Algebra for all? The meanings that mothers assign to participation in an algebra class

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Abstract

In this paper, we report on a series of algebra classes with a group of low-income, African American mothers of elementary-aged children who had limited and negative formal experiences with algebra. We drew from United States reform-oriented elementary mathematics curricular materials in the classes. The women initially arrived to the class out of a desire to support their children's learning but over time also engaged in the class for intellectual purposes. We show how their questions and observations, rooted in their experiences with algebra in secondary education and in their children's elementary mathematics, drove our instruction, and how the women shifted their understandings of who can "do" algebra and of algebraic content. We suggest that the shifts they experienced were supported by three sources of meaning-making specific to algebra: "from within the mathematics, from the problem context, and from that which was exterior to the mathematics/problem context" (Kieran, 2007, p. 711). Our analysis suggests the importance of understanding parents as learners and the potential of reform-oriented elementary curriculum for supporting the learning of adults who had negative experiences with mathematics.

Key words: adult education; algebra; parents.

The significance of algebra

Algebra is often referred to as a "gatekeeper" in U.S. society (Katz, 2007; Moses & Cobb, 2001). Typically, this statement is made in the context of economic prosperity. It is not clear why succeeding in a high school algebra course relates positively to economic prosperity. Rather, it is likely that succeeding in high school algebra is a proxy for other social and cultural factors that are related to occupational and financial success.

High school algebra courses are often used as a sorting mechanism, explicitly and de-facto, for "college-bound" students and those who are not (Chazan, 1996). Historically, this has meant that non-white and low-income students were "tracked" out of algebra in higher proportions than white, middle-class students (Oakes, 1990). States in the U.S. are increasingly making policies that mandate that all students will have access to algebra in ninth grade, and in some cases, eighth grade. Chazan (1996) offers a reflection on the "Algebra for All" movement based on his experiences teaching an Algebra I course for a "low-track" group of high school students. He argues that in addition to providing algebra to all students, it is necessary to reconfigure what is understood as "algebra" in classes and, subsequently, the curriculum as well as the typical ways in which algebra is taught. Otherwise, Chazan warns, it is unlikely that the provision of traditional algebra to those students who historically have been excluded from algebra will result in success for all students.

Even with recent efforts to democratize access to algebra, algebra maintains an air of exclusivity. In this paper, we show how three African American women, who arrived to algebra classes with well-formed views of what algebra was — a disconnected body of knowledge that they did not understand — and corresponding views of who could "do" algebra — "smart," "college-prep" people, people different from themselves — changed their views of what algebra was and who could "do" algebra. Although the women initially came to classes to learn how to help their children and grandchildren with elementary mathematics, over time they came to engage in algebra much as a person studying mathematics for its own sake might do. We use this case of mothers studying algebra to question traditional notions of appropriate sequences of mathematics as well as the role of "real world" contexts in adult education classes. As we show below, these women changed their views of themselves and of algebra through genuine, intellectual inquiry into the mathematics of algebra. Furthermore, their intellectual curiosity drove the pedagogy and content of the courses.

First, we describe Kieran's (2007) framework for characterizing three sources of meaning for developing algebraic understandings. We use this framework to organize our findings about the meanings that the women in this case study made in the context of algebra classes. Second, we describe how algebra is typically positioned in adult education and in United States K-12 education. This is important because we used elementary curriculum as the point of access for an adult education course in algebra. Third, we describe the research context and our methods of data collection and analysis. Fourth, we describe the pedagogy of the courses, with a focus on the type of questions that the women raised. Fifth, we describe the shifts in the meaning that algebra held for these women as well as the shifts they noted in themselves as learners of algebra. Finally, we raise implications for research and practice in adult education mathematics.

Making meaning of algebra

In the mathematics education community, there are different opinions as to what constitutes algebra. Algebra has been described as the following:

1. "a means to express generalizations, relations and formulas; problems; denote unknowns; and solve equations" (Bell, 1996 as cited in Kieran, 2007, p. 713).
2. "generalized arithmetic, the set of procedures used for solving certain problems, the study of relationships among quantities, and the study of structures" (Usiskin, 1998, as cited in Kieran, 2007, p. 713).
3. "generalization and formalization; syntactically guided manipulations; the study of structure; the study of functions, relations, and joint variation; and a modelling language" (Kaput, 1995, as cited in Kieran, 2007, p. 713).

Although these definitions vary slightly, Kieran (2007) argues that a unifying theme across these definitions is that algebra is essentially an "activity" (p. 713). Algebra involves acting on objects such that one object is transformed into another.

If we take algebra as an activity that involves the various elements listed above, how do people come to make algebraic meaning? Kieran (2007) recently reviewed the work of Radford (2004) and Noss and Hoyles (1996) in relation to how students make meaning of algebra. Based on her review of their schemas for meaning-making specific to algebra, Kieran offers that there are at least three sources of making meaning in algebra:

1. from within the mathematics (e.g., from the algebraic structure itself, involving the letter-symbolic form, from other mathematical representations, including multiple representations)
2. from the problem context
3. from that which is exterior to the mathematics/problem context (e.g., linguistic activity, gestures and body language, metaphors, lived experience, image building).

(adapted from Radford, 2004, as cited in Kieran, 2007, p. 711)

Making meaning *from within the mathematics* refers to making meaning from algebraic symbols and representations, including equations, tables, and graphs, and linking symbolic forms to their "numerical foundations" (p. 711). According to Kieran, the use of multiple representations, which allows for students to "coordinate objects and actions within two different representations," is critical to making meaning in algebra (p. 711). Making meaning *from the problem context* refers to how individuals connect given information about problem situations to symbols and notations. Modelling is included in this category. Making meaning *from that which is exterior to the mathematics/problem context* is meant to capture those aspects of making algebraic meaning which are not embedded in the symbols, representations, or the given problem context. This category "focuses on students' processes of meaning production in terms of the way diverse resources such as gestures, bodily movements, words, metaphors, and artifacts become interwoven during mathematical activity" (p. 712). This category also includes experiences that students bring to algebraic work from other content domains. As we argue below, the women with whom we worked arrived to algebra class with distinct conceptions of the content of algebra and who could "do" algebra. They also arrived with histories regarding their participation, or lack of participation, in algebra courses. For this reason, it was critical that we understand and acknowledge the meanings that the women brought to and took from the class, what Kieran and Radford consider *exterior to the mathematics/problem context*.

How algebra is positioned in adult education

Adults who return to study mathematics bring with them their own mathematics histories and experiences, in and out of school, and their own near and far term goals. They return to the study of formal mathematics for a variety of reasons, and outcomes vary. Self reported gains in response to participation in adult mathematics learning include self-confidence (Civil, 2000; Evans, 2000), employment, preparation and entry into further study, and in parents' ability to help their children (Brew, 2000; Civil, 2000).

Adult education theorists argue that because adults have limited time and are deeply engaged in real world activity, they are more likely to persist and learn most efficiently and effectively through instruction that builds on their experience and situates content in contexts that are meaningful to them (Knowles, 1984). However, adult mathematics curricula are often based on learner needs as defined by external organizations or frameworks. For example, in the United States, curricula are often driven by preparation for taking and passing the General Educational Development Test (GED), particularly the mathematics test, which has the highest failure rate among the five tests. This test, primarily a multiple-choice test, includes content from arithmetic through beginning algebra and geometry. Teachers frequently focus on particular problem types that have historically appeared on the test, de-emphasizing opportunities to study any topic deeply. The primary context within which instruction is couched is the test itself. From the perspective of adult education programs, receipt of federal funding requires reporting student progress within the National Reporting System (NRS) and using acceptable standardized assessments such as Test of Adult Basic Education (TABE) and the Comprehensive Adult Student Assessment Systems (CASAS). The six Educational Functioning Levels of the NRS are defined through a traditional ladder-like acquisition of computation skills, beginning with addition and subtraction, then multiplication and division, first with whole numbers, then with rational numbers, and finally reaching algebra and geometry. Algebra is seen as a capstone content area, to be addressed only after all of the more basic content has been mastered.

Alternatively, the requirements for entry into a workforce training program or for gaining a workplace certification include, in many countries, key skills as specified in national qualification frameworks, mathematics units that are geared to the particular context of the workplace, and/or content units that can be made vocationally relevant (Coben, Colwell, Macrae, Boaler, et al., 2003; FitzSimons, 1997; Wedege, 2002). The idea of embedding learning in contexts that are relevant and meaningful has also been embraced within a vision of learning mathematics for social justice, empowerment, and as a mechanism for developing adults' critical consciousness (Benn, 1997; Frankenstein, 1990; Knijnik, 2007). In both these cases, mathematics learning is practical, functional, and goal oriented and might be expected to engage learners because it is closely tied to their identities as workers or as citizens seeking to challenge and improve their society.

On the one hand, then, in adult education, algebra has often been framed as a fixed body of knowledge to be mastered only after a learner has progressed through a sequence of mathematics courses. On the other hand, in the context of workplace training, algebra has been framed as unnecessary or irrelevant, perhaps because it is associated with abstract mathematics as opposed to "grounded, real-life" mathematics. Importantly, the classes we describe below do not fit neatly into either of these categories. Rather, in our classes, we drew from children's elementary curricula, and in response to the participants in the course, we embarked on what would be considered abstract contexts, but contexts that held meaning for the participants. The abstract contexts held meaning precisely because these women had been denied access to understanding the content in their earlier years of schooling.

How algebra is positioned in elementary mathematics education

Over the last two decades, there have been repeated calls within the United States K-12 mathematics education community to shift how algebraic content is positioned across the curriculum (National Council of Teachers of Mathematics, 1989, 2000). Historically, algebraic content was introduced in the middle grades and formally taught in high school. However, in response to studies that show that elementary students are capable of algebraic reasoning as well as international assessments that show that other industrialized nations outperform the United States in the context of problem solving, mathematics educators have argued for the importance of embedding algebraic work across the grades, beginning in kindergarten (Katz, 2007).

Reform-oriented elementary mathematics curricula that have been supported by the National Science Foundation, such as *Everyday Mathematics* (EM) (University of Chicago School Mathematics Project, 2001) and *Investigations in Number, Data, and Space* (TERC, 1998), provide examples of how algebraic reasoning, in the form of patterns, functions, and variables, has been integrated across the K-6 curriculum. "Early algebra," or algebra in the elementary years, typically includes two main features:

1. generalizing, or identifying, expressing and justifying mathematical structure, properties, and relationships; and
2. reasoning and actions based on the forms of generalizations.

(Lins & Kaput, 2004; Kaput, 2007, as cited in Katz, 2007, p. 7)

Reform-oriented elementary curricula use slightly different conventions and formats to address these two features of early algebra. For the purposes of this paper, we will briefly describe EM's approach, as we drew from these materials as a basis for our work with adults in algebra.

EM weaves two content strands related to algebraic thinking throughout their K-6 curriculum: "patterns, functions, and sequences" and "algebra and uses of variables". We generally drew from the patterns, functions, and sequences work. EM uses several curricular conventions across the grade levels, and increasingly varies the difficulty of the content associated with those conventions as the children advance in grade level. Two such conventions that we drew from include "Frames-and-Arrows" and "What's My Rule?".

"Frames-and-Arrows" are sequences of numbers that follow a particular pattern. "Frames" refer to the boxes in which each number in the sequence is placed, and the "arrows" show the direction in which the operation(s) are to be applied to the numbers. The pattern, or operation(s), is identified as a "rule". For example, if the sequence were 3, 7, 11, 15, …, the rule would be "+4" and there would be arrows from the 3 to the 7, from the 7 to the 11, and so forth, indicating that you were to add 4 to 3 to result in 7, etc. Frames-and-Arrows are initially introduced in first grade and are a staple convention of the EM curriculum through the sixth grade. They increase in difficulty across the grades. For example, older grades include the use of composite Frames-and-Arrows, where there are two or more rules as well as a composite rule, which is the sum of the rules.

"What's My Rule?" are function machines and are also introduced in first grade. They take the form of an "in-out" table, whereby "in" refers to input and "out" refers to output. As with Frames-and-Arrows, the pattern is referred to as a "rule." What's My Rule? also increases in difficulty across the grades. Children have to identify inputs, outputs, and rules, and the "rules," or relationships between the input and output increase in difficulty. As we describe below, we used Frames-and-Arrows and What's My Rule? as points of access into algebra for the participants in the classes.

Research context

The data we report on in this paper come from Parent-Child Numeracy Connections (PCNC), a project intended to support a group of parents'[1] understandings of their children's reform-oriented mathematics instruction and curriculum (for a description of the full study, see Jackson & Remillard, 2005; Remillard & Jackson, 2006). The project lasted for four years, and began when the majority of a cohort of 42 children were in grade 3. The children were all African American or Afro-Caribbean and lived in a low-income neighbourhood in a large city in the United States. Approximately half of their parents had a high school diploma. The cohort were recipients of an Educational Scholarship Program (ESP); if the children graduated from high school, they would receive a last-bottom-dollar scholarship to attend the post-secondary education institution of their choice. ESP provided academic and social supports throughout the children's K-12 schooling to increase the chances that they would graduate from high school and be able to access the college scholarship. In grade two, the children's elementary school adopted EM as its elementary mathematics curriculum, which prompted ESP to approach a local university to work with the parents of these children in regards to the new curriculum. EM was decidedly different from the elementary mathematics the parents had experienced in their elementary education.

One component of PCNC was parent math classes. Parent math class sessions lasted 6-8 weeks at a time, met 2 hours per week, and were held three times a year over the course of 4 years. Initially, the topics of the classes focused on measurement and percent, however, at the request of the parents, the topic of three of the 6-8 week sessions was algebra. The parents requested algebra in part because of the format of the classes, in which parents were asked to bring in questions they had about their children's mathematics. Many of their initial questions had to do with patterning activities, such as Frames-and-Arrows and What's My Rule? In the course of the discussions about why the children were given these activities and what they might be learning from them, we (the instructors) told the women that the patterning activities were the beginnings of algebraic thinking and were included to gradually build knowledge and skills that would help the students be successful with algebra. After a while, the women began to have fewer questions about their children's work and asked if they could study algebra during the sessions. In response, we designed tasks that grew out of EM conventions.

Although we had long-term goals and developed lesson plans prior to each algebra class, the actual content of each meeting and the activities that took place were inevitably modified or pre-empted by the learners' questions or observations. Occasionally the women brought in questions from their children's mathematics homework, and the ensuing discussions went in unplanned directions, but generally connections were made between these discussions and aspects of algebra. We drew from the EM materials to structure the algebra classes in an effort to connect to the work the participants' children were doing.

As we show below, classes were discussion-based, and tended to follow a structure of 1) instructors posed an algebraic task to the group; 2) participants worked on the task with individual assistance from the instructors; 3) participants shared solutions; 4) participants were prompted to make observations about the various solutions and to justify their solution paths; and 5) participants revised their solutions if necessary. Because we designed the tasks to connect with the children's work, we did not follow a typical algebra sequence, in which work with variables and solving linear equations precedes graphical representations of linear

[1] We use the term "parents" to include parents, grandparents and other caregivers.

functions. Rather, over the course of the three algebra sessions, we addressed the following topics in this order: pattern work using Frames-and-Arrows, with an emphasis on inverse operations and composite functions; function work using What's My Rule?, with an emphasis on determining "rules" that were generalizeable; graphing lines using the in-out tables in the context of What's My Rule?; naming linear equations from in-out tables; introduction to negative integers in the context of the coordinate plane and graphing; determining the equations of lines from graphical representations (slope-intercept form).

Twelve parents attended parent math classes over the four years. The data for this paper come from a case study of three mothers (Dionne, Lucille, and Betty) who attended all three algebra sessions. All three women had limited experience with formal algebra and formal higher education.

At the time of the last adult algebra class, Dionne was in her early forties and was a single parent of 3 children. Dionne's eldest daughter was completing her first year of college, her second daughter graduated from high school and was planning to attend the local community college, and Dionne's son was in fifth grade. Dionne seems to have been tracked into a non-academic course of study in high school and may not have graduated. She did not remember studying mathematics in high school. She recently completed an 8-week nursing assistant course and passed a certification test. She spoke about one day becoming a community counsellor.

Lucille was in her early fifties, married and had five children. Her two eldest lived on their own, and her middle daughter had just graduated from high school and was attending the local community college. She had two younger children, a son in fifth grade and a daughter in third grade. Lucille did not complete high school and worked part time as an assistant in an after-school program located in her children's neighbourhood elementary school.

Betty was in her early fifties, the mother of five children between the ages of 21 and 31, and the grandmother of six grandchildren. She often functioned as primary caretaker of her fifth grade granddaughter. Betty graduated from high school and was currently working in an insurance office doing accounting-related work. Through the ESP's educational support program for parents and caregivers, Betty enrolled in a proprietary school to become a medical assistant, fulfilling a long-standing dream. She attended classes after work and was among the highest achievers in the program.

The two authors co-facilitated the parent math classes. Kara previously taught high school mathematics and was a graduate student at a local university. She worked closely with the ESP program, teaching in their after school program, overseeing the mathematics program of their summer program, tutoring children as needed, and providing educational support to parents who returned to college or technical studies. She had many formal and informal opportunities in multiple settings to engage with family members of the women featured in the case study. Lynda previously taught math in high school, in developmental classes at community colleges, as well as in adult education programs and was a researcher at a local university.

Data sources and methods of analysis

There are two main sources of data for this paper: video-recordings of the sessions and audio-recorded interviews with the participants. All classes were video-recorded (24 algebra classes over three eight week sessions), and an outside observer took detailed field notes during each session. We also conducted three or four audio-recorded interviews with each woman, including a task-based interview, each lasting approximately an hour. With the exception of the task-based interview, the interviews were semi-structured. For the purpose of this paper, we focused on the participants' responses to questions about participating in the parent math classes, views of algebra, views of themselves as learners of mathematics, and their purposes for attending the classes.

Our analysis focused on the meanings that the women assigned to their participation and to algebra, how these meanings shifted over time, and shifts in how the women participated in the classes. We began by viewing the videos and reading the corresponding field notes for evidence of the practices, social norms, and sociomathematical norms of the classes (Cobb, Stephan, McClain, & Gravemeijer, 2001). Classroom social norms are "characteristics of the classroom community and … regularities in classroom activity that are jointly established by the teacher and students" (Cobb et al., 2001, p. 123). Examples include "explaining and justifying solutions, attempting to make sense of explanations given by others, indicating agreement or disagreement, and questioning alternatives when a conflict in interpretations had become apparent" (p. 123). Cobb et al. argue that these norms are not specific to learning mathematics; rather, this set of norms cut across discipline-specific learning situations.

To complement discipline-neutral social norms, Cobb et al. argue that it is important to establish and identify socio-mathematical norms in mathematics classroom practices, in other words, norms that are particular to learning mathematics. Cobb et al. suggest that examples include "what counts as a different mathematical solution, a sophisticated mathematical solution, an efficient mathematical solution, and an acceptable mathematical solution" (p. 124). Identifying socio-mathematical norms in the classroom was especially useful to our analysis because we were interested in what activities in the class supported participants to shift their identities of themselves as learners of algebra in relationship to their understandings of algebraic content. Cobb et al. state, "We conjecture that, in guiding the establishment of particular socio-mathematical norms, teachers are simultaneously supporting their students' reorganization of the beliefs and values that constitute what may be called their mathematical dispositions" (p. 124).

Through coding for norms and socio-mathematical norms across the classes, it became apparent that questioning and making observations were classroom practices that both the instructors and participants engaged in, and that there were particular socio-mathematical norms established around questioning and making observations that supported the shifts we were interested in. We then coded each class for particular types of questioning and observations; the various kinds of questioning and observations shifted over time, and we conjectured that these shifts corresponded with a shift in their reasons for continuing to engage in algebra and how the women were viewing algebra and themselves in relation to algebra. Simultaneously, we read through the interview transcripts and coded for instances where they described algebra, themselves in relation to algebra, their participation in the classes, and the shifts they experienced in relation to the classes.

Initial understandings of who can do algebra and what algebra is

"I'm a mother and I don't know algebra."

Each of the three women had been "tracked out" of algebra in high school to varying degrees, and each of the women was eager to learn algebra. In doing so, they challenged their initial models of "who could do algebra" as well as their own historical identities as people for whom algebra was not possible.

For example, Lucille indicated that in high school, she was in the track that studied basic mathematics. She was not offered an opportunity to take algebra and wasn't one of "the algebra people."

> We had basic [math]. Yeah, so it wasn't, like you got introduced to it a little bit. We didn't really, you didn't really hit on it like we doing it now. Like you had to be … in another section, to be into that mindset. So we didn't do, we didn't do algebra like that. Algebra was basically a college thing, so like we didn't really touch on that.… They were the algebra people.

Betty took algebra in high school, but she did not feel successful at it and did not see herself as capable of mastering the content. She indicated that she "dropped out of the academic" track after struggling with algebra and switched to the "clerical" track.

> The teacher that we had was one of the ones, like he wanted you to catch on so he always went at a fast pace. So the ones that didn't catch too good, kind of got like lost. … And I had to get extra help and all that kind of [thing]. Uh, I wasn't interested in it at all. I just couldn't wait to get out of

> that class with a passing grade so my mom wouldn't kill me, but, after that, I didn't want no more courses in math. I dropped out of academics and went to clerical. You know, the easy math.

Dionne never had algebra in high school but did attempt to take a Developmental Algebra class at the local community college later in life. After a short time, she dropped the class because she did not understand the content and did not know how to get help. She described the experience as "devastating"; it confirmed to her that she was not one of the "smart people" who could learn algebra.

> Well, when I think of algebra, I think of algebra as something hard. (laugh) Hard. Something, something only smart people can do. Somebody, you know, uh, got glasses on, with a lot of books in their hands.

The women's feelings of inadequacy were reinforced when they encountered algebra as they were trying to help their older children with algebra homework and were unable to understand the work. Dionne describes such feelings as follows:

> My oldest daughter is 17. She knew how to do [algebra] but I didn't. And I would look at it and I would say, "Teach me this." And she would say, "It's easy, it's easy. Do these little numbers here, and then you do it with this number here, what the sign says." It looks like a puzzle that you cannot fix. I mean it. It looks a puzzle, like a real hard puzzle and the piece you can't put [it] together, and this piece here. I'm just used to saying 2 plus 3 is 5. Then, and the 'a' and the 'b' and the '=.' I said, "No, No, I don't know this at all." I was so hurt. I was very hurt. I was hurting.

At the same time, their desire to help their children was one of the reasons they were interested in learning algebra. All three women were responsible for children who were in the same grade encountering the same early algebra content, and they felt a parental responsibility to be able to help them. Lucille described recognizing that in order to provide help to her younger children, she needed to understand the algebra content they were receiving

> [I needed help so I could] more or less get updated with the way they're making the changes because … [my son is] getting it in elementary school and [my older daughter] didn't get [algebra] to almost high school. It's like time is really changing.

And, although Dionne described a desire to help her youngest child, Jerome, with his elementary algebra, she recognized her limitations in content knowledge.

> Interviewer: So [did] you help Jerome with that [assignment focused on algebraic reasoning]?
> Dionne: No, uh ah. I don't know algebra. I'm a mother and I don't know algebra.

The mystique of algebra

Each of the women had substantial views of what "algebra" was, rooted in their formal and/or peripheral experiences with algebra. There was an air of mystique that surrounded "algebra," and this mystique was reinforced by their limited access to the content. Most of the mystery seemed to centre on the idea of variables, x's and y's that were decidedly confusing. Dionne spoke about her experience in a Developmental Algebra class.

> I came into class and the teacher had numbers as long as the board. I look[ed] at it and I didn't understand it. Not one bit. $4x$ here and 7, and I was like, "What is that?"

Lucille, who had never studied algebra before but watched her older children work on algebra homework, remarked,

> I just, I think what made it so complicated looking to me was I had to understand the *x* and the *y*. And I think that always seemed so confusing. … It just seemed like, "Oh my god, what the heck is this?"

Betty had experienced algebra in high school, but never felt she understood what she was doing,

> I used to always wonder, well, how do you add letters? How do letters come in? But, I didn't really, no one really explained…

Mechanisms for change: how participants' questions and observations provided access to algebra

Questioning is recognized as a critical instructional tool in the teaching of mathematics for understanding, particularly in the K-12 mathematics education literature (Chapin, O'Connor, & Anderson, 2003). Strategic questioning can provide access into students' mathematical thinking and understanding and therefore can be used as a tool for on-going formative assessment. Questioning can also serve as a tool for scaffolding students' understanding of the content at hand. Particular questions like, "Why? How do you know that's true? Could you have solved the problem in a different way?" push learners to justify their solutions and to make their solutions public.

Within the algebra class, as instructors, we used these types of questions to push the participants to justify their solutions, to make their solutions public, and to further their understanding of the content at hand. However, what emerged from our analysis of the video data was that participants developed an understanding of the content at hand because *they* asked questions and made observations (solicited and un-solicited) throughout the classes. And, their questions and observations often pushed us as instructors to change the direction we had intended to take during a class period, and instead to engage the learners in sequences of activities that were more challenging than we had initially intended. Below, we offer two illustrative examples of typical sequences of instruction, followed by a discussion of the types of questions and observations that emerged across the series of classes and the instructional work they helped support.

What's My Rule?

A significant source of meaning for the women was the problem context of their children's work. However, as the example below illustrates, although we often began with the children's work, the women's questions and observations launched instruction that went beyond the context of their children's work. On April 23, 2005, we were in the midst of the third series of algebra sessions. The theme of this particular class was What's My Rule? based on the EM convention described above. In the previous sessions, we identified patterns in Frames-and-Arrows, both single and composite functions, and focused on processes of informal proof, namely how many examples were necessary to try before one could feel confident with a pattern. We began this class by looking at an EM What's My Rule? worksheet. We used the "in" and "out" terminology provided in the worksheet, and solved for "outs" given a "rule," solved for "ins" given a "rule," and determined "rules" given a set of "ins" and "outs." The idea of "inverse operations" had been developed since the first class of the session, and the women made use of it to complete What's My Rule? tables. Figure 1 provides an example of the first What's My Rule? problem we completed.

IN	OUT
100	*50*
120	*70*
70	*20*
150	*100*
200	*150*
50	*0*

IN
⇓

RULE
Subtract 50

⇓
OUT

Figure 1. Completed "What's My Rule?" problem, $x - 50 = y$. The given information is in plain font; the information the participants filled in is in *italics*.

About half-way into the ninety-minute class, we took the first "What's My Rule?" table from the worksheet ("subtract 50" or $x - 50 = y$) (see Figure 1) and introduced the idea of graphing the relationship on large, chart-sized graph paper. At this point, we did not algebraically name the line. Rather, we worked through how to plot a coordinate point. We explained to the women that the "in" is typically named the variable, x, and the "out" is typically named the variable, y. Kara began by graphing the point (100, 50), modelling for the women how to plot a point on graph paper and how to write the coordinate of a point. The following discussion ensued.

42:00 **Lynda:** Where would the point be if the x was 75?
Lucille: Halfway between. [Lucille is referring to the fact that 75 would be between 70 and 80 on the x-axis given that we used a scale of 10.]
Dionne: What would the y be?
Betty: (softly) 25
Lynda: Can you say that again?
Betty repeats her answer.
Lucille: Why do you all make it so easy and the book makes it seem so hard?

We ask Dionne to graph the point (150, 100) and Betty to graph (70, 20) from the What's My Rule? Table.
…
Lucille: You all make algebra seem fun, but I'm sure it gets more complicated.
…
Kara: What do you all notice?
Dionne: The numbers are even.
Lucille: (stands up) If you connect the dots, they all line up in a straight line.
Dionne: They all point to 50 [on the x-axis].

We ask them to connect the dots using a ruler.

Lynda: So what do you notice?
Lucille: It almost seems like half the graph.
Lynda to Dionne: And you noticed that it hit 50.
Lucille: And that's what we started out as.
Lynda: So it hits 50 when x is 50. So what's y going to be?

Lynda adds 50 as an "in" to the What's My Rule? Table (see the last row in Figure 1).

Dionne: Zero.
Betty: Zero.
Lucille: Okay, so where did I get confused at?
Kara: So if x is 50, put 50 [as an "in" on your personal What's My Rule? tables.]

Lucille: Zero.
Lynda: Why? How come?
Lucille: Because it would be minus 50.
Lynda: What if x was 40?
Dionne: Minus
Betty: Minus 10.

Lucille shakes her head in agreement. Dionne looks quizzically at the paper. We have a discussion of negative numbers in the context of temperature. The women work on finding where y = -10 lies on the graph. Eventually, they plot the point (40, -10). Lucille and Betty then plot (200, 150) together.

Lucille: Hmm, so you're still staying on the line, staying on the border.
Lynda: I think that's a really important thing to notice, that all of these things that we're figuring out land on the same line. Why is that?
Dionne: As long as the rule is the same, they'll all be on the same line.
Lynda: So you know what they do? They give this line a name. From what we're doing, what would you say the name of this line is?
Lucille: The rule.
Lynda: And what's our rule?
Lucille: The rule is subtract.
Lynda: Subtract what?
Lucille: 50

Lynda then writes x – 50 = y, describing it as the "in" minus 50 equals the "out."

Dionne: This is really something. (Everyone laughs.)
Lucille: It's a little mind-blowing, but it seems so simple once you get to working it out.

As illustrated above, at lines 12 and 17, we ask the women what they notice about the points they have plotted. Dionne observes that the inputs and outputs are all even, and Lucille notices that the points, if connected, would make a straight line. Dionne then adds that the "line" points to 50, meaning that the x-intercept is at 50. These observations are unsolicited. This is the first time Lucille and Dionne have graphed on a coordinate plane, or so they remember. After we have them connect the dots, building on Lucille's observation, Lynda capitalizes on Dionne's observation about the x-intercept and has the women figure out the y for $x = 50$. After plotting a few more points (see line 36), Lucille observes that all of the points are on the same line. We then briefly discuss why this is so (Dionne offers that they all follow the same "rule"), and then we name the line using the form of an equation with variables.

The women's observations drove the trajectory of our instruction, and therefore of their learning of algebra, that day. Our initial goals for the day were to learn how to graph coordinate points, generated from a table, and to connect them in a line. However, their curiosities and observations led us to explore algebraic ideas that typically might have been considered "beyond" a first-time experience with graphing coordinate points. Importantly, we recognize that we were able to flexibly respond to their observations and questions because we were not subject to an external curriculum or assessment. However, as we argue in the Discussion section, the fact that this was possible raises questions for how we typically frame adult learners in the context of K-12 and Adult Education.

Drawing a line with one point

Whereas the previous example illustrated a case where we began with the problem context of the women's children's work, this example illustrates that another source of meaning for the women was rooted in the algebra itself. In addition, this example is further evidence of how the women's questions and observations shaped the path our instruction took, and in particular, into unanticipated territory. A week after the class described above, we had the women generate their own rules and ins (x-values) on which they would operate. Then, we had each woman graph her relationship given the set of points (in, out), or (x, y), that she generated. Although we did not design this purposefully, all of the "rules" that the women chose were additive and were linear. Mathematically, this meant that all of the lines they graphed were parallel (i.e., they had the same slope of 1). Dionne generated and graphed the lines $x + 8 = y$ and $x - 10 = y$, and Lucille generated and graphed line $x + 12 = y$. (Betty did not attend class this day.)

Once the women had graphed the lines, Lynda asked, "Anybody notice anything?" Her question led to a series of observations, including Lucille's observation that the lines were parallel, to a discussion of how one knows that lines are parallel, which then led to an innovative technique on the part of Lucille for drawing a line. After a brief discussion about Lucille's observation that the lines were "parallel," Dionne made an observation that Lucille's graph $x + 8 = y$ was "more" than $x - 10 = y$. After some probing, Lynda and I understood that Dionne's use of "more" referred to the following—both Lucille and Dionne used 70 as one of their x-values. So, for the same x, ($x = 70$), Lucille generated 78 as her y ($70 + 8 = y$) while Dionne generated 60 for her y ($70 - 10 = y$). We then engaged in a group discussion about the difference between the y-values for any given x when comparing these two linear equations. Dionne and Lucille showed the y-values they found for an x of 70 (60 and 78, respectively) on the graph paper. Lynda revoiced what they said, and then asked, "You (Dionne) were subtracting 10, and you (Lucille) were adding 8. So how far apart are they?"

Dionne: You, well from her I'm 8. Gotta be 8.
Lucille: Mm mm *(meaning she doesn't agree; Lucille stands up and runs her fingers along the difference between Dionne's line and her line.)*
Lynda: You're 8 from there, and yours is
Dionne: Mine's is—
Lucille: 10
Dionne: 10, no, no, no not 10. Let me see. What is it? 12. No, no, can't be 12. If she's, hers is 8 more than mine's so mine's will be um, 8 less from her. Cause 78 and 70.
Lynda: No, but yours isn't 70, remember what—
Dionne: Mine's is 10 from 70.
Lynda: Yeah, cause you had to subtract 10.
Dionne: Yeah, this is 10 and this is 8. Then it's a 60.
Lucille: Wait a minute. 18. 18?
Dionne: So what was your question again?
Lynda: How far apart are they?
Lucille: 18? 18 inches?
Lynda: How do you figure? Why is it 18?
Lucille: Cause if you were to take and add the difference between that, it would make it 18.
Lynda: Show me.
Dionne: From 60 she said.
Lucille: *(Lucille shows with her hand the difference between (70, 60) and (70, 78).)* From 60 to 78 would be your 18 inches more. Difference.
Lynda: Could you know that by looking at your equations? Could you get that 18?
Dionne: Yes.
Lynda: How do you figure?
Dionne: With the plus 8 and the minus 8? 8 plus

Lucille: well if you
Dionne: 10
Lucille: wasn't looking at the minus and the plus, it would be 10 and 8 which is 18.
Lynda: Yeah, cause what happened, you went down 10 and she went up 8.
Lucille, Dionne: Yeah, yeah, 18.
Dionne: *(laughs)*
Lucille: That's crazy. *(laughs)*

In the excerpt above, the women determine that the difference between the y-values for the same x-value for the two lines, $x + 8 = y$ and $x - 10 = y$, is 18. In what follows, Lynda asks the women what the difference would be for an x of 40. This then leads to the important question of whether the difference will always remain 18 for any x. Over a few minutes, Lucille and Dionne establish that the difference between the y-values for any given x with respect to their two different lines remained constant, no matter which x-value they chose. At one point, Lynda asked them, "What if your in was 500? What would the difference be between the y's on your lines?" Dionne and Lucille agreed that it would be 18. Dionne then offered, "It [the x-value] could be 1000, and it would still be 18 inches [because of our rules]." Lynda responded, "That's why the in is called a variable, cause it really doesn't matter what it is. You can always find out what the y is because of the rule."

Lynda then asked again, "What else do you notice about the lines?" Dionne responded that she noticed that she used more points to construct her line than Lucille did. This then sparked a conversation about how many points one needs to draw a line. Initially, Lucille and Dionne disagree about the number of points needed to draw a line (see lines 84-95). They eventually both agree that they could have drawn the same line with three points. However, at line 97, Lynda asked the women if they could draw a line with one point. At line 100, Lucille argues that she can.

Kara: To draw this line, how many points do you use?
Dionne: I did 6.
Lucille: And I did 5.
Lynda: Does it matter for drawing the line?
Dionne: Yes.
Lucille: No.
Dionne: She said no and I said yes.
Kara: If you had only gotten 3 points, would you still have drawn the same line?
Lucille: Cause if you're saying it varies with it going off the chart, no.
Lynda: It wouldn't matter?
Lucille: No, it wouldn't matter if you only had 3 points. Cause you still gonna draw the line. (She extends her arms in both directions.)
Lynda: The line would be the same.
Lucille: Yeah.
Lynda: What do you think [Dionne]?
Dionne: It doesn't matter.
Lucille: You got the dots, but you still going to extend the lines.
…
Lynda: Okay, how about if you had only one point?
Lucille: It's still going to, it's still going to (extends arm).
Kara: So if you only had the point (40, 48), could you have drawn that line?
Lucille: Off of just that one dot? Mm hmm (indicating yes).

Mathematically, a line is constructed of at least two points. At this point in our sessions, we had only introduced the method of plotting points to construct a line. Assuming that the women would find the task of drawing a line with one point impossible, we asked Lucille to generate one point for $x - 5 = y$, and for Dionne to generate two points. We then asked both to graph their lines using only the points they generated.

Lucille quickly generated a new point (55, 50). She volunteered to plot it and construct a line. Lucille stood up, ran her right index finger along $x = 55$ and her left index finger along $y = 50$ and placed a dot where they met. She then picked up a ruler and carefully aligned it so that it went through the point (55,50) and was parallel to the other lines drawn on the paper. Indeed, Lucille drew a line using one and only one point. Lynda asked her, "How do you know where to draw it?" Lucille responded, "Cause I have to stay on the dot." Lynda then took the ruler, placed it on (55, 50), and tilted the ruler so that it was no longer parallel to the other lines. She asked Lucille, "How do you know it's not like this?" Lucille responded:

> Because it's supposed to be parallel! And I was also thinking that when we was doing it last week, it was like we weren't going like a (Lucille moves her hand so that it traces a spiky line graph), so I'm thinking okay, we talked about the parallel, and the dots connecting, so I'm figuring they have to be parallel. Was I right? Was I right? (laughs) So that's why I figured it didn't matter if we didn't have any more dots because it's still going to go off the graph whichever way that it does.

A few minutes later in the class, Lucille looked carefully at where $x – 5 = y$ crossed the y-axis and announced that her line was a bit off; it should have crossed at the y-axis at exactly $y = -5$. (It crossed just a few hairs above $y = -5$.) We had not discussed the relationship between y-intercepts and the slope-intercept form of an equation at this point; however, Lucille noticed that the numbers given in the other equations were the same as where those lines crossed the y-axis (i.e., the y-intercepts).

Types of questions and observations

Over time, the basis for participants' questions and observations changed. In the first sessions, the majority of the questions stemmed from the participants' experiences with their children's EM curriculum, including questions about Frames-and-Arrows and In-Out Tables. They generally did not understand the purpose of the conventions or how to solve problems using them. However, once they developed familiarity with the EM conventions, we were able to use the conventions to explore algebraic content, as illustrated above.

Their understanding of the EM conventions, then, supported them to ask questions that were rooted in a desire to understand algebra, as they recognized it. For example, on May 14, 2005, we solved linear equations and did not initially do so in the context of graphing. We decided to solve linear equations in response to a section that Lucille found in the children's curriculum in which they were to solve such equations. About an hour into our session on solving linear equations, Lucille asked, "This equation problem ($12 = 5n + 2$), does that still play a part on the graph paper?" Lucille was interested in the relationship between solving a linear equation and graphing a linear relationship. We decided to graph the equation $y = 5x + 2$, and then we explored what the x-value was when $y = 12$. In order to graph the equation, we distributed blank What's My Rule? tables, and the women chose a variety of inputs. Lucille exclaimed as they each plotted their points to graph the equation, "Oh ladies, I didn't mean to start something! [But this] gets my curiosity piquing!" These types of questions, which we argue were rooted in intellectual curiosity, were a staple of the instruction of the classes. Sometimes the questions were in response to us asking the participants what they noticed, but oftentimes, they were unsolicited.

The women also asked questions about bits and pieces of "formal algebra" that they either had seen in the context of their high-school aged children or had seen when they attended school. For example, they asked about "the little 2 next to the x", meaning exponents. During a class focused on determining the slope of lines and comparing slopes, one woman asked, "Now tell me something. I've seen something with a U shape," meaning a graph of a quadratic equation. We also used these types of questions to shape our instruction.

The freedom with which the women asked questions and made observations was supported by the ease with which they worked together. This may be because they arrived at the class with a common interest in supporting their children, and they knew each other from the neighbourhood, although they did not regularly socialize with one another prior to the classes.

They developed a relationship based on trust and common purpose. This was critical because the women arrived with different strengths and challenges, mathematics and communication-wise—Lucille struggled with simple computation and relied heavily on a calculator, Dionne sometimes struggled to articulate her reasoning, and Betty was reserved about sharing her ideas publicly. They also were comfortable with and came to celebrate the idea that there were often multiple methods and approaches that led to the same conclusion. Lucille said,

> Yeah, that's the part I enjoyed … I think we did it in a different way, some of us did it in a different way, but we still wind up with the answer. And you know, just to see that, she did her's one way, and I did mine one way, and another one did. And we still come up with the same – and it was amazing how we all did it differently but we came up with the same answer. So…you know, that goes to show you that not everybody sorta thinks alike. You know? Cuz I had my way of working it out, she did her figures in another manner and you know, it goes to show you, okay well, you know, it was something different. …But when we sat down, we could talk about it and discuss how we did our problem and they did their problem but we all wind up with the same answer.

Shifting identities as learners of algebra and understandings of algebra

By the end of the sessions, each woman had redefined her identity as an algebra learner. This redefinition seemed to be tied closely to the fact that what they had learned resonated with their previous models of algebra—namely, that there were variables and equations. Each woman initially perceived algebraic content as unattainable and difficult. However, by challenging themselves to engage in learning "real" algebra, and finding that they were able to understand the content, they were able to see themselves as accomplished and competent, and found the experience personally rewarding.

> Dionne: I feel more adult. Yeah! Adult math. Something I should have, something I didn't but I should know. Kids use it, but it's more adult, it makes you feel more adult. I feel like it's more adult math to me, maybe not to you and Jerome [her son], but it really feels like adult math … Like it makes you feel like you can do something more harder. I feel more accomplished. I can accomplish more. Like I accomplished something. … Before this class, I felt like a 5, but with this class, I feel like a 10. I do. That's how I felt all through the time after the time I got out of high school. Because I did not know how to do the algebra. It was the algebra. For all those many years, I did not know.

> Betty: When I was getting the right answers, …then you feel good, like oh, okay. I always felt bad about not being good at math, but then I said, "Hey, I can do this." So that made me feel better.

Similarly, the reasons why the women attended class shifted, albeit subtly, over the course of the sessions. Initially we provided parent math classes in the context of parents providing support for their children's learning of mathematics, and the women attended so that they would be better equipped to support their children. An additional conjecture of ours regarding parent math classes was that parents would benefit from the chance to re-experience mathematics, given that so many of them had negative experiences in school with math. This, we believed, might support them in developing a greater appreciation for the reform-oriented mathematics that their children were receiving in elementary school. However, as Lucille articulates below, the women developed an additional purpose for attending class—to intellectually engage in mathematics for the sake of doing mathematics.

> Lucille: [Algebra class] was my moment for me. …It was still a moment for me to do something with myself so I kinda enjoyed that part about it. You know? Because it was something for me, and at the same token, it was something that I was learning and can pass on to my child.

Importantly, the shifts in the women's identities as learners of algebra were supported by their increasing understandings of the content. It was important that the content we engaged in during class was compatible with their previous notions of what "algebra" looked like. In other words, in order to support shifts in their understandings of who could do algebra, the model of algebra in the classes had to resonate with what they remembered as algebra. For example, during the class sessions, the idea of a variable, exemplified by "x's and y's," emerged from discussions of the graphs of the What's My Rule? activities. So although the What's My Rule? did not look familiar from their previous encounters with algebra, the connections we and they made to variables did and substantiated for the women that they were indeed learning algebra. Over time, Lucille found the algebra not only accessible, but fun.

> I enjoy my lessons, you know um… I thought it was going to be more complicated than that and it wasn't — [it was] more like, Okay, now this starting to tick, tick, tick, tick, tick, and I'm like, "Okay, it's not as bad as I thought"…. And I just found it was very interesting and I enjoyed it. I don't know — I had fun. I had fun. [laugh]

In fact, she recruited other parents to the class because she believed that algebra could be accessible to everyone.

> I would tell them about um, how we started the basics of algebra. How…you'd be surprised how, once you get the swing of it, you know, the flow of it becomes more easier than you think. You know, some people look at algebra, they paint the picture of it being real hard, you know and I've said it to a couple of parents and I'm like, "No, but it's not as bad as you think" 'cause they already have that wall put there – Algebra is hard, it's hard, it's hard, it's hard. You know? And I'm like, "No, no, no, once you start with the basics of it, and you learn it from the ground up, you know… it's not as bad as it seems."

Betty was the only woman of the three who made "real world" connections to learning algebra. However, she was enrolled in a medical assistant program and occasionally brought in proportion problems related to dosages from her classes, which we solved using algebraic methods. She came to understand algebra as useful and practical.

> Now, it seems to be just another way of doing math. …As a method for solving. I see like, um, I don't know, but like if you was like buying a floor from a store, and you know how you have to measure the room, you need to know how to cut the corners and all that, I think it's, I think people use it. But I couldn't understand back then why anyone would use it, but I see people do use it, like at their jobs.

Discussion

Three sources of meaning

We began this article by offering Kieran's (2007) characterization of three sources of meaning-making regarding algebra. The women we describe derived meaning in algebra from all three sources suggested by Kieran — from within the mathematics, from the problem context, and from that which is exterior to the mathematics/problem context. This is important, we argue, given that the varied sources of meaning supported the women's shifts as learners of algebra (and mathematics, more broadly) and their understandings of algebra. Importantly, all three sources of meaning described below supported the women's shifts in their understandings of the content and of themselves as learners and doers of mathematics. The boundaries between the mathematics, the problem contexts, and that which was exterior to either of those contexts were blurred within the actual second-to-second interactions that constituted the algebra classes.

From within the mathematics

As illustrated in the excerpts above, the women often made observations or asked questions about the algebra they were doing. Sometimes the questions were about different algebraic representations (e.g., equations and lines). Other times, the questions and observations were in relation to the mathematics they had investigated in previous classes, as illustrated in Lucille's observation about parallel lines in the April 30 class. She drew on understandings she developed in the previous class about what parallel lines looked like to support her conjecture about the lines the women had constructed in the subsequent class.

The meaning making in the realm of "within the mathematics" that we observed supports our characterization of the women as being intellectually curious about the mathematics, which, we argue, supported the shifts they identified in themselves as learners of mathematics. Civil and Bernier (2004) argue for the importance of framing parents, particularly low-income parents of color, as "intellectual resources" in relation to mathematics. Although we have not provided evidence that the women acted as intellectual resources for their children as a result of the classes, we have provided evidence that indeed, these women acted in ways within the context of the class that could potentially support similar interactions with their children with regards to mathematics.

From the problem context

Meaning in algebra can also be derived from the problem context, which includes the "events and situations" (Kieran, 2007, p. 712) onto which algebraic symbols and conventions can be mapped and/or connected to mathematics content of the outside world. We typically did not embed algebraic content within what would be considered "real world" contexts. Rather, we found that for these women, the problem context which held significance for them was a mixture of symbolic notations that they had seen in their previous schooling and the EM work (e.g., Frames-and-Arrows, In-Out Tables) that their children were doing, which they came to understand as "early algebra" in parent math classes.

The women's role as parents striving to support their children's mathematics learning shaped the primary problem context in which they made meaning of algebra. Their children's EM home- and school-work functioned as a bridge between the meanings of algebra that they initially brought with them to the classes and the meanings they came to assign to algebra through participation in the classes. They perceived that the algebra they explored grew out of their children's assignments and in turn would feed back into the children's work as they felt better able to support that work. All three women originally participated in the parent math classes because they wanted to be better prepared to help their children with schoolwork. While they came to want to study algebra for themselves as well, the references to their children's homework and the curriculum materials used in the children's classes were frequent.

From that which is exterior to the mathematics/problem context

In addition to wanting to understand and assist their children with mathematics, the women asked to focus on algebra because they had been alienated from or denied algebra in the past. Given their histories, the class represented a context in which they could challenge themselves and their perceptions of algebra as frustrating, difficult and mysterious. As they persisted, algebra became intellectually challenging, accessible and pleasurable. This historical and personal context to their participation, that which was exterior to the content and the problem contexts of the class, was a significant source of meaning for the women. Furthermore, we contend that the social aspect of the class — women coming together who shared, to an extent, a similar past and present with algebra — constituted another important source of meaning. Saturday afternoons were a social event that supported academic and social shifts in the women's understandings of mathematics.

Implications for research and practice

We have provided an illustration of women re-engaging in algebra. These women experienced shifts in their identities as learners of mathematics and in their understanding of mathematical content that they had previously symbolized as reserved for "smart" people. Below, we offer two implications for research and practice from this work.

First, the role of the elementary mathematics curriculum was central to the academic and social accomplishments of the algebra sessions. We used the children's materials as an entrée into algebraic activity. The women had experiences with the children's materials, from which we could base instruction. They simultaneously learned about how to approach the unfamiliar conventions of their children's work as well as the algebraic content embedded in their children's work. We began by using the materials as the problem context, and over time, used the materials as tools for developing further, more sophisticated understandings of algebra. We suggest that children's materials can serve as useful bridges for parents between their children's mathematics education reality and the parents' own understandings of mathematics.

Second, a related point is the importance of framing parents as learners, or as intellectual beings, in addition to identifying them as supports for their children. Typical interventions that involve parents are solely concerned with the child. The parents are framed as a vehicle for improving the child. However, in the case of the algebra sessions, although the women first came to the parent math classes so they could better support their children, they engaged in the mathematics as learners. Interventions that focus only on the outcome of the child ignore the potential for impact on adults' experiences for themselves.

In conclusion, we would like to return to the current popular sentiment in the United States of "algebra for all." Although that statement is typically made in reference to high school students, our data is evidence of the potential for adults who were denied access to algebra in high school to re-experience and re-engage with algebraic content in meaningful ways. These women were written off in the context of secondary education and, subsequently, had written themselves off as capable of learning and doing algebra. Although algebra is typically framed as a capstone in adult education, this project showed that it might also serve as a point of entry for adults for whom it has been historically understood as a barrier.

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