Journal for Research in Mathematics Education
2016, Vol. 47, No. 3, 233–269

More Than Just Skill: Examining Mathematics Identities, Racialized Narratives, and Remediation Among Black Undergraduates

Gregory V. Larnell
University of Illinois at Chicago

The purpose of this study was to shed light on the mathematics-learning experiences of students who were enrolled in non-credit-bearing remedial mathematics courses at a 4-year university. Non-credit-bearing remedial mathematics courses have a long curricular history in both 2-year and 4-year higher education institutions, but students' mathematics-learning experiences in these courses have been largely unexplored. Furthermore, other recent studies have evinced the otherwise anecdotal supposition that African American learners, particularly, are disproportionately placed in these courses. In this study, students' narratives are the primary unit of analysis, and the data are derived from semistructured interviews with then-enrolled students and observations in a non-credit-bearing remedial mathematics course at a public, 4-year university. The study's findings center on two psychosocial phenomena amid these students' mathematics-learning experiences: identity satisficing and racialized identity threat. The article closes with implications for future research regarding both non-credit-bearing remedial mathematics courses and mathematics-learning identities and experiences.

Key words: Black learners; Identity; Narrative analysis; Non-credit-bearing remedial mathematics courses

"All young Americans must learn to think mathematically, and they must think mathematically to learn."(Kilpatrick, Swafford, & Findell, 2001, p. 1)

"What happens when we assume that certain children are less than brilliant? Our tendency is to teach less, to teach down, to teach for remediation." (Delpit, 2012, p. 6)

This article was written with support from the UIC College of Education (COE), the UIC Institute for Research on Race and Public Policy, and the Chicago Community Trust. Portions of the study and article were also completed while the author was supported by a National Science Foundation (NSF) doctoral fellowship through the Center for the Study of Mathematics Curriculum (NSF EI-0333879), as a fellow of the NSF STaR program. My hearty thanks to Jack Smith, Glenda Lappan, Anna Sfard, Raven McCrory, Danny Martin, Maria Varelas, Rico Gutstein, Mandy Jansen, and Barbara Reys for thorough feedback on earlier versions of this manuscript. I also thank Cynthia Langrall, the editor, the *JRME* editorial staff, and the anonymous reviewers for providing remarkably generative feedback and guidance. Above all, I thank the student participants from whom I learned the most. Any opinions, conclusions, or errata are solely those of the author and not the aforementioned institutions or colleagues.

Inequitable access to quality mathematics-learning experiences has been a longstanding, immensely pressing, occasionally infamous, yet gradually growing concern in mathematics education research (Lubienski & Bowen, 2000; Pais, 2012; Secada & Meyer, 1989; see also Martin, 2015). At the same time, a seemingly inescapable axiom has developed progressively over the past several decades: A "strong" school mathematics education is more important—and for a wider, more diverse pool of prospective learners—than it has ever been. In spite of this (or perhaps because of it), narrow measures of mathematical proficiency often serve as gatekeepers to curricular trajectories and careers involving mathematics and, ultimately, to broader arrays of individual and collective participation in society (Ladson-Billings, 1997; Martin, 2009; Moses & Cobb, 2001; Nasir & Cobb, 2007; Sfard, 2012). Furthermore, the elevated role that mathematics assumes is then transformed by and routinely connected to international economic and competitiveness concerns (Gutstein, 2003; Secada, 1989; Washington, Torres, Gholson, & Martin, 2012). This complex convergence has consistently positioned mathematics as a high-status academic subject within the broad educational curriculum (Apple, 1992; Rutherford & Ahlgren, 1990; Usiskin, 2007).

Within the contemporary K–16 curricular "pipeline," the status of mathematics as an academic discipline is nowhere else more apparently heightened—and yet understudied—than amid the transition to postsecondary education. At this crucial stage, students are tested and their mathematical knowledge measured to regulate access to college-level mathematics and other courses that satisfy general or concentration-specific university requirements. Students who have benefited from a strong K–12 mathematics education, advanced courses, or preparation for various screening assessments (e.g., SAT, ACT) are granted access to credit-bearing curricular tracks toward graduation. For a large proportion of students who are admitted each year to 4-year universities but do not sufficiently demonstrate a required level of mastery, non-credit-bearing remedial (NCBR) mathematics courses have become a common alternative experience.

NCBR mathematics courses have a long curricular history in both 2-year and 4-year universities, but curiously, students' mathematics-learning experiences in these courses[1] have been largely unexplored. Furthermore, recent studies have provided evidence that Black students are disproportionately placed in these courses (e.g., Attewell, Lavin, Domina, & Levey, 2006; Bahr, 2008). The combination of curricular gatekeeping and racialized disparities is a particularly cogent rationale—an equity-oriented rationale—for further and intensive study.

The overarching purpose of this article is to contribute to unpacking and shedding light on students' mathematics-learning experiences within this narrowed segment of the broader mathematics education pipeline—that is, among learners who enroll in NCBR mathematics courses amid their transition to college. The

[1] Furthermore, other scholars have documented "misplacement" issues regarding Black students (and students from other underrepresented groups) in algebra courses within the K–12 range, particularly in Grade 8 (Loveless, 2008, as cited in Stein, Kaufman, Sherman, & Hillen, 2011).

study reported here focuses specifically on the mathematics-learning experiences of Black students in these courses to contribute to understanding the coconstruction of racialized and mathematics-specific identities amid Black learners' experiences (Martin, 2007). Following a brief review of literature regarding NCBR mathematics courses in 4-year universities, the article focuses on theory, research design, and findings that contribute to or hinge on the following questions:

1. What mathematics identities are Black learners constructing as they experience non-credit-bearing remedial mathematics courses?
2. What may the mathematics identities that these students are constructing indicate about mathematics-learning experiences in non-credit-bearing remedial mathematics courses?

Algebra, Race, Remediation, and Mathematics Learning Experiences

It is widely recognized that college completion (and hence college entrance) is itself a gatekeeper to full citizenship in a society that calls for and favors constant scientific and technological innovation, pioneering engineering expertise, and increasingly complex mathematical knowledge (Secada, 1989). Algebra continues to serve as a gatekeeper to college and plays a unique role in mediating—or guarding—both the entrances and the exits at 4-year universities. Elaborating on the sociopolitical implications of this special relationship between algebra coursework and access to college, Moses and Cobb (2001) asserted the following incontrovertible claim:

> So algebra, once solely in place as the gatekeeper for higher math and the priesthood who gained access to it, now is the gatekeeper for citizenship; and people who don't have it are like the people who couldn't read and write in the industrial age. But because of how access to—the learning of—algebra was organized in the industrial era, its place in society under the old jurisdiction, it has become not a barrier to college entrance, but a barrier to citizenship. That's the importance of algebra that has emerged with the new higher technology. It didn't have to be algebra; that's the decision the mathematical community made over the years. (p. 14)

For many students who successfully negotiate high school—often with 3 or more years of mathematics coursework—the transition to college-level mathematics includes enrollment in a below-college-level, NCBR mathematics course. Various names or labels are attached to these courses (and inaptly to students) at 2-year and 4-year colleges and universities: developmental, remedial, compensatory, intermediate, college-preparatory, refresher, basic skills (e.g., Attewell et al., 2006; Merisotis & Phipps, 2000; Ross, 1970). Although *developmental* and *remedial*—by far, the most conventional among the many colloquial labels—have been used interchangeably, they have not always been regarded as synonymous terms. Many institutions refer to these courses as *developmental* to avoid the unfavorable connotation and resulting stigma that *remedial* has acquired (Deil-Amen & Rosenbaum, 2002). I use the initialism NCBR not only to highlight the fact that courses of this type are aimed at remediating writ large (despite the stigma-laden

connotation) but also to underscore the more salient fact that these courses are administered in ways that require students to pay for courses that earn nonadditive credits (Adelman, 2004).

Prior research has shown that the number of students who take NCBR courses, particularly in mathematics, has risen sharply within the past 20 years (e.g., Attewell et al., 2006; Ignash, 1997). According to a policy brief of the Association for the Study of Higher Education and the Lumina Foundation (Parker, 2007), approximately 47% of all undergraduates at nonselective, selective, and highly selective 4-year colleges take at least one NCBR course in reading, writing, mathematics, or another content area (see also Attewell et al., 2006; Davis & Palmer, 2010; Hagedorn, Siadat, Fogel, Nora, & Pascarella, 1999; Russell, 2008). This figure has risen considerably from the 22% reported by the National Center for Educational Statistics in 1989 (Ignash, 1997). Among those enrolling in NCBR courses, mathematics courses have continually attracted the highest enrollments among all content areas (Attewell et al., 2006; Parsad, Lewis, & Greene, 2003).

Racialized disparities have been noted recently among the students who enroll in NCBR mathematics courses (Attewell et al., 2006; Bahr, 2008, 2010; Grubb, 2001; Stage & Kloosterman, 1995). The data have depicted a clear, decades-long trend: African American and Latin@[2] students, particularly, are disproportionately enrolled in NCBR mathematics courses at 2-year and 4-year colleges and universities. Because students in NCBR courses are more likely either to not take advanced courses or to leave their universities altogether (see Bahr, 2008), the system ultimately produces an invidiously well-worn result: African American and Latin@ students are filtered out of the mathematics pipeline at this early stage of higher education. In some cases, the effects are more extreme: If a student is not able to pass an NCBR mathematics course, the student may be filtered out of the university after accumulating considerable financial debt from multiple attempts to successfully complete the course (Larnell, 2013b).

As Moses and Cobb (2001) alluded to in the quotation above, not only is the choice of algebra as an institutional gatekeeper not arbitrary (although as they suggested, it "didn't have to be algebra"), but also the consequences of institutional curricular choices regarding algebra teaching and learning within NCBR mathematics courses are profound and diffuse. The traditional and prevailing curricular makeup of these courses may present another, more subtle form of inequity with regard to opportunities for substantive learning—especially as they intersect with the racially disproportionate enrollments. Typically, NCBR mathematics courses emphasize a curricular trajectory that extends from basic arithmetic skills

---

[2] I use this term as Gutiérrez (2013) did

> to indicate both an "a" and "o" ending (Latina and Latino). The presence of both an "a" and "o" ending decenters the patriarchal nature of the Spanish language where is it customary for groups of men (Latinos) and women (Latinas) to be written in the form that denotes only the masculine form (Latinos). The term is written Latin@ with the "a" and "o" intertwined, as opposed to Latina/Latino or Latina/o, as a sign of solidarity with individuals who identify as lesbian, gay, bisexual, transgender, questioning, and queer (LGBTQ). (p. 7)

(e.g., order of operations, in some cases) to solving one- and two-step linear equations, factoring quadratic and cubic polynomial expressions, and ultimately to simplifying and factoring higher order polynomial expressions and solving equations that involve one or more variables. The central pedagogical curricular issue, however, is that too often these concepts are not taught toward developing deep conceptual understanding; instead, rote procedural skills related to manipulating algebraic symbols are routinely emphasized at the expense of promoting algebraic problem solving and other, process-oriented dimensions of algebraic reasoning. As a result, students in NCBR mathematics courses are exposed to limited opportunities for mathematics proficiency (Kilpatrick et al., 2001)—whereby procedural fluency often outstrips not just conceptual understanding but also strategic competence (i.e., knowing when certain strategies or procedures are appropriate), adaptive reasoning (i.e., the capacity to move flexibly through problems and self-monitor), and productive disposition (i.e., developing a tendency to see the mathematics with which one engages as both useful and worthwhile).

Many big questions surround the general topic of non-credit-bearing remediation. What is mathematics remediation, and what does it look like in situ (Grubb, 2001)? Does it work (Bahr, 2008)? Who should provide it (Ignash, 1997)? How much remediation should be offered (Adelman, 1998)? What are the political and policy considerations (Soliday, 2002)? Which curricular reforms would make a difference in students' opportunities for learning mathematics? A full exploration of these issues, however, is beyond the scope of this article and, in some cases, beyond the disciplinary bounds of mathematics education and perhaps beyond the scope of any single study.

Identity as a Lens on NCBR Mathematics-learning Experiences

According to Hoffman (1998), although it has quickly become "the bread and butter of our educational diet . . . served up on nearly every scholarly table" (p. 324; see also Gee, 2001), identity is a relatively recent entrant into mathematics education discourse—emerging mostly within the past 2 decades. Much of this scholarship has relied on conceptions of identity that have been introduced in other, broader fields of study, including psychology, anthropology, linguistics (especially, sociolinguistics and discourse and narrative studies), and sociology (e.g., Berry, 2008; Bishop, 2012; Boaler & Greeno, 2000; Cobb, Gresalfi, & Hodge, 2009; de Freitas, 2008; Heyd-Metzuyanim & Sfard, 2011; Horn, 2008; Jackson, 2009; Martin, 2000; Nasir, 2002, 2011; Sfard, 2008; Sfard & Prusak, 2005; Solomon, 2009; Spencer, 2009; Turner, Dominguez, Maldonado, & Empson, 2013). In all cases, this scholarship has established a strong theoretical link between identity construction and mathematics-learning experiences and proficiencies (Bishop, 2012).

Despite both the diversity of perspectives that intersect with research in mathematics education and a relatively recent social turn in the field (Lerman, 2000; Stinson & Bullock, 2012), many studies of affective or identity-oriented issues prior to the social turn centered on beliefs,[3] motivations, and attitudes, drawing

principally from a psychology-inspired "master discourse" (McLaren, 2004, p. xiii; see also Cobb, 2004; Heyd-Metzuyanim & Sfard, 2011) with some notable exceptions (e.g., de Abreu, 1995). Within this social-turn perspective, however, identity has come to be viewed less as a static, natural-core sense of who individuals are and increasingly as fluid, always-developing processes or performances through which individuals are constantly becoming. This "identifying" view (Heyd-Metzuyanim & Sfard, 2011, p. 129) also advances alternative methodological perspectives and data sources that reflect this fluid character, relying on broader snippets of experience than closed-ended survey responses or other artifact analyses. Discourse, interaction, and narrative analyses feature prominently among contemporary sites that inform this new perspective.

Although identity is widespread within education and mathematics education discourses—especially in analyses of learning (Hand & Gresalfi, 2015)—it has not been employed as a lens on learners' experiences in NCBR mathematics courses. In fact, there has been very little attentiveness to learners' lived experiences in introductory mathematics courses at all, particularly as those experiences unfold in situ and in relation to learners' capacities to make sense of them. The primary theoretical question, then, centers on how one studies identity in ways that attend to the broader socializing institutional space (and the variety of actors therein) while centering on learners' lived experiences.

The theoretical framework presented across the following sections is intended to operationally define the central unit of analysis in this study: mathematics identity as a narrative construct. Instead of beliefs, attitudes, or other cognitive concepts, the concept of "narrative-defined identity" is posited as a means toward interpreting how learners make sense of their learning experiences and the contexts in which they are positioned (Sfard & Prusak, 2005, p. 17). This framework is discussed in two ways: (a) as a set of conceptual criteria toward selecting segments of data as examples of narrative identities and (b) as a set of conceptual elements toward interpreting the selected segments as instances of mathematics identifying and socialization.

Narrative Identity Selection Criteria

Although more mathematics education researchers are employing identity as a tool for empirical research, there have been few attempts to operationally define what is otherwise a slippery construct.[4] Other researchers have also raised concerns about whether our commonplace understandings of identity obscure its usefulness and thereby contribute to a perception that it may be, as Cobb, Gresalfi, and Hodge (2009) observed, too "vague and ill-defined" to be relevant, considering "mathematics educators' traditional focus on improving the learning and teaching of central mathematical ideas" (p. 41). Based on the extant literature, two

[3] See Stage and Kloosterman (1995) for an example that relates social difference, beliefs, and mathematics remediation.bisexual, transgender, questioning, and queer (LGBTQ). (p. 7)

main concerns relate to defining identity as a narrative construct, and these two concerns undergird the framework in this article. The first concern is how to determine criteria by which narratives about mathematics-learning experiences qualify as identities. The second related concern is interpretive: How does one then decide which identities matter, given the narratives about mathematics-learning experiences that they entail? To address this first concern, I drew on Sfard and Prusak's (2005) framing of identity as narrative. To address the second, I drew on Martin's (2000) framing of mathematics socialization and mathematics identity.

For the purposes of this study, mathematics identity is operationally defined as a set of personal narrativizations about mathematics-learning or mathematics-teaching experiences that reify, endorse, and signify their subject as a certain kind of mathematics user or doer (Gee, 2001; Labov & Waletzky, 2003; Martin, 2000; Sfard, 2008; Sfard & Prusak, 2005). As Sfard and Prusak (2005) asserted, not every narrative qualifies as an identity, and criteria should be established to bolster a workable definition of identity as a narrative construct. They argued that a narrative candidate must *reify* by way of "is-sentences" (p. 16); it must *endorse* the subject such that, if asked, the identity builder would "say that it faithfully reflects the state of affairs in the world" (p. 16); and it must convey the *significance* of the narrative such that "any change in it is likely to affect the storyteller's feelings about the identified person" (pp. 16–17). Put differently, an identity (as narrative) must be more than a single statement or label. I refer to these three conditions as *narrative identity criteria*; they distinguish empirically the structure of an identity as a narrative from the possible functions of other kinds of narratives.

To supplement the narrative identity criteria, I also drew on scholarship outside of mathematics education and education more broadly to address Juzwik's (2006) well-noted concern that Sfard and Prusak's framing—despite efforts to define identity as a "relational and dynamic process" (p. 14)—did not adequately operationalize it as a narrative construct. The challenge is to specify the ways in which identities relate to the structural elements of narrative. Drawing on Labov's (1984; 2011; Labov & Waletzky, 2003) framing of narrative analysis, specifically, I also considered the possible structural elements of narrative that may align with the narrative identity criteria: a narrative's orientation (i.e., the part of the narrative that specifies its subject), complication (i.e., the central issue of the narrative situated between an orientation and some result), evaluation (i.e., an essential element of the narrative that gives it its significance—its "point"; Labov & Waletzky, 2003, p. 94), or its resolution or coda (i.e., the result of the narrative or a "functional device" that returns the narrative to the present moment; p. 100). Additionally, I drew on Nelson's (2001) criteria for narrative-based identity to bolster conceptually Sfard and Prusak's

[4] This is complicated further by the idea that identifying is both fluid and constituted across timescales (Wortham, 2006). Therefore, defining identity is also an act that, metaphorically speaking, attempts to "overcome the fluidity of change by collapsing a video clip into a snapshot" (Sfard & Prusak, 2005, p. 16). Some would argue, as Langer-Osuna (2011) does, that these moment-to-moment constructions begin to adhere to patterned trajectories that "thicken" or stabilize over time (p. 208), even if they maintain their fluid character.

terms—that is, reifying as asserting the identity with "strong explanatory force" (Nelson, 2001, p. 93), endorsing as relating to some sort of action on behalf of the subject, and significance as the "heft" of the narrative (p. 96).

Interpreting Mathematics Identities: Central Themes

Along with delineating empirical criteria for recognizing narrative identities, the theoretical framing described here also serves a second function: interpreting those narratives through the lens of mathematics socialization. Put differently, following the selection of narrative identities within the data, how does one then make claims that these identities pertain to aspects of mathematics socialization? How does one interpret those narratives toward evincing claims about learners' experiences in NCBR mathematics contexts (or other contexts)? More specifically, how can a framework help to contextualize identities with regard to institutional forces, societal narratives more broadly, or community- and family-oriented influences?

In his groundbreaking study of the coconstruction of race and mathematics learning among African Americans, Martin (2000) offered a framing of mathematics identity that considers the social forces and environments in which mathematics socialization and racialization intersect as realms of experience (see also Martin, 2007). According to Martin (2007), mathematics identity refers to the "dispositions and deeply held beliefs that individuals develop about their ability to participate and perform effectively in mathematical contexts and to use mathematics to change the conditions of their lives" (p. 150).[5] This definition of identity is then situated among nested levels of socialization (i.e., sociohistorical, community, institution or school, and individual levels), and factors at each of those levels are considered in the analytical framing of this study (e.g., stereotypes and other sociohistorical master narratives, institutional norms, community resources, and peer influences).

I adapted the central themes of mathematics identity from Martin's (2000) framing to interpret students' narratives regarding their mathematics-learning experiences: (a) references to the instrumental value of mathematics, (b) references to motivation to attain mathematical knowledge, (c) references to opportunities to learn mathematics, (d) references to strategies to learn or participate in formal and informal mathematics contexts, (e) references to constraints or barriers on participation within mathematics-learning contexts, and (f) references to one's own capacity to perform in mathematics-learning contexts.

A second set of theoretical concepts was introduced to aid analysis: that is, toward interpreting parts of participants' talk that have been recognized previously to be narrative identities. This need to differentiate the selection of the narratives

[5] Again, the focus on beliefs in Martin's (2000) text is characteristic of the social-turn moment of mathematics education research in which his study was situated (see Larnell, 2013a; Stinson & Bullock, 2012). As I explore more fully in the following section, my focus on identity (and narrative identity, particularly) is based on the notion that beliefs are difficult to operationally define (i.e., How does one know, when they "see" beliefs, whether to empirically unpack them or to measure their frequency or correlation with other reported attributes?).

from the interpretation of identities was first mentioned in the exchange between Sfard and Prusak (2005), Juzwik (2006), and Sfard (2006). The relationship between our identities (as discursively constituted) and those extradiscursive forces that shape identities are important to consider, but as Sfard (2006) suggested, those "identity-shaping factors" (p. 24) must always be understood as acting on identities and not as part of those identities necessarily. Sfard elaborated on this claim:

> Indeed, the fact that one cannot tell just any story about a person, ignoring or contradicting this person's inborn characteristics, does not translate into the claim that the identity-shaping factors (as opposed to stories about them) are an actual part of identity. Such claim is as unlikely as would be the assertion that the person who modeled for da Vinci's "Mona Lisa" became, in flesh, a part of the famous picture. (p. 24)

To account for the extradiscursive forces that may shape identities but should be regarded to interpret identities, I constantly considered and adapted a set of socialization forces based on Martin's (2000) multilevel framing. Martin outlined four concentric levels of socialization, with the outermost level representing sociohistorical factors that shape contemporary identity construction. At the sociohistorical level, Martin alluded to the prevalence of stereotypes and other contingencies of identity that are constituted beyond our individual experiences and across generations. These stock frames offer possible categorical understandings for identities that, as I have argued elsewhere in more detail (e.g., Larnell, 2011), offer opportunities or vulnerabilities for the persons who the stereotypes (or master narratives or identity contingencies) propose to represent. In terms of identities, these opportunities and vulnerabilities map directly onto interpreting whether a narrative identity expresses one's motivations or, even more directly, their sense of whether mathematics-learning contexts present opportunities or constraints (Martin, 2000).

Within the sociohistorical level, institution-level forces such as university policies, instructors, support programs, and placement exams are points of focus by which identities are constructed and negotiated. Also within the sociohistorical level, there are community forces that interact with institutional forces—for instance, families, fictive kinships, home-community conditions (and expectations among these groups). Martin contended that these outermost levels of socialization then interact with and partly constitute the innermost level representing individual identifying.

On Interpretation, Researcher Positioning, and Personal Identifying

As I discuss more fully later in the data analysis section, there were two stages of analysis in which parts of this theoretical framework were applied toward addressing the central research questions. The first stage was based on analytically coding the participants' utterances to select narrative identities from among them. The second stage was largely interpretive and formed the basis for the findings section. That interpretative analysis, more so than the analytical coding phase, relied on my identities and the relationships between those identities and the study—for example, relative "social, economic, and racial positionings" (Razfar, 2012, p. 65).

As such, my positioning in this study was certainly and saliently crucial to what participants said and to how those utterances were interpreted. In my view, my positioning and intentions can be represented by the following pair of quotations:

> I . . . as a black writer, must in some way represent you. Now, you didn't elect me, and I didn't ask for it, but here we are. . . . Everything I write will in some way reflect on you. So . . . what do we do? I'll make you a pledge. If you will promise me, your elder brother, that you will never, ever accept any of the many derogatory, degrading, and reductive definitions that this society has ready for you, then *I . . . promise you I shall never betray you.* (Baldwin, 1963; as cited in Carmichael, 2003, p. 263)

> But the solution is not, to my mind, to present these people as they see themselves or *as they are;* we must be enabled to see them as they have been or as they might become; otherwise, we merely judge them as specimens and feel nothing for them as human beings. (Baldwin, 1966, p. 42)

Like the participants in the study, I identify (unavoidably and unapologetically) as a Black person, and at the time of the study, I shared greater generational proximity (or closeness in age) and social connection with the study's participants than I did even with my (invariably older) colleagues. My racialized identifying, moreover, also intersects with my identifying as a cisgender, heterosexual, masculine male; a young adult; and, at the time of the study, a member of a class sometimes referred to as the working poor (among other intersections). My mathematics-specific identity, of course, is also important to consider. At the time of the study, I was as a paraprofessional user of mathematics; now, I am a professional mathematics education professor (and this certainly intersects with shifts in my class-specific identities and other identities).

Given this, I drew on perceived (and confirmed) shared experiences to establish social connectedness with the student participants in ways that informed their comfort with sharing their experiences. We shared stories about family, community, and schooling experiences that extended beyond the expected bounds of the study's research questions. Although my research protocol was derived from a pool of potential questions and prompts, I readily adapted the rhythm of the interview, adjusted the ordering and selection of questions, and sometimes annotated the exchanges with my own narratives and experiences as they related to those of the participants. I was thusly able to establish an easy conversational rapport with all of the interview participants, and I was able to encourage them to share their stories freely.

Method

In the study reported in this article, I drew on data from a yearlong, empirical case study of Black students' mathematics learning experiences—specifically, while those students were enrolled in an NCBR mathematics program during their first year at a large, predominantly White, 4-year university in the midwestern region of the United States (LMU hereafter). The focus of that case study was twofold: an examination of NCBR mathematics course experience (through the

equity-minded lens of Black learners' experience) and an examination of a specific, institutional case of such a phenomenon (cf. Yin, 2003). Within the methodological framings of phenomenology and instrumental case study, the broader inquiry was based on qualitative methods—primarily semistructured interviews, classroom observations, and the systematic collection and examination of course documents and, more selectively, students' mathematical work. Data were collected across the full academic year in which the students were enrolled in the NCBR mathematics course. A subset of these data—students' told narratives about their academic and mathematics learning experiences—provided the primary units of analysis for the present study.

Setting and Participant Pool

At LMU, all first-time students are required to complete a computer-based mathematics placement exam[6] (with some special exceptions), and students whose scores fall below a predetermined benchmark are placed in the university's compulsory NCBR mathematics course. At the time of the study, the university enrolled more than 2,000 students in this program and distributed the enrollees across two types of course sections: lecture-hall sections (with more than 150 students in each) and seminar-style sections (of 25 to 35 students). In contrast to the larger lecture sections as well as many other kinds of courses at the university, the smaller seminar-style sections met daily, Monday through Friday, for 50 minutes on Mondays, Wednesdays, and Fridays and for 70 minutes on Tuesdays and Thursdays. Students enrolled in these sections experienced more direct instruction than they would have experienced in most other mathematics courses. Also, at the time of the study, individualized computer-based instruction modules supplemented the already intensive course experience. The curricular trajectory of this particular one-semester NCBR mathematics course began with a review of arithmetic operations, order of operations, and linear expressions; progressed quickly to simplifying first-degree binomial expressions and to solving linear and quadratic equations and inequalities; and culminated with simplifying and solving quadratic, higher order polynomials with multiple variables and simplifying rational polynomial expressions or functions with multiple variables and real-number domains.

Thirty students were enrolled in a seminar-style section that was the site of the study, and 28 of those students consented to participate. Among those 28 consenting students, 13 students completed an initial screening questionnaire upon which they reported demographic information, academic and personal

[6] The LMU mathematics placement exam was created by faculty members in the mathematics department and was used for many years (and is still in use at the time of this publication). The exam is administered online, and all prospective test takers are informed that they are required to complete the exam by a certain date. A set of sample items are available via the department's website (although it is not clear how representative the items are or what their value is to test takers). The department's website also includes a page that discusses the cutoff scores for various placements, and students are encourage to not cheat on the exam so as to not be misplaced in a higher mathematics course than they would otherwise be placed.

background information, and mathematics course history in and attitudes and beliefs about mathematics. Of the 13 respondents (three self-identified as men; 10 as women; nine as Black or African American; three as White or Caucasian; one as Mexican American), there was considerable diversity regarding mathematics-course background, with many students ($n = 7$) completing courses at or beyond the level of precalculus. Twelve respondents completed 3 or 4 years of high school mathematics courses, and one student completed only 2 full years of mathematics courses. Six of these students participated in the study.

Data Collection Methods and Case Participant Selection

To set the stage for semistructured, formal, audio-recorded interviews, I conducted extensive classroom observations during 10 of the 15 weeks of the course. I wrote field notes, specially designed observation templates that included maps of the classroom used to capture interaction patterns. Finally, I generated audio-recorded postobservation notes from approximately 22 hours of observations. These observation artifacts were used indirectly to inform the findings reported here.

I conducted four in-depth interviews with each case participant (each between 1 and 2 hours in length) during the fall semester and one or two follow-up interviews during the spring semester (after their NCBR course experience ended). These formal, semistructured interviews (Spradley, 1979) were also modeled loosely after the sociolinguistic interview (Labov, 1984). Other sources of data (e.g., "patterns of communication among members" of the classroom) informed the interview process and provided opportunities for a "range of topics . . . of greatest interest to the speaker, and allow[ed] him or her to [sometimes] lead in defining the topic of conversation" (Labov, 1984, pp. 32–33). Overall, more than 30 hours of interview data were collected and transcribed from the six case participants.

In this article, I report on data collected from two of these case participants, Vanessa and Cedric. Although the study included several student participants whose academic backgrounds included both low grades (i.e., C and below) and far fewer mathematics courses, Cedric and Vanessa were selected as focal participants because of their consistent course attendance and because they initially (on their screening questionnaires) reported strong beliefs and attitudes about mathematics and the role of mathematics in their projected academic and career trajectories. Selecting these two students is not meant to hide or ignore any others, their academic backgrounds, or their struggles with mathematics. Instead, a secondary purpose for focusing on these two students in particular is to draw much-needed attention to the fact that despite potential negative stereotypes regarding those who enroll in NCBR courses, many students who have remarkable on-paper academic histories enroll in these courses when they begin postsecondary study. Although it may be tempting to suggest that this focus on Vanessa's and Cedric's cases aligns with a trend toward research among successful Black learners, I would argue that all of the students who enroll in these courses can lay claim to success-oriented identities by virtue of their matriculation to a 4-year university.

Data and Analysis Methods

I audio recorded each of the interviews with Vanessa and Cedric, and transcripts of those interviews were produced and entered into spreadsheets. Each row represented an utterance—"relatively small discursive chunks (lines), in which each line included everything said between a pause" (Juzwik, 2006, p. 18). I analyzed the transcribed utterances in two phases. The purpose of this first phase was to filter narrative identities from the rest of the interview data. The second phase of analysis was more interpretive than the first. In this phase, I examined the narrative identities to determine whether they included themes related to mathematics identity (Martin, 2000) or referenced particular socialization factors. The codes developed for both phases, with brief descriptions and examples, are presented in the Appendix.

Phase 1: Narrative identity coding. To distinguish narrative identities from other forms of the participants' talk, I first grouped the utterances into *minimal narratives,* which are sequences of utterances separated by at least one temporal juncture such that "a change in the order of the clauses produces a change in the interpretation of the order of the referenced events in past time" (Labov, 2011, p. 547). Following the parsing of transcripts into minimal narratives, I analyzed each narrative according to both the structural elements of narrative and the narrative identity criteria. That is, I first coded the narratives with regard to the structural elements that they conveyed: (a) orientation, (b) complicating action, (c) evaluation, (d) resolution, or (e) coda (Labov, 2011; Labov & Waletzky, 2003). I then determined whether the narrative clause was reifying, endorsing, or signifying (each complete narrative identity included these three criteria). This phase was useful primarily as a means to locate narrative-specific text within the broader corpus of the interview text. Moreover, by adapting and applying the narrative identity criteria as codes, it was then easier to distinguish identities from one another (e.g., by their reifying clauses).

Phase 2: Mathematics identity and mathematics socialization coding. In this phase, I analyzed the narrative identities using codes that were based on Martin's (2000) mathematics identity themes: (a) references to the instrumental value of mathematics, (b) references to motivation to attain mathematical knowledge, (c) references to opportunities to learn mathematics, (d) references to strategies to learn or participate in formal and informal mathematics contexts, (e) references to constraints on or barriers to participation within mathematics-learning contexts, and (f) references to one's own capacity to perform in mathematics-learning contexts. (See the Appendix for more detail related to coding.) As this more selective coding would suggest, not all of the narratives identified in the first phase would qualify as mathematics identities. Only those narratives that included direct or interpretable (from the context of the surrounding interview text) references to mathematics content, the mathematics classroom, mathematics learning and teaching, or otherwise mathematics-specific experiences were coded using these themes. I also analyzed the narrative identities with regard to the mathematics

socialization factors. References to community or home, institutional, and sociohistorical levels were coded as top-level socialization themes along with more particular themes based on Martin's (2000) mathematics socialization framework: for instance, perceptions of peers, perceptions of school climate, community-home expectations, or racialized narrative about status and differential treatment. However, some of the mathematics socialization factors were applied to narratives that were not specific to mathematics, for example, narratives that referred to the mathematics instructor but perhaps were not about mathematics instruction or mathematics-learning experiences.

To generate the findings presented in the next section, I grouped and regrouped identities according to the various codes (e.g., motivation in mathematics contexts) to interpret what students were reporting across the various themes. In some cases, I examined the confluence of themes (e.g., What were students saying in their narratives about both the importance of mathematics and their capacity to perform?) or the confluence of socialization forces and themes (e.g., Did students discuss their strategies in mathematics contexts in relation to particular socialization agents?). Toward interpreting the roles of racialized identities and master narratives (i.e., stock plots or stereotypes that include partial sociohistorical constructions of race), I examined narrative identities in which the speakers related talk about themselves or others with explicit or implicit talk about race and racialization. I also examined the various narratives with a general alertness for the students' insights about themselves and their experiences, their hunches about other people and other contexts outside of the mathematics classroom, their senses of vulnerability or surprise, or their opinions about what might improve the circumstances of students who take these specific courses.

Findings

My analysis of the interview data for Vanessa and Cedric resulted in the specification of general narrative identities (including identities that pertained more generally to academics) and mathematics identities for both students. In both cases, the specified narratives represented approximately half of the transcribed interview text. There were four main findings related to the participants' academic and mathematics identities. Cedric and Vanessa regarded themselves throughout to be generally high-achieving students. Nevertheless, as NCBR-course students, both Cedric and Vanessa began to question their mathematics identities. There was some evidence that in response to various forces (e.g., the mathematics placement exam), Cedric and Vanessa shifted their identities over time and exhibited behaviors that were misaligned to high-achieving identities. Finally, both Cedric and Vanessa experienced episodic threats to their mathematics identities.

An elaboration of these findings is organized according to the following questions, which extend from the study's two central research questions: (a) What were Vanessa's and Cedric's academic identities regarding schooling (K–12), their respective mathematics course backgrounds, and their experiences at LMU?

(b) What identities were the students constructing about their relationships and experiences with mathematics learning as they attended and participated in an NCBR mathematics course? (c) What other identities were the students negotiating in relation to their NCBR mathematics course experience, with what socialization forces were these other identities associated, and what psychosocial or otherwise mediating effects did they pose?

Academic Identities and Socialization Factors

Vanessa and Cedric were recruited to participate in the interview phase of the study in part because of their seemingly strong (on-paper) academic backgrounds. Both students completed high school at or near the top of their respective graduating classes. Furthermore, Cedric and Vanessa reported remarkably positive attitudes and beliefs about the importance of schooling, about their experiences with teachers and peers in school, and about the connection between their efforts in school and their prospective opportunities beyond it. Consider the identity narrative from Cedric (Interview 1, Week 3):

> *C:* Well, I think that there were maybe five hundred students in the whole school. I think that only one hundred or so graduated in my class. Well, I was salutatorian. But it was a lot of hard work in high school. But yeah, I was a good student.

(*Later during the same interview, Cedric returned to the theme of high school background, foregrounding peers as a socialization factor.*)

> *C:* I think that me and my friends kinda had like the same vision. Like we basically wanted to go somewhere. We all got into the higher classes, the honor classes. Like a lot of my friends were salutatorians along with me, so.

These two students were not only academically successful but also interested in careers that would demand considerable academic commitment and, possibly, advanced mathematics course backgrounds: Cedric was intent on becoming a psychologist, and Vanessa was resolute on a career in medicine, possibly as a nurse. For both Vanessa and Cedric, their career aspirations were derived, at least in part, from family and community influences. For Vanessa, her commitment to medicine was grounded in her first-hand experiences dealing with and participating in aspects of her father's cancer treatments and subsequent at-home care and recovery. She decided that a career based on helping others would be a worthwhile use of her considerable drive and talent. Cedric had similar inclinations toward working with youth in schools based on his own experiences and his perceptions of need among youth in his local community.

Cedric was from an exurban city situated between two major urban areas that was historically a destination for many migrating African American families seeking either industrial work or an alternative to industrial-era urban centers (or both). Vanessa was from one of the major postindustrial urban centers (roughly an hour's drive from Cedric's hometown), and she drew direct connections

between her school experiences and the local urban environment in which those experiences were situated (Interview 1, Week 4).

> *V:* I went to [a well-known high school in the city]. It was really good during the ninth grade . . . you know, you had to take a test to get in, which was really good. And then they started closing down a lot of high schools in the area, and they merged a lot of kids. That's when my school got closer to two thousand kids in the school, and they merged them all together it became a horrible learning environment. Like, it was terrible.

Vanessa's narrative personalizes and brings to light some contemporary realities of urban schooling (e.g., school consolidations and closings), but it also exemplifies the effect of those phenomenal realities on the educational experiences of many urban students—that the quality of her preexisting high school experience was diminished after the change. Many of her school's programmatic efforts to promote academic achievement and excellence were canceled or curtailed during her final 2 years (after the schools' merger), including the school's chapter of the National Honor Society, of which Vanessa was an inducted member. Fortunately, however, not all programs were cut, and Vanessa was able to affirm her high-achieving academic identity in other school contexts (Interview 1, Week 4):

> *V:* Okay, well, [the school] is like divided into programs, and this was the [STEM-specific] program. That's what I was in. It was a college-prep program, and there was also like a commercial/media-arts program or whatever, but I was in the math one. And in the tenth grade, we had to take two math courses. It was really hard. We took Geometry and Algebra three and four. We were the only ones. We had to take math all four years, just my group. So, the academics were really good. But then, in eleventh grade, it just all came down. And we had to take three years of language, where other people only had to take two. So, we were like the hardest little group.

Both Vanessa and Cedric reported being excellent students during their precollege schooling experiences, whereby excellence was evidenced as maximizing their opportunities in school by participating in academic success-oriented programs. Each remarked that their families and home communities were important factors toward that success. When asked to signify the first-generation college student narrative (i.e., why it matters), Cedric made the direct connection to his parents' expectations for him to do well in school and to represent his family (Interview 1, Week 3).

> *C:* Um, well, I'm like a first generation student. So, my mom and my father, they never went to a four-year university, so yeah. And uhm, I don't think that my grandparents went to college either.
> *GL:* Could you talk a little bit about what that means for you? For them? What expectations there may be?
> *C:* I think that there's a little pressure, but not, like a lot. I think that more people are kinda leaning on me to do well. They want to see me do well. I've just got to

keep that in mind that people are counting on me to succeed. Like my family and friends are mostly my family.

(*Later during the interview, Cedric mentioned his family again.*)

C: And even family, they'll be like, "I've got a cousin that's at LMU" talking about me. I think that my mom and dad are just proud that they raised a son that was able to go to college. And when I tell them that I'm doing well, then that makes them feel good. And I think that that's the case for the rest of my family. Just as proud as my parents are.

Although Cedric was content that he was affirming his family's more general, academic expectations, he was not as forthcoming with his family about the particular courses that he was taking. As he explained in the excerpt below, although he discussed his coursework with his family members, Cedric did not discuss his then-current placement in a remedial mathematics course. For him, the course seemed to be something to hide, possibly because participating in such an academic setting did not endorse the identity that he sought to portray about himself—an identity as a high-achieving academic student (Interview 2, Week 6).

GL: Have you told your family about other courses that you're taking? Is it something that you'd ordinarily do?

C: Well, yeah, I've told them. I've told them about classes that I'm taking, but they don't really know what the classes are really like about. So. And I tell them if I'm doing well or if I'm not doing well. So.

During the semester following the NCBR mathematics course, Cedric followed up regarding his communication with his family about the course and discussing his mathematics-learning experiences with them (Interview 5; Week 24):

GL: You mentioned that you were taking this [NCBR math] class, and you hadn't talked with your family about it.

C: Mm-hm [yes].

GL: Has that changed? Or has it not?

C: Um, it hasn't changed. Like, they know that I'm taking a math course but they don't know, you know, anything about the math course.

The notion that certain experiences, or certain actions, were misaligned to the identities that these students took up for themselves is crucial. As academically high-achieving students, Cedric and Vanessa seemed to be academic maximizers, or students who were regarded as best in their classes and who sought out similarly regarded peers, support systems, and learning opportunities (see Schwartz et al., 2002). Vanessa and Cedric each had participated in several organizations that aimed to enhance their academic identities. In addition, Cedric sought the more advanced mathematics courses and completed differential calculus during his junior year.

Mathematics Narrative Identities Among Case Study Participants

Vanessa: From excellence in mathematics to questioning. Vanessa completed at least one mathematics course during each of her 4 years in high school: algebra one and two during her first year, algebra three and four[7] during her second year, a geometry and a precalculus course during her third year, and an Advanced Placement probability and statistics course during her final year. Given that the study was conducted long after these courses were completed and within a different institutional setting, there was no way to assess directly or measure the impact of four algebra courses on her mathematical content knowledge (and whether that knowledge was sufficient for entry to college). Instead, Vanessa shared her recollection of these and her other mathematics courses during her interviews and gave her own assessment (Interview 1, Week 4).

> *V:* Um, I was excellent in my algebra classes like A's. Geometry? I had a teacher who was a terrible teacher . . . He was just like, um, "Oh, is that an odd one? Just look in the back of the book." I did not learn anything! When it comes to geometry, I'm just a blank now. When I say that I haven't learned a single thing, I'm very serious. And, um, I still got a B out of the class. He gave me a B. He was just terrible. He gave everybody a B or an A. So then of course I wasn't pushed to do any work, because I knew that I was going to get a B anyway, so I didn't do any work. I didn't learn anything. And when I tried to learn I'd ask and he'd say, "Oh, just forget that one." Terrible.

Vanessa labeled herself as an "excellent" student in her high school algebra classes. As a counterpoint, Vanessa characterized her experiences in her high school geometry class as "terrible." In explaining the difference between the two course experiences, she related her opportunities to learn with "being pushed" and earning a grade that reflected her effort. This may not be equivalent to an assessment of her skills, but one can infer that Vanessa's valuation of the course and her regard of its worth were related to whether the course helped her develop mathematically.

Vanessa substantiated the latter evaluation by including a passage about her high school geometry teacher, and it may be justifiable to infer that her algebra courses were not settings in which there were low expectations for students such that a teacher would give "everybody a B or an A" without sufficient effort (however that was determined in that context). The geometry course was unique among her courses in that regard, and she evaluated it as a negative experience. However, Vanessa associated the terribleness of that experience with the course and the instructor and the excellence of the algebra experience with her own efforts.

After experiencing some earned and unearned success in mathematics courses during her first few years, Vanessa then experienced her first road bump, a

---

[7] These course titles were reported by Vanessa and may correspond to the more standards names of courses (e.g., "Algebra I" and "Algebra II"). That is, the school that Vanessa attended may have structured the courses in ways that separated Algebra I into two separate courses.

challenge to an otherwise success-oriented identity, during her final year with the Advanced Placement course. As she put it (Interview 1, Week 4),

> *V:* And um, AP prob and stats . . . I did good . . . I did well, like during the first semester. Then in, like, the third quarter I got my first D ever. Ever. Now that was terrible. But it wasn't on my transcript, so that was good. And then I went from a D to a B. I really worked really hard to get that B, so I wouldn't have any bad things on my transcript.

Vanessa's experiences in her high school mathematics courses—although they varied—did not lead her to openly question her relationship with mathematics as a discipline. She associated the positive experiences with her own academic identity (as an "excellent" or an A student), even when she had to work hard to recover her grade in the AP probability and statistics course. When challenged, Vanessa not only worked hard in her mathematics courses, but she was proud of the results of those efforts.

During her first semester at the university, Vanessa's mathematics course experience seemed to resemble a blending of her former algebra and geometry course experiences. That is, although she was atop the class in terms of achievement in the course, there was very little effort involved. She attended classes regularly and participated actively, but Vanessa was still concerned about the course and, particularly, her experience on testing days (Interview 3, Week 10).

> *V:* Yeah. And that worries me because like on our quiz, [the instructor] said, um, that it was going to take the whole hour. I took it, and I was done in like fifteen minutes. So after fifteen minutes, I'm thinking, I must've done something so wrong. And I got a nineteen out of twenty! I'm like I was like so shocked! I could not believe it! And I was done in like fifteen minutes, and she was so serious, this was going to take a whole hour. Take your time all that.

As Vanessa attested, the quizzes and tests in the course were not sufficiently challenging mathematically. Routinely, she completed the hour-long quizzes within 20 minutes after receiving them. She was among a small group of students for whom this was the case (including Cedric), but she was the quickest. The quizzes may have affirmed her capacity to perform in mathematics contexts, but she openly questioned the validity of that affirmation. Were the tests an indication of her capacity to perform in the course or an indication of the opportunities to learn mathematics in the course?

Cedric: From a high-achieving "natural" to resilient strategist. Cedric completed four mathematics courses during 3 years in high school: A geometry course during his first year; a course on functions, statistics, and trigonometry as well as a precalculus course during the second year; and a differential calculus course during his third year. Because Advanced Placement courses in mathematics were not available at his high school, Cedric had completed the suite of available mathematics courses at his school before his final year (and, at the time, only

3 years of mathematics courses were required). Although grades are certainly a limited indicator of a student's capacity to perform, it is notable that Cedric, like Vanessa, earned high marks in his high school mathematics courses; his lowest grade, a B, was in the precalculus course.

Cedric's on-paper mathematics background was not the only indication that he was a positively oriented mathematics student prior to his college experience. During the interviews, Cedric also referred to experiences during high school in which others noticed that he was a capable mathematics student. As he mentioned before, his high-achieving peer group pushed him to achieve in mathematics along with his other subjects. His capacity to perform was also noticed by one of his former teachers (Interview 2, Week 6):

C: It was Mr. B, my calc teacher [in high school]. I think that he was really happy to have us all in his class.
GL: Who was us?
C: Uh, me and my friends were all in that class, and we were also the top students in the school. I think that it helped that we were all in there. I mean, it helped all of us do well to have each other. But anyway, Mr. B pulled me aside one day and told me that he thought that I was a natural at math I was kinda shocked, because math had never really been my thing—you know? I mean, I was all right. But I had been doing well in his class the whole time, and he thought that I really had some talent for math. I liked math, but I really was more interested in psychology. I didn't tell him that, though. I liked that he wanted me to know that.

Cedric seemed to relish the idea that others identified his capacity to perform in mathematics contexts as a talent. Despite being a part of a group of high-achieving students, in this narrative, Cedric is singled-out and presented with a new identity that was an unexpected and complimentary designation, was from a major socialization agent in his academic environment (his mathematics teacher), and, as such, was potentially significant for his own identity construction. Although he also recognized the connection between his interests in psychology and persistence in mathematics, he still did not fully identify himself as a "math person."

C: Well, I'm not going to say that I totally don't like math. But math has always been something that I kinda struggled with. I can always say, though, that I do like it when I understand it. So, um . . . I knew that in math I had to work just a little bit harder, so that's basically what pushed me to get good grades to basically put in the best that I could.

Cedric characterized his mathematics learning experiences as being challenging yet worthwhile, largely because he recognized that the work that accompanied his opportunities to learn mathematics allowed him to "put in the best" effort that he could—in other words, to maximize. That is, although Cedric did not readily identify with mathematics as something that was intrinsically important, he did

recognize its instrumental importance inasmuch as it amplified or in some other way signaled his academic maximizing identity.

As Cedric transitioned to LMU and enrolled and participated in the NCBR mathematics course, his orientation toward work and opportunities to learn mathematics was similar, at least at the outset. Although he had completed mathematics courses in high school beyond the curricular scope of the algebra-intensive NCBR mathematics course at LMU, Cedric continued to assert that he had to work "just a little bit harder" in his mathematics course. As illustrated in the following excerpts (Interview 2, Week 6), Cedric and I discussed the level of work involved in the course and, particularly, the work hours that he committed weekly to written homework and other assignments that were administered via a software platform, ALEKS (Version 2.0; 2010).[8]

C: So ALEKS . . . Usually, well . . . I spend like an hour per night on it.
GL: Each week?
C: Yep . . . each week.
GL: Okay. So, let's add this all up, then. An hour and a half for homework, and about an hour, wait, so that's at least seven hours per week. And then an hour per week for ALEKS. So we're at about eight hours. And then it's, what is it, seven hours per week of instruction time? Something like that? About three hours on Monday, Wednesday, and Friday, and then two hours on Tuesday and again on Thursday.
C: Yeah.
GL: That's about class plus homework plus ALEKS . . . roughly 15 hours each week. How do you feel about that time commitment?
C: Um . . . like in the beginning, I was like, oh, this is a lot of work. I was doing much work on math that it was taking away from my work in other classes.
GL: Okay.
C: That was something that I was really struggling with.
GL: How did you negotiate that time crunch?
C: Um, like I'd try . . . that's why I try to get like my math done first, and then I can focus on my other homework that I have.

As a high school calculus student, Cedric identified as a learner who appreciated productive struggle while doing mathematics and identified strongly with his friends who were also "top students"—or maximizing students. Carrying that effort forward to his NCBR mathematics course, Cedric found the workload in the course to be especially heavy. It is difficult to infer, however, whether the new workload was in any way related to sense of his capacity to perform. Contrary to this, there is evidence from his narratives about his high school mathematics learning experiences that would suggest that Cedric's capacity to do mathematics was more than sufficient—for example, his calculus teacher describing him as "a natural." During the NCBR mathematics course, however, there was some evidence that the workload was actually discouraging Cedric to "put in the best,"

[8] ALEKS, or Assessment and Learning in Knowledge Spaces, is a software platform used to administer placement exams at some institutions (but not, at the time of the study, at LMU). At LMU, ALEKS was used to supplement face-to-face instruction with individually paced and assessed modules that students were expected to complete outside of the classroom hours.

as he would ordinarily have done. As he said during his third interview, "I'm just going to do what I need to do to get through this."

Identity shifts from maximizer to satisficer. As Cedric and Vanessa reported by way of their screening questionnaires and interviews, they generally regarded mathematics as being instrumentally important—perhaps even intrinsically important. They also recognized the role that mathematics would likely play in their desired careers—even if Cedric said that he always struggled with the subject as well as with the idea of being considered a "natural" by one of his high school teachers and, similarly, if Vanessa had to "work my [her] ass off" to recover a poor grade in her Advanced Placement probability and statistics course. Despite an overarching sense of the subject's importance, there were curious inconsistencies regarding the students' academic and mathematics course backgrounds and their subsequent placement in an NCBR mathematics course. To this point, there was evidence that these dissonant circumstances began even before the first day of the NCBR course.

At the point of entry to LMU, students were required to complete the university's mathematics placement examination, which was a truly high-stakes hurdle. When asked about her experience with the exam, Vanessa shared the following narrative about the event (Interview 3, Week 10):

V: Well, I actually didn't take it, I just pressed next like on all of them because I knew that I wanted to be in the lowest math. I knew that I wasn't that good in math, so yeah. I just I tried to do some of them, then after a while I just said "skip this," and I just pressed next, to the next one. I didn't want to come into college, um, like behind. Well, even though I am behind in [the NCBR mathematics course], but you know, I wanted to be where I needed to be which is [the NCBR mathematics course].

GL: Why was [the NCBR mathematics course] where you needed to be?

V: Because it's the lowest math class here [at LMU].

Why would Vanessa not take the test seriously? What does it mean that—despite the evidence inherent in her academic and mathematics course background—she "needed to be" there (in that course)? Did Vanessa avoid engaging the test fully to diminish the stress of testing? (Did she know the stakes?) Was there something else—some other phenomenon—at work? Surely, this must have been an isolated occurrence; perhaps she was having a bad day and did not feel well enough or up to par to give the test her full attention. Given her academic background, it seems plausible that this was altogether or partially true. Before attempting to unpack Vanessa's experience with the test, however, consider the following account from Cedric (Interview 3, Week 9):

GL: Okay. So let's think back to this past summer-spring, before you enrolled. When did you take the placement exam?

C: I took the placement exam, I think, um, right before [first-year orientation], I think . . . um, I think that there was a deadline for the math placement exam, and

> um . . . my [orientation] was during June. I can't remember when the deadline for the math placement exam was. Yeah.
>
> *GL:* So, what did you think about the test? I see this smile creeping across your face.
>
> *C:* Yeah . . . during the math placement test I just, kinda just rushed through it. Like, I finished my . . . we had block classes in high school, so I finished my calculus class in my junior year. I didn't have any math in my senior year. So, some of the stuff I was just like, um, "I don't know," "I don't know," and I clicked off . . . basically through the whole math placement test. So, yeah.

Why did both of these students—both quite capable academically—act in this way in a mathematics-specific testing situation, especially given that the test would determine the students' mathematics course-taking trajectories in college? According to Vanessa, given the choice between trying to solve the mathematics problems presented on the exam (which were presented in increasing difficulty and would have included at least some items that extended beyond her previous exposure) and selecting a do-not-know option, she opted for the latter. She signified this act by suggesting that it was in line with her aspirations or, more accurately, where she thought she should be. Similarly, when Cedric was faced with a testing situation in which he felt mathematically underprepared because of his break from mathematics content courses during his senior year, he also chose to act in a way that was interpretively uncharacteristic.

These data suggest, along with data presented in the previous sections, that the students were perhaps identifying in ways that signaled a shift from being academically successful maximizers[9]—students who take every opportunity to excel and exhibit their best in school-related situations—to a different kind of identifying. They were, in this situation, acting as satisficers. *Satisficing,* a portmanteau term composed from the words "satisfy" and "suffice," was coined by Herbert Simon (1955; see also 1957) to describe situations in which individuals "pursue not the best option, but a good enough option" (Schwartz et al., 2002, p. 1178). Evidence of satisficing does not indicate that a person does not possess knowledge or opinion about the domain (Berinsky, 2004); instead, it means that the person is choosing to act as a certain kind of person—in this case, as a satisficer and not as a maximizer (cf. Schwartz et al., 2002). According to Simon (1987), the difference between the terms is tantamount to "searching for the sharpest needle [in the haystack]" (maximizing) versus "searching for a needle sharp enough to sew with" (satisficing; p. 244).

In this particular case, satisficing not only includes *satisfying* and *sufficing* as its etymological roots but also indicates the students' seeming willingness to potentially sacrifice their mathematical trajectories for the expediency of the moment (unless the stakes were actually unknown or underappreciated). Cedric and Vanessa were

[9] Maximizing necessarily involves "choosing one's actions so that they are most likely to bring about *states of affairs* [emphasis added] that one prefers" (Byron, 2004, p. 2; cf. Schwartz et al., 2002). Compare this to Sfard and Prusak's (2005) notion of an endorsed narrative that "faithfully reflects the state of affairs in the [identity-builder's] world." Maximizing, then, can be thought of as constructing one's endorsed narratives in a way that brings about a preferable and optimal outcome.

satisficing within a context that would determine their mathematics course-taking pathways—either through courses that bore college credit immediately or first through the NCBR course. For these two students, this identity shift, which relied on different endorsables (e.g., "I just pressed next") and different significations (e.g., "I wanted to be where I needed to be"), was predicated on the existence of a constructed choice. Basically, by choosing to satisfy the university's requirement of completing the placement exam in ways that were only minimally sufficient (i.e., selecting don't-know options), Cedric and Vanessa had essentially placed themselves in this course. Undoubtedly, this is a very curious act of individual agency.

The question remains, however: Did the students know the stakes? If so, did the students seem to satisfice toward this specific end? In lieu of a definite answer, consider the following exchange with Vanessa that occurred several weeks into the study:

GL: Okay. So you don't study, but you do well on everything. Do you think that you belong in this class?
V: Yeah! I placed in this class.
GL: But do you think that you could've placed into [the credit-bearing algebra course]?
V: No.
GL: Why not?
V: Well . . . I don't know. Because I did take the test over the summer. I didn't remember anything . . . I just kept clicking next, next. Maybe if I had studied, Maybe if I'd come in with the right frame of mind . . . instead of "I need to be in the lowest class." Maybe I should've; I don't know.
GL: But you're okay where you are?
V: Yep . . . Do you think that I should be in [the credit-bearing algebra course]?

Vanessa oscillated between questioning her placement in the NCBR course and contending that the placement was appropriate. It is difficult to infer whether she preferred to be in either the NCBR mathematics course or the credit-bearing algebra course. Based on other exchanges, however, it is clear that both Vanessa and Cedric preferred to succeed academically—and choosing to be placed in an NCBR mathematics course could be viewed as a more cautious route toward ultimate success. By choosing the NCBR course, these students were effectively selecting a course that was good enough for a successful start but was not the more efficient route toward graduation. To use Simon's (1987) metaphor, for Cedric and Vanessa, the NCBR mathematics course was good enough to sew with, even if it was not the sharpest needle.

Racialized Mathematics Identities: On Identity Threat and Racialized Identity Threat

In the NCBR mathematics classroom, Cedric was characteristically quiet. Although he attended every class session, he rarely asked questions and almost never talked to the other students. He took copious notes, however, and often transcribed the instructor's procedural demonstrations and strategies step-by-step

and even word-for-word. Although his peers would often compare and share their notes and homework answers as they worked during class (or simply copy them), Cedric would refer only to his textbook, verifying his answers to odd-numbered problems using the key in the back of the book. (As it was, the instructor made it a point to assign only these problems, indeed hoping that students would use the answer key as a resource, as Cedric did.) Although these observed actions—that is, not asking questions, not collaborating, referring to the text as a primary resource—may seem atypical for a high-achieving student (or they may not), Cedric clearly preferred them in this context.

Cedric, it seemed, was attempting to differentiate his mathematics identity from the identities of his classroom peers, perhaps by engaging in a different set of actions that still endorsed a maximizer identity, albeit in a different, less vocal way. Furthermore, there was evidence that Cedric was beginning to analyze his own experience in this particular mathematics context. During the interview sessions, I asked the students if they had questions for me as the researcher—either about mathematics, the interview, or the course experience (or anything else, for that matter). Usually, Cedric did not ask questions, but during one of the later interviews he posed the following question (Interview 4, Week 11):

C: Um . . . [long pause] I want to know, like, what do you think about like, um . . . the African Americans in the class? And like the large number of African Americans in the class?

GL: Okay. Well . . . let me just ask a quick question before I answer. But I will . . . I'll definitely answer your question. But, you noticed. And first, what do you think about that?

C: Like, um . . . it brings to mind like . . . I guess, like . . . I kinda question what's their work ethic like. Are they just going to give up on the class? Or are they going to try to do their best? Try, even though it may be a struggle now, just to try to and get through it. And like, um, I don't know; it's just . . . I see a lot of African American students that have dropped the class or just aren't there anymore, and like I'll see them come in and sometimes they'll just leave and I don't know, it's just kinda . . . it kinda opened my eyes up to like where I am. Like for this class, I want to do well. So, I'm going to come every day, I'm going to, um, take notes, do whatever I can just to get a good grade, and to get out of it whatever I can.

In this exchange, Cedric was not only noticing the large proportion of African Americans among his course peers, but he was curious about what it looked like to others or, in other words, what it signified. The situation was a cue of some kind. Although it was not immediately clear whether he was questioning this signification for himself and his own identity, Cedric went on to narrate that significance for himself (Interview 5, Week 18).

C: I mean I see it . . . I walk these halls everyday. I see who's in these classes. I'll see calculus on the board, and no black students in the seats. Sometimes one or two . . . Okay. I just feel like . . . it . . . [long pause] I don't know . . . it kinda hurts me to see so many black people, like me, in the classroom. I just feel like we're . . . [long pause] I feel like we could do better. [long pause] Like, if we're

> going to come to [LMU], then um . . . and just be put in the [NCBR] class, and then to see people, like um, just drop out of it; that just, kinda like, hurts me, because it, kinda like, says to me, "Okay, African American students can't succeed in this class, you know." And it's remedial, the lowest class, so . . . So, it's kinda . . . I don't know.
>
> *GL:* Could you talk a little bit about what you think that term ["remedial"] means? Do you think that it applies to the course that you just took?
>
> *C:* The word means like simple or, like, dumb. Well, I don't want to say dumb, but . . . And how it applies to the course that I just took? I think that most of the material was simple. But . . . and I feel like . . . Okay. Like when people ask you, like, what course are you in, [the NCBR mathematics course], it's kind of like, "Well, gee, you're really bad at math!" So, yeah.

According to Steele (2010), "cues implicating one's marginality" are major harbingers of identity threat;[10] "the number one such cue is the number of other people in a setting with the same identity—the 'critical mass cue'" (p. 140). For Cedric, the critical mass cue (i.e., noticing "so many black people . . . in the classroom") was indeed major. In direct response to this cue, or as Steele also calls it, an *identity contingency*[11] (cf. Purdie-Vaughns, Steele, Davies, Ditlmann, & Crosby, 2008), Cedric took on the role of "contingency detective" and literally conducted his own quasiexperimental walks through the halls of the mathematics classroom building to verify his suspicions prompted by the critical mass cue.

The primary downside of this contingency detection work—attending to threatening or unfavorable identity contingencies in any sense—is that it causes the person to exert extraordinary identity-constructing effort. Depending on the significance of the identity, this can happen at considerable psychosocial cost to the identifying person. Over the long term, as Delpit (2012) suggested in her take on the phenomenon, "the chronic experience of stereotype threat appears to lead individuals to 'dis-identify' with the domain in which they are experiencing the threat" (p. 19). In Cedric's case, he paced through the building while constructing narratives that adjoined certain kinds of persons (e.g., "who's in these classes . . . no black students in the seats") to certain kinds of activities or states of affairs ("calculus on the board").

Similarly, Vanessa also confronted a variety of identity contingencies associated with her experiences in this remedial mathematics course. Unlike Cedric, however, Vanessa's cues were sourced from her involvement in an institutional support program for underrepresented minority students at LMU. Many of the students in

---

[10] Although Steele (2010) has recently termed this "identity threat" (p. 140), the phenomenon is better known in his and his colleagues' research as "stereotype threat" (p. 59). Commensurate to a view that beliefs and stereotypes reflect a cognitive-psychological perspective whereas identities and master narratives (respectively) reflect a discursive orientation, identity threat seems to encompass both perspectives.

[11] Identity contingencies are the "situational predicament[s]" that an individual may face because she or he has a certain identity (Steele, 2010, p. 59). These predicaments represent a "range of vulnerabilities and opportunities a person expects to face based on the settings' response to one or more of the person's social identities" (Purdie-Vaughns et al., 2008, p. 616).

the program were from Vanessa's hometown; in fact, she knew many of them prior to matriculating at LMU. Most were also first-year students, and oftentimes the senior students would speak to their junior peers about their academic and extracurricular experiences at the university. Sometimes the staff adviser would give presentations or facilitate discussion groups on topics as varied as study strategies and sexual assault on campus. In the narrative that follows, Vanessa describes a recurring situation in which the students spoke directly about mathematics learning and the NCBR mathematics course experience at LMU.

V: It's this little skit. They have this group called "Algebra 99."[12]
GL: I don't know anything about any of this. Please continue.
V: Yeah, It's like, it's mainly for . . . I'm not going to . . . like mostly black kids. It's every Tuesday, right down the hall . . . you should go, it's really enlightening. Um, well . . . [the Algebra 99 skit group] is really about this group of kids that are going through certain stereotypes or whatever that kids go through, and they just make . . . I don't know . . . Algebra 99 just has this reputation . . . yeah!
GL: And what does that reputation mean?
V: I mean . . . we know that the skit is going to be funny, first off. We know that the kids are going to struggle through something . . . Like in every little skit, they have something to overcome. Like, it's just ironic that they named it Algebra 99.
GL: Yeah . . . that's interesting. Any other characteristics of . . .
V: Yeah, there's always something about the skit that—there'll be some kid who's lazy, doesn't come to class, or something like that, and then there's somebody who comes and enlightens him. Point of the matter is that it's always something going on with the person in the skit. And it's about freshmen. Like they're all quote-unquote freshmen. But they're upperclassmen playing freshmen.
GL: That's really interesting. How does that make you feel?
V: Being that they're all black, it's kinda like most black kids are in Algebra 99. That's kinda what it seems like to me. Which is kinda true, in a way.

Like Cedric, Vanessa was unintentionally cast—by virtue of an imposed contingency of her identity as a Black student enrolled in an NCBR mathematics course—into a crucial sense-making situation. In both cases, it could be called a kind of identity crisis. Whereas Cedric's identity threat was cued as he surveyed the context around him, Vanessa's identities as a maximizer and as an excellent mathematics student were being tacitly challenged by interactions with her peers and, significantly, among senior peers. Through this peer-support program and the skit series (again, named after the NCBR mathematics course), the senior students were essentially performing possible identities for their junior peers. Put differently, the senior students were substantiating and transmitting a deficit-oriented and identity-threatening master narrative about the experiences of Black students in

[12] "Algebra 99" is a pseudonym for the course number of the NCBR mathematics course at LMU in which both Vanessa and Cedric were enrolled. It is used here to facilitate the expression of Vanessa's narrative. It is used purposely to signify a course that is not quite college-level (99 and not, say, 100 or 101). The students in Vanessa's narrative named the skit group after the NCBR mathematics course. For the present purposes, this indicates how deeply embedded the NCBR mathematics course and its reputation was in LMU's institutional culture.

NCBR mathematics courses, and the reception of that master narrative generated dissonance for Vanessa. Furthermore, this mimetic master narrating was happening year after year under the auspices of an institutional support system.

The identity threats that Cedric and Vanessa referenced were explicitly racialized. *Racialized identity threat* refers to instances in which identity contingencies, which are cued either explicitly or implicitly, relate to their racial identities in a setting. In these two cases, mathematics identities about NCBR mathematics course experiences were being coconstructed in relation to racialized narratives. For Vanessa, the racialized identity threat was contingent on a kind of peer-influence cue; for Cedric, it was contingent on a critical mass cue. These pursuant episodes were psychosocial experiences in the sense that they proposed to alter engagement within a particular domain. As Steele (2010) described,

> The problem is that the pressure to disprove a stereotype changes what you are about in a situation. It gives you an additional task. In addition to learning new skills, knowledge, and ways of thinking in a schooling situation, . . . you are also trying to slay a ghost in the room, the negative stereotype and its allegation about you and your group. You are multitasking, and because the stakes are high—survival and success versus failure in an area that is important to you—this multitasking is stressful and distracting. . . . it can cause highly inefficient strategies and rigidities. . . . And when you realize that this stressful experience is probably a chronic feature of the setting for you, it can be difficult for you to stay in the setting, to sustain your motivation to succeed there. Disproving a stereotype is a Sisyphean task; something that you have to do over and over again as long as you are in the domain where the stereotype applies. (pp. 110–111)

Discussion

Equity may be a central principle for school mathematics, but the compounded task of recognizing and unpacking systemic inequities is a (if not the) grand challenge for mathematics education researchers (cf. Stephan et al., 2015). Although there has been considerable progress toward developing agendas for fostering equity, the resulting perspectives—albeit with creditable intent—often aim to equalize learners' participation within their mathematics classrooms.[13] Not only do inequities in mathematics education pervade the teaching and learning that occurs in school, but they also adhere stubbornly to other aspects of mathematics socialization beyond and within schooling institutions—including, for instance, the institutional structures and discourses that circumscribe local teaching and learning (historically and contemporarily); sociopolitical and sociohistorical conditions, expectations, and goals of communities and families; and, ultimately, individual identifying and mathematizing.

This study accounted for a broad array of mathematics socialization forces—including institutional practices and sociohistorical master narratives—and their impact on Black learners' identities in NCBR mathematics courses. Specifically,

[13] This is not intended to discredit that work in any way but to suggest perhaps that what counts as an equity project should be revisited (as a penumbral term; Apple, 1992)—in ways that distinguish between equity projects and projects that aim to critically interrogate or otherwise objectify inequities in mathematics education.

the study focused on the mathematics identities that Black students were constructing about their experiences in NCBR mathematics courses and, secondarily, on the lenses that those mathematics identities provide on NCBR mathematics courses as an institutional context.

With regard to the first research question, Cedric and Vanessa constructed general academic identities, mathematics identities, identities related to being a student in an NCBR mathematics course, and identities that interlaced mathematics learning, academic, and racialized experiences. Although they struggled to maintain their high-achieving, maximizing identities in the face of their experiences in the NCBR mathematics course, both Cedric and Vanessa referred to their communities and families as resources that they drew on to sustain their academic identifying. Most of their narratives about negative experiences or instances in which they questioned their identities involved institutional factors: the institutional climate, policies, or formal and informal practices. This suggests that the institution itself can present barriers to Black learners and their identities.

With regard to the second research question, a clear and central message of this study is that students are not only negotiating the mathematics instruction and curriculum in the classroom but also negotiating their selves as mathematics learners, as (often but certainly not always) first-time college students, and as Black college students in predominantly White universities. It is crucial to note, however, that the experience of being a Black student in an NCBR mathematics course at this university was not restricted to the classroom setting, although it was relevant there (particularly for Cedric). The findings of this study also contribute conceptually to understanding what students may encounter as they negotiate this distinctive mathematics-learning experience—specifically, the possibilities of identity satisficing and racialized identity threats.

This study contributes to the research literature regarding mathematics identity by offering a more nuanced conceptualization of Martin's (2000) framing of mathematics identity as a narrative-identity construct. The participant-centered inquiry of this study also provides cases in which the mathematics socialization levels and factors of Martin's influential framework are explored empirically. Furthermore, the adapted use of Sfard and Prusak's (2005) narrative identity framework—with a serious consideration of Juzwik's (2006) suggestion to attend to the narrative elements—adds to the interdisciplinary robustness required to attend to narrative, narrative identity, and mathematics identity. Further research about academic and racialized identities may be more robustly incorporated with these other identity elements.

Aside from the contribution to identity-oriented research in mathematics education, there is still much need to study the experiences of learners in NCBR mathematics courses. As mathematics identity proliferates as an analytical tool, in what ways can it be refined to improve learners' experiences in NCBR mathematics courses? How can institutions begin to draw on identity-oriented research to inform the development of institutional policies and practices (e.g., strengthening the link between academic courses and student support systems)? With regard to

the refinement of mathematics identity as an analytical tool, the findings of this study suggest that contextually specific framings of mathematics identity may reveal even more context-particular forces with which students are contending.

Closing Remarks

In closing, consider the following quotation:

> When mathematics, so effective in creating useful stories about the physical reality around us, is also applied in crafting stories about children (as in "This is a below average student") and plays a decisive role in determining the paths their lives are going to take, the results may be less than helpful. More often than not, the numerical tags with which these stories label their young protagonists, rather than empowering the student, may be raising barriers that some of the children will never be able to cross. (Sfard, 2012, p. 8)

As Sfard (2012) argued, mathematics as a field of knowledge—and its utility, specifically—gets exercised in a variety of ways. With fascinating precision, mathematics is used as a preeminent resource for creating or evaluating strongly explanatory stories about our physical and sociopolitical realities. Based on the status and authority that those stories engender, mathematics is also employed as a gatekeeper in school contexts and actualized as a kind of intellectual property—a subject through which students must pass to endorse their academic merit. In this way, mathematics achievement has become a powerful shorthand for crafting storylines about young persons' phenomenal realities (Martin, 2012). When mathematics is used to label—to reify students as certain kinds of persons (e.g., high or low achievers) and to affix assumed meanings and behaviors thereunto—the results may not only raise barriers (that are not necessarily insurmountable) but also stimulate overwhelming contingencies for young protagonists as they negotiate those barriers. As the present study bears out, this is especially the case as those identities unavoidably intersect with already existing stories about other kinds of social identities.

References

Adelman, C. (1998). The kiss of death? An alternative view of college remediation. *National Crosstalk, 6*(3), 11. Retrieved from http://www.highereducation.org/crosstalk/pdf/ctsummer98.pdf

Adelman, C. (2004, January). *Principal indicators of student academic histories in postsecondary education, 1972–2000.* Washington, DC: U.S. Department of Education, Institute of Education Sciences. Retrieved from http://www2.ed.gov/rschstat/research/pubs/prinindicat/prinindicat.pdf

ALEKS (Version 2) [Computer software]. (2010). Irvine, CA: ALEKS. Available at https://www.aleks.com/

Apple, M. W. (1992). Do the standards go far enough? Power, policy, and practice in mathematics education. *Journal for Research in Mathematics Education, 23*(5), 412–431. doi:10.2307/749562

Attewell, P., Lavin, D., Domina, T., & Levey, T. (2006). New evidence on college remediation. *The Journal of Higher Education, 77*(5), 886–924.

Bahr, P. R. (2008). Does mathematics remediation work?: A comparative analysis of academic attainment among community college students. *Research in Higher Education, 49*(5), 420–450. doi:10.1007/s11162-008-9089-4

Bahr, P. R. (2010). Preparing the underprepared: An analysis of racial disparities in postsecondary mathematics remediation. *The Journal of Higher Education, 81*(2), 209–237. doi:10.1353/jhe.0.0086

Baldwin, J. (1966). Theatre: The Negro in and out. *Negro Digest, 15*(6), 37–44.

Berinsky, A. J. (2004). *Silent voices: Public opinion and political participation in America*. Princeton, NJ: Princeton University Press.

Berry, R. Q., III. (2008). Access to upper-level mathematics: The stories of successful African American middle school boys. *Journal for Research in Mathematics Education, 39*(5), 464–488.

Bishop, J. P. (2012). "She's always been the smart one. I've always been the dumb one": Identities in the mathematics classroom. *Journal for Research in Mathematics Education, 43*(1), 34–74. doi:10.5951/jresematheduc.43.1.0034

Boaler, J., & Greeno, J. G. (2000). Identity, agency, and knowing in mathematics worlds. In J. Boaler (Ed.), *Multiple perspectives on mathematics teaching and learning* (pp. 171–200). Westport, CT: Ablex.

Byron, M. (Ed.) (2004). *Satisficing and maximizing: Moral theorists on practical reason*. New York, NY: Cambridge University Press.

Carmichael, S. (with Thelwell, E. M.). (2003). *Ready for revolution: The life and struggles of Stokely Carmichael* (Kwame Ture). New York, NY: Simon & Schuster.

Cobb, P. (2004). Mathematics, literacies, and identity. *Reading Research Quarterly, 39*(3), 333–337.

Cobb, P., Gresalfi, M., & Hodge, L. L. (2009). An interpretive scheme for analyzing the identities that students develop in mathematics classrooms. *Journal for Research in Mathematics Education, 40*(1), 40–68.

Davis, R. J., & Palmer, R. T. (2010). The role of postsecondary remediation for African American students: A review of research. *Journal of Negro Education, 79*(4), 503–520.

de Abreu, G. (1995). Understanding how children experience the relationship between home and school mathematics. *Mind, Culture, and Activity, 2*(2), 119–142. doi:10.1080/10749039509524693

de Freitas, E. (2008). Enacting identity through narrative: Interrupting the procedural discourse in mathematics classrooms. In T. Brown (Ed.), *The psychology of mathematics education: A psychoanalytic displacement* (pp. 139–155). Rotterdam, the Netherlands: Sense Publishers.

Deil-Amen, R., & Rosenbaum, J. E. (2002). The unintended consequences of stigma-free remediation. *Sociology of Education, 75*(3), 249–268.

Delpit, L. (2012). *"Multiplication is for white people": Raising expectations for other people's children*. New York, NY: The New Press.

Gee, J. P. (2001). Identity as an analytic lens for research in education. *Review of Research in Education, 25*(1), 99–125. doi:10.3102/0091732X025001099

Grubb, W. N. (2001, February). *From black box to Pandora's box: Evaluating remedial/developmental education*. New York, NY: Columbia University, Teachers College, Community College Research Center. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/black-box-evaluating-remedial-education.pdf

Gutiérrez, R. (2013). Why (urban) mathematics teachers need political knowledge. *Journal of Urban Mathematics Education, 6*(2), 7–19.

Gutstein, E. (2003). Teaching and learning mathematics for social justice in an urban, Latino school. *Journal for Research in Mathematics Education, 34*(1), 37–73. doi:10.2307/30034699

Hagedorn, L. S., Siadat, M. V., Fogel, S. F., Nora, A., & Pascarella, E. T. (1999). Success in college mathematics: Comparisons between remedial and nonremedial first-year college students. *Research in Higher Education, 40*(3), 261–284.

Hand, V., & Gresalfi, M. (2015). The joint accomplishment of identity. *Educational Psychologist, 50*(3), 190–203. doi:10.1080/00461520.2015.1075401

Heyd-Metzuyanim, E., & Sfard, A. (2011). Identity struggles in the mathematics classroom: On learning mathematics as an interplay of mathematizing and identifying. *International Journal of Educational Research,* 51–52, 128–145. doi:10.1016/j.ijer.2011.12.015

Hoffman, D. M. (1998). A therapeutic moment? Identity, self, and culture in the anthropology of education. *Anthropology & Education Quarterly, 29*(3), 324–346.

Horn, I. S. (2008). Turnaround students in high school mathematics: Constructing identities of competence through mathematical worlds. *Mathematical Thinking and Learning, 10*(3), 201–239. doi:10.1080/10986060802216177

Ignash, J. M. (1997). Who should provide postsecondary remedial/developmental education? *New Directions for Community Colleges, 1997*(100), 5–20. doi:10.1002/cc.10001

Jackson, K. J. (2009). The social construction of youth and mathematics: The case of a fifth-grade classroom. In D. Martin (Ed.), *Mathematics teaching, learning, and liberation in the lives of black children* (pp. 175–199). New York, NY: Routledge.

Juzwik, M. M. (2006). Situating narrative-minded research: A commentary on Anna Sfard and Anna Prusak's "Telling Identities." *Educational Researcher, 35*(9), 13–21.

Kilpatrick, J., Swafford, J., & Findell, B. (Eds.). (2001). *Adding it up: Helping children learn mathematics*. Washington, DC: National Academy Press.

Labov, W. (1984). Field methods of the project on linguistic change and variation. In J. Baugh & J. Sherzer (Eds.), *Language in use: Readings in sociolinguistics* (pp. 28–53). Englewood Cliffs, NJ: Prentice Hall.

Labov, W. (2011). Narratives of personal experience. In P. C. Hogan (Ed.), *The Cambridge encyclopedia of the language sciences* (pp. 546–548). New York, NY: Cambridge University Press.

Labov, W., & Waletzky, J. (2003). Narrative analysis: Oral versions of personal experience. In C. B. Paulston & G. R. Tucker (Eds.), *Sociolinguistics: The essential readings* (pp. 74–104). Malden, MA: Blackwell.

Ladson-Billings, G. (1997). It doesn't add up: African American students' mathematics achievement. *Journal for Research in Mathematics Education. 28*(6), 697–708. doi:10.2307/749638

Langer-Osuna, J. M. (2011). How Brianna became bossy and Kofi came out smart: Understanding the trajectories of identity and engagement for two group leaders in a project-based mathematics classroom. C*anadian Journal of Science, Mathematics and Technology Education, 11*(3), 207–225. doi:10.1080/14926156.2011.595881

Larnell, G. V. (2011). *More than just skill: Mathematics identities, socialization, and remediation among African American undergraduates* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3465411)

Larnell, G. V. (2013a). On "new waves" in mathematics education research: Identity, power, and the mathematics learning experiences of all children. *New Waves—Educational Research and Development, 16*(1), 146–156.

Larnell, G. V. (2013b). *Toward reforming non-credit-bearing remedial mathematics courses in four-year universities* (Policy Brief Vol. 2, Book 2). Chicago: University of Illinois at Chicago, Research on Urban Education Policy Initiative. Retrieved from http://c-stemec.org/wp-content/uploads/2013/08/Toward-Reforming-Non-Credit-Bearing-Remedial-Mathematics-Courses-in-Four-Year-Universities.pdf

Lerman, S. (2000). The social turn in mathematics education research. In J. Boaler (Ed.), *Multiple perspectives on mathematics teaching and learning* (pp. 19–44). Westport, CT: Ablex Publishing.

Lubienski, S. T., & Bowen, A. (2000). Who's counting? A survey of mathematics education research 1982–1998. *Journal for Research in Mathematics Education, 31*(5), 626–633. doi:10.2307/749890

Martin, D. B. (2000). *Mathematics success and failure among African-American youth: The roles of sociohistorical context, community forces, school influence, and individual agency.* Mahwah, NJ: Erlbaum.

Martin, D. B. (2007). Mathematics learning and participation in the African American context: The co-construction of identity in two intersecting realms of experience. In N. S. Nasir & P. Cobb (Eds.), *Improving access to mathematics: Diversity and equity in the classroom* (pp. 146–158). New York, NY: Teachers College Press.

Martin, D. B. (2009). Liberating the production of knowledge about African American children and mathematics. In D. B. Martin (Ed.), *Mathematics teaching, learning, and liberation in the lives of black children* (pp. 3–38). New York, NY: Routledge.

Martin, D. B. (2012). Learning mathematics while black. *The Journal of Educational Foundations, 26*(1–2), 47–66.

Martin, D. B. (2015). The collective black and Principles to Actions. *Journal of Urban Mathematics Education, 8*(1), 17–23. Retrieved from http://ed-osprey.gsu.edu/ojs/index.php/JUME/article/view/270/169

McLaren, P. (2004). Preface. In P. Valero and R. Zevenbergen (Eds.), *Researching the socio-political dimensions of mathematics education: Issues of power in theory and methodology* (pp. xiii–xiv). Boston, MA: Kluwer. doi:10.1007/b120597

Merisotis, J., & Phipps, R. (2000). Remedial education in colleges and universities: What's really going on? *The Review of Higher Education, 24*(1), 67–86. doi:10.1353/rhe.2000.0023

Moses, R. P., & Cobb, C. E., Jr. (2001). *Radical equations: Civil rights from Mississippi to the Algebra Project.* Boston, MA: Beacon Press.

Nasir, N. S. (2002). Identity, goals, and learning: Mathematics in cultural practice. *Mathematical Thinking and Learning, 4*(2–3), 213–247. doi:10.1207/S15327833MTL04023_6

Nasir, N. S. (2011). *Racialized identities: Race and achievement among African American youth.* Stanford, CA: Stanford University Press.

Nasir, N. S., & Cobb, P. (Eds.). (2007). *Improving access to mathematics: Equity and diversity in the classroom.* New York, NY: Teachers College Press.

Nelson, H. L. (2001). *Damaged identities, narrative repair.* Ithaca, NY: Cornell University Press.

Pais, A. (2012). A critical approach to equity. In O. Skovsmose & B. Greer (Eds.), *Opening the cage: Critique and politics of mathematics education* (pp. 49–91). Rotterdam, the Netherlands: Sense. doi:10.1007/978-94-6091-808-7

Parker, T. L. (2007, October). Ending college remediation: Consequences for access and opportunity (ASHE/Lumina Policy Briefs and Critical Essays No. 2). Ames, IA: Iowa State University, Department of Educational Leadership and Policy Studies.

Parsad, B., Lewis, L., & Greene, B. (2003). *Remedial education at degree-granting post-secondary institutions in Fall 2000* (NCES 2004-010). Washington, DC: National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2004/2004010.pdf

Purdie-Vaughns, V., Steele, C. M., Davies, P. G., Ditlmann, R., & Crosby, J. R. (2008). Social identity contingencies: How diversity cues signal threat or safety for African Americans in mainstream institutions. *Journal of Personality and Social Psychology. 94*(4), 615–630. doi:10.1037/0022-3514.94.4.615

Razfar, A. (2012). Narrating beliefs: A language ideologies approach to teacher beliefs. *Anthropology & Education Quarterly, 43*(1), 61–81. doi:10.1111/j.1548-1492.2011.01157.x

Ross, D. (1970). Remedial or developmental? Confusion over terms. *The Two-year College Journal, 1*(2), 27–31. doi:10.2307/3027355

Russell, A. (2008, August). *Enhancing college student success through developmental education* (Policy Brief). Washington, DC: American Association of State Colleges and Universities. Retrieved from http://www.aascu.org/policy/publications/policymatters/2008/developmentaleducation.pdf

Rutherford, F. J., & Ahlgren, A. (1990). *Science for all Americans.* New York, NY: Oxford University Press.

Schwartz, B., Ward, A., Monterosso, J., Lyubomirski, S., White, K., & Lehman, D. R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Journal of Personality and Social Psychology, 83*(5), 1178–1197. doi:10.1037/0022-3514.83.5.1178

Secada, W. G. (1989). Agenda setting, enlightened self-interest, and equity in mathematics education. *Peabody Journal of Education, 66*(2), 22–56. doi:10.1080/01619568909538637

Secada, W. G., & Meyer, M. R. (1989). Needed: An agenda for equity in mathematics education. *Peabody Journal of Education, 66*(2), 1–5. doi:10.1080/01619568909538635

Sfard, A. (2006). Telling ideas by the company they keep: A response to the critique by Mary Juzwik. E*ducational Researcher, 35*(9), 22–27. dsfardoi:10.3102/0013189X035009022

Sfard, A. (2008). *Thinking as communicating: Human development, the growth of discourses, and mathematizing.* New York, NY: Cambridge University Press. doi:10.1017/CBO9780511499944

Sfard, A. (2012). Why mathematics? What mathematics? *The Mathematics Educator, 22*(1), 3–16.

Sfard, A., & Prusak, A. (2005). Telling identities: In search of an analytic tool for investigating learning as a culturally shaped activity. *Educational Researcher, 34*(4), 14–22. doi:10.3102/0013189X034004014

Simon, H. A. (1955). A behavioral model of rational choice. *The Quarterly Journal of Economics. 69*(1), 99–118. doi:10.2307/1884852

Simon, H. A. (1957). *Models of man, social and rational: Mathematical essays on rational human behavior.* New York, NY: Wiley.

Simon, H. A. (1987). Satisficing. In J. Eatwell, M. Milgate, & P. Newman (Eds.), *The New Palgrave: A Dictionary of Economics* (Vol. 4, pp. 243–245). London, England: Macmillan.

Soliday, M. (2002). *The politics of remediation: Institutional and student needs in higher education*. Pittsburgh, PA: University of Pittsburgh Press.

Solomon, Y. (2009). *Mathematical literacy: Developing identities of inclusion.* New York, NY: Routledge.

Spencer, J. A. (2009). Identity at the crossroads: Understanding the practices and forces that shape African American successes and struggle in mathematics. In D. B. Martin (Ed.), *Mathematics teaching, learning, and liberation in the lives of black children* (pp. 200–230). New York, NY: Routledge.

Spradley, J. P. (1979). *The ethnographic interview.* New York, NY: Holt, Rinehart, & Winston.

Stage, F. K., & Kloosterman, P. (1995). Gender, beliefs, and achievement in remedial college-level mathematics. *The Journal of Higher Education, 66*(3), 294–311. doi:10.2307/2943893

Steele, C. M. (2010). *Whistling Vivaldi: And other clues to how stereotypes affect us*. New York, NY: W. W. Norton & Company.

Stein, M. K., Kaufman, J. H., Sherman, M., & Hillen, A. F. (2011). Algebra: A challenge at the crossroads of policy and practice. *Review of Educational Research, 81*(4), 453–492.

Stephan, M. L., Chval, K. B., Wanko, J. J., Civil, M., Fish, M. C., Herbel-Eisenmann, B., . . . Wilkerson, T. L. (2015). Grand challenges and opportunities in mathematics education research. *Journal for Research in Mathematics Education, 46*(2), 134–146. doi:10.5951/jresematheduc.46.2.0134

Stinson, D. W., & Bullock, E. C. (2012). Critical postmodern theory in mathematics education research: A praxis of uncertainty. *Educational Studies in Mathematics, 80*(1–2), 41–55. doi:10.1007/s10649-012-9386-x

Turner, E., Dominguez, H., Maldonado, L., & Empson, S. (2013). English learners' participation in mathematical discussion: Shifting positionings and dynamic identities. *Journal for Research in Mathematics Education* [Special Equity Issue], *44*(1), 199–234. doi:10.5951/jresematheduc.44.1.0199

Usiskin, Z. (2007). Do we need national standards with teeth? *Educational Leadership, 65*(3), 38–42.

Washington, D., Torres, Z., Gholson, M., & Martin, D. B. (2012). Crisis as a discursive frame in mathematics education research and reform: Implications for educating black children. In S. Mukhopadhyay & W.-M. Roth (Eds.), *Alternative forms of knowing (in) mathematics: Celebrations of diversity of mathematical practices* (pp. 53–69). Rotterdam, the Netherlands: Sense Publishers.

Wortham, S. (2006). *Learning identity: The joint emergence of social identification and academic learning.* New York, NY: Cambridge University Press.

Yin, R. (2003). *Case study research: Design and methods*. Thousand Oaks, CA: SAGE.

Author

Gregory V. Larnell, Department of Curriculum and Instruction, College of Education, University of Illinois at Chicago, 1040 West Harrison Street (MC 147), Chicago, IL 60607; glarnell@uic.edu.

Submitted October 20, 2014
Accepted February 28, 2015

APPENDIX

Table A1
*Coding Table for Transcript Analysis With Example*s

Phase 1: Identity [I] and Narrative [N] Coding		
Code	Description	Example
[N] Orientation	Establishes the narrative's subject, context or setting, and state of affairs	Well, in the beginning I was struggling like with the math. And with us having so much homework.
[N] Complicating action	Expresses the central activity or event of the narrative involving the subject, responding to the question "What happened then?"	I got it all straightened out.
[N] Evaluation	Expresses the subject's stance toward the progression of the narrative, responding to the question "So what?"	But it's good now. Oh, I'm doing pretty good now.
[N] Resolution	Expresses whether the narrative is resolved and the activity of the subject brought to a kind of result	(Double coded) I got it all straightened out.
[N] Coda	Brings the narrative's setting to the present	My grade is a 3.5 right now.
[I] Reifying	Establishes the subject as a certain kind of person ("is-sentences") with strong explanatory force	Well, in the beginning I was struggling like with the math.
[I] Endorsing	Assigns an activity (or "state of affairs" or set of activities) or practice(s) or associates the subject with an action(s)	And with us having so much homework. I got it all straightened out.
[I] Signifying (heft)	Utterances that associate the subject or their actions with a sense of meaning of purpose attributable to the subject	But it's good now. Oh, I'm doing pretty good now. My grade is a 3.5 right now.

Phase 2: Mathematics Identity [MI] and Socialization [MS] Coding		
Code	Description	Example (multiple coding is not shown here)
[MI] Importance of mathematics	About students' sense of mathematics as a useful or worthwhile endeavor or mathematics as discipline (current or designated)	I'm kind've a math person, I'd say. Well I'm not going to say that I totally don't like math Math has always been something that I kinda struggled with. I can always say that I do like it when I understand it. So, uhm, I knew that in math I had to work just a little bit harder, So that's basically what pushed me to get good grades to basically put in the best that I could.
[MI] Motivation	About reasons for engaging in mathematical activities	I'm already here but I want to do better get a good grade in the class I want to prove that you know there are African American students that will get a good grade in this class.
[MI] Strategies	About tactics or preferred methods of negotiating math-specific context and situations	I'm not even trying to be serious in here. I just keep my head down, you know? Why put all my energy into this when I know the result already?
[MI] Opportunities	About occasions for participating in mathematics contexts or acquiring mathematical knowledge	Well, the environment is pretty good. I guess we, um, like [Instructor] says we're a pretty talkative classroom we can talk to each other. I hear people talking about different problems, you know They interact with each other, they can study with each other, so. and sometimes I'll ask about different problems and then get their feedback on what they got for the answer and stuff like that. I think that the classroom environment does help us learn.

[MI] Constraints	About perceptions or evinced barriers to otherwise fuller participation in mathematical contexts	Well, in the beginning I was struggling like with the math. And with us having so much homework. I got it all straightened out. But it's good now. Oh, I'm doing pretty good now. I got it all straightened out. My grade is a 3.5 right now.
[MI] Capacity to perform	About what one knows, why one's ability to take advantage of opportunities to learn	That we'll succeed in this class. It pushes me more than it pushes back. [Other students in the class] may [feel the same way]. Like um, the girl that I work with, [Vanessa], I think that maybe she feels the same way that I do. We told each other that we want a four-point in this class.
[MS] Institutional	Identity narrative includes references to institutional factors	Just because I'm a [student support program] student. I think that most of us are required to take MATH 99, I think. Well [the student support program], I know that the way I was enrolled in LMU was through [the program]. It's basically for, I guess, low-income students it's a whole bunch of like different range of students who are accepted into [the program].
[MS] Sociohistorical	Stereotype/Master narrative Broad social histories and contextual forces Historical narratives about differential treatment	I feel like we could do better. Like, if we're going to come to LMU then um, and just be put in the MATH 99 class and then to see people, like um, just drop out of it that just, kinda like, hurts me because it, kinda like, says to me, "Okay, African American students can't succeed in this class, you know." And it's the lowest class
[MS] Community-home	Parents' expectations Community expectations Educational goals	Yeah, I was a good student. I think that me and my friends kinda had like the same vision. Like we basically wanted to go somewhere. What's why a lot of my friends were salutatorians along with me, so. Yeah, there's actually six of us from [my former high school].