five years later.

Interviewer: Do you remember discussing your teaching with your peers? And if you do, what do you remember kind of taking away from those discussions?

Graduate: Oh, absolutely. It was very beneficial because we would talk about what our strengths were during that lesson, what we could improve upon and how we would change it if we had to do it again. And the thing is we were talking to our peers, so some of the feedback came from teachers, mentor teachers, but then other times, it came back from our peers, which helps a lot.

5. Reflecting on their early mathematics teaching experiences, all graduates noted that those early preparation experiences were aligned with the teaching work they did after graduation.

Interviewer: So looking back on these experiences, were they kind of aligned or misaligned with the teaching work that you would do once you graduated?

Graduate: Oh, they were very aligned.

6. Graduates named classroom management as an area for which they felt underprepared upon entering the profession. Graduates felt that the program did not address this topic adequately, and noted that the demands of managing a classroom alone were greater than they had anticipated.

7. All graduates felt that the program prepared them to teach mathematics in a culturally responsive way. They reported learning about culturally responsive instruction through their coursework, specifically in their methods course and the course titled *Detroit Families, Schools, and Communities*; during discussions with teachers and university instructors and coaches; and by participating in a series on trauma-informed teaching.

8. Nearly all program graduates from all cohorts have remained in teaching and are working in high-needs schools. Typically, graduates stay for two years in their first job and then move to another school, to follow a principal or to work closer to home.

Scholarly significance of the study

Teachers, especially minority teachers, leave the profession at astonishing rates and soon after graduation (Ingersoll & May, 2011). This problem is especially acute in schools for children of color living in poverty. TeachDETROIT graduates defy this national trend: nearly every graduate from all six cohorts of TeachDETROIT has remained in teaching and serves in high-poverty schools. We hypothesize that the curated early field experience is a significant factor contributing to increased teacher retention in hard-to-staff schools. This study provides some preliminary evidence that teacher retention, particularly in schools for children of color living in poverty, can be strengthened by preparing teachers to teach ambitious mathematics, along with attention to teaching for equity. We hypothesize that the curated field experience provides teachers with the skills and knowledge to teach ambitious mathematics and work in schools much like those they will teach in, and this in turn leads to feelings of self-efficacy and job satisfaction once graduates are teachers of record. Their shared explorations of the city of Detroit further cement program graduates' sense of commitment to the families in the city and the sense that as teachers, they are part of something bigger than themselves. Although limited by the small number of participants, this study sheds some light on the longer term effects of a program that is designed for preservice teachers to learn "in and from practice" (Lampert, 2010). Further investigation is needed to understand the intersection of culturally relevant teaching practices and the instructional routines in mathematics that graduates learned while in the program. Additionally, external validation of graduates' perceptions would greatly strengthen the claims made here, and to obtain the quality of their instruction. Finally, although retention in hard-to-staff schools

is strong for TeachDETROIT graduates, we have yet to study the quality of teaching and the extent to which graduates continue to carry out ambitious mathematics instruction.

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