23 Identity in Research on Mathematics Education

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Identity is a construct that people use to capture something they intuitively grasp about themselves and other humans. There is something unique about each individual, something that could be called a self-concept or a personality. And yet, there is something people share with other members of their social groups: girl-ness or white-ness or wealth-ness. Their relationships to these social groups depend on historical time and geographic place, which shape what these groups mean and how group members experience them. Identity is a construct that has been used to describe these complex phenomena. In this chapter, we make a distinction between *individual* identities—those that an individual develops in relation to a social context, such as "struggling student" in the mathematics classroom or "star player" on the basketball team—and *membership* identities—those based on social membership related to race, gender, and language.

Studies of identity in mathematics teaching and learning are fairly new in North American scholarship. Arguably starting about a decade and a half ago with Boaler and Greeno (2000), Martin (2000), and Nasir (2002), identity research in mathematics education has largely been approached from a sociocultural perspective, which frames identity and learning as fundamentally linked to one another and arising from participation in social practices (Lave & Wenger, 1991; Wenger, 1999). This research has helped illuminate the ways in which learners develop mathematics-linked identities through their participation in varied cultural practices or communities of practice, both in and out of the classroom. This perspective frames identity as fundamentally linked to learning because learning is conceptualized as the *process of becoming* a certain kind of person in relation to mathematical activity, including its varied skills, knowledge base, and social practices. Boaler (2002b) went on to consider how mathematical identities become gendered, whereas Nasir (2002) and Martin (2000) focused on racialized mathematical identities. Thus, from the start researchers have been concerned about understanding how individual identities in mathematics (e.g., "able," "competent," "normal"; Black, Mendick, Rodd, & Solomon, 2009, p. 5) are related to broader membership identities.

Our goal for this review is to tease apart the different definitions of identity currently at play in mathematics education research and explore the underlying theoretical frameworks. This is not an exhaustive review for several reasons. First and most simply, the study of identity is a nascent area of research in mathematics education, and a map of the theoretical terrain will advance the field more than would a detailed collection of findings. Further, it is difficult to synthesize the findings of research on identity in mathematics education due to the lack of coherence in how the construct is defined and framed. This incoherence is increased because published works frequently do not define identity or define identity in a vague or unoperationalized way.

Second, because we are most interested in the relationship between identity and mathematics thinking, teaching, and learning, we focus on definitions and theories that posit identity as occurring in social contexts and as changeable over time. Some uses of the term *identity* refer to something that is interior to a person, like a self-concept or inner sense of self. Although focused on the individual, these conceptions of identity capture something that nevertheless develops through participation in social contexts, like classrooms. However, this fundamental connection to social context is often obscured in theories of identity development. For this reason, we focus on

theories in which identity development is fundamentally bound to the contexts in which the identity is enacted even when the focus remains on the individual.

The organization of the chapter is as follows. We begin with research that considers individual identity development. In particular, we focus on four theoretical approaches to identity: (1) discursive (poststructural), (2) positional, (3) narrative, and (4) psychoanalytic. We then discuss related research that examines the relationships between individual identities and membership identities (e.g., identities as members of racialized or gendered groups). For each approach to identity, we provide definitions, theoretical underpinnings, and typical methodologies. We then consider the implications of each approach for how we conceptualize and organize mathematical teaching and learning spaces. We close the chapter by considering recommendations for this nascent area of research as it grows and increasingly enters mainstream conversations about mathematics education.

Four Theoretical Approaches to the Study of Identity

We begin by considering the breadth of theoretical approaches to the study of individual identities. Although we characterize these approaches as four distinct theoretical frameworks, there are many connections and tensions between them. We acknowledge that our discussion masks some of the complexity of the field, but we find that the division into four distinct approaches is a useful way to conceptualize the ongoing research. We start with what have been termed discursive or poststructural theories of identity, drawing on the work of Foucault (1982). We then discuss sociocultural theories—drawing primarily on the work of Lave and Wenger (1991); Holland, Lachicotte, Skinner, and Cain (1998); and Sfard and Prusak (2005)—and focus on two variations on identity that have come to the fore: positional identities and narrative identities.[1] We end with psychoanalytic theory, an approach that is infrequently used in North American mathematics education research but nevertheless offers unique insights. Table 23.1 offers a summary of these approaches and their implications for both mathematical identities and mathematics education.

Discursive Production of Mathematical Selves

Discursive or poststructural theories of identity describe "the person as a multiplicitous and fragmented subject who is subjugated—but not determined—by the sociocultural discourses that constitute the person (Butler, 1990/1999)" (Stinson, 2013, p. 77). Black et al. (2009) offer a characterization of how a poststructural approach frames inquiries into mathematics education:

> We do not ask "Is *x* true?," but rather "What makes *x* possible?" and "What are its effects?" For example, we do not ask "Is it true that some people have greater natural ability in mathematics than others?," but rather "What makes it possible to think about some people having greater natural ability in mathematics than others?" and "What effects does this idea have" on the ways we think of mathematics, ourselves, others, and the relations among these? Similarly, reformulating our analytic questions around choice, we must move from, "Why did someone choose (not to) continue studying mathematics?" to "What makes it possible for us to think of someone as making a choice (not) to do mathematics?" and "What effects does this have?" . . . This is a switch of focus that foregrounds not the individual and their "choices" and "abilities," but the ways that people are assembled as (not) choosing mathematics and as un/able through patterns of relationships, materiality, and so on. (pp. 72–73)

Methodologically, research that draws from discursive or poststructural theories typically relies on narratives, such as interviews, which are then analyzed in relation to the "broader sociocultural context" (Stinson, 2013, p. 87). These broader contexts include life experiences and participation in local environments (e.g., schools), as well as broader discourses around mathematics, teachers, and students (e.g., Stinson, 2013; Walshaw, 2013).

For example, Walshaw (2013) "foregrounded the political and strategic nature of learning to teach" (p. 79) in an analysis of preservice teachers engaged in practicum teaching. The regulation of teaching by policy makers, governments, and schools provides a language through which (and against which) teachers construct identities. These regulations make some ways of seeing and engaging in teaching possible through the organization of power. Power operates in the routines of everyday classroom life, shaping teaching identities through interactions influenced by the discourses made available to them through policy and curricular realities.

This research illuminates how broader structures of power enable and constrain possibilities for teacher and student identities. In the interplay between structure and agency, discursive or poststructural work foregrounds how structures shape the arenas in which people exercise agency. In the next section, we focus on sociocultural approaches, which also consider broader structures of power, but foreground the role of individual agency in navigating relationships of power.

Table 23.1. Theoretical Approaches to Identity and Their Natures and Implications for Mathematics Education

	Poststructural theory	Positioning theory	Narrative theory	Psychoanalytic theory
Nature of identity	Broad discourses make certain subject positions available and constrain the ways in which people exercise agency. People construct identifications in relation to these discourses.	Individuals construct subject positions in relationship with others during interactions, in particular through talk, that make claims about who people are within particular social contexts. Relative to poststructural theories, positioning theories emphasize agency.	Individuals and the people around them create stories about themselves as they make sense of their experiences across social settings.	Individuals are governed by strong unconscious forces of fear and desire and develop identities as they cope with these inner forces.
Implication for mathematical identities	Mathematical identifications are fundamentally shaped by broader power structures, such as education policy, funding allocation, curricular options, and so on.	Mathematical identities develop through the claims people make about themselves and others in mathematical spaces.	Mathematical identities develop as people make sense of their experiences with mathematics and develop stories of success and failure and belonging or distance.	Mathematical identities develop as people cope with their anxieties, fears, desires, and longings attached to mathematical experiences.
Implication for mathematics education research	Research highlights the importance of considering the organizing role of broader power structures in shaping possibilities for how individuals identify with (and thus engage in) mathematics teaching and learning.	Research highlights the importance of how classroom (and related) talk shapes identities of competence and belonging in mathematics.	Research highlights how particular kinds of (positive or negative) experiences shape trajectories of mathematics education and beyond (i.e., the STEM pipeline).	Research highlights the emotional relationships individuals develop with mathematics teaching and learning and how (dis)engagement with mathematics are ways of coping with these anxieties and desires.

Positional Identities in Mathematics-Linked Worlds

Sociocultural or situative perspectives link identities to individuals' forms of participation in social practices (Lave & Wenger, 1991). In mathematics education research focused on identity, this line of work has been increasingly augmented with positioning theory, primarily through the work of Davies and Harré (1999) and Holland et al. (1998). Holland et al. argue that

> the dialect we speak, the degree of formality we adopt in our speech, the deeds we do, the places we go, the emotions we express, and the clothes we wear are treated as indicators of claims to and identification with social categories and positions of privilege relative to those with whom we are interacting. (p. 127)

The analyst's job is to consider this vast array of data—talk, action, and embodied space—to examine the positional identities being constructed or made salient in interaction and to discern how power and privilege are distributed, enacted, and taken up (Davies & Harré, 1999).

Positional approaches define identity as constructed through social interactions that make claims about who a person is in relation to others in a social context (Davies & Harré, 1999). As people interact with one another, they act to position themselves as displaying certain qualities (e.g., friendly, smart, authoritative) or as having a particular role (e.g., teacher, student, group leader). People also act to position others and accept or reject acts of positioning about themselves or others. Although always agentive, individuals do not have the capacity to solely determine their own identity. Rather, people interactionally negotiate their positions within a particular community through an ongoing process of positional acts (Engle, Langer-Osuna, & McKinney de Royston, 2014). These acts draw from local norms and activity structures that partially determine what is possible.

Positional theories of identity have much in common with discursive or poststructural approaches that build on the work of Foucault. Indeed, Holland et al. (1998) integrated Foucault's attention to power and discourse into their theoretical frame of figured worlds and identities.[2] The distinction we make here is twofold: (1) the relative foregrounding of individual agency in sociocultural

approaches and (2) the closer focus on the construction of local figured worlds and identities (sociocultural) rather than on broad societal discourses and the circulation of power and control (discursive poststructural).

Methodologically, studies of positional identity differ according to whether they focus more on what have been called *micro-identities* ("the position of a person in a moment of time"; Wood, 2013, p. 780) or on *thickened* identities, in which micro-identities accumulate over time to construct a seemingly stable identity, that is, when a student becomes more and more likely to be positioned in a particular way (e.g., as a trouble-maker; Wortham, 2006; as a dominoes player; Nasir, 2005; or as the winner of a debate; Engle et al., 2014). Studies of micro-identities consider how particular acts of positioning constrain opportunities for learning during classroom activities. Some micro-identities afford mathematical competence, such as being positioned as a mathematical explainer (Wood, 2013), expert, or facilitator (Esmonde, 2009). Other micro-identities afford mathematical incapability, such as being positioned as a menial worker (someone who accepts social directives from peers; Wood, 2013) or novice (Esmonde, 2009). These micro-identities can shift rapidly, offering a moment-to-moment understanding of how interactions enable or constrain opportunities for learning in situ. Studies of thickened identities focus on a series of acts of positioning over time, noting how they build upon past interactions in ways that highlight the production of kinds of mathematics learners (Langer-Osuna, 2011, 2015; Nasir, 2005; Wortham, 2006). Nasir (2005), for instance, focused on African American students' mathematical thinking, which was more robust in out-of-school contexts where they experienced greater belonging than in the mathematics classroom. Identities of competence and belonging beget more central participation and robust reasoning.

Positional approaches consider teachers and students as coparticipants in the classroom, and their positional identities coevolve. The research has much to say about how positioning acts by teachers (and other students) make some positional identities available for students but not others. Teachers can make positive[3] acts of positioning more likely to occur for more students by framing a range of student participation in mathematical sense making as enactments of competence (Cobb, Gresalfi, & Hodge, 2009). Classroom norms that support students in taking up conceptual agency and intellectual authority enable students to see themselves as productive doers of mathematics (Boaler, 2002a; Boaler & Greeno, 2000; Cobb et al., 2009; Gresalfi & Cobb, 2006; Gresalfi, Martin, Hand, & Greeno, 2009; Langer-Osuna, 2015). Boaler and Staples (2008) argue that students who are positioned as agentive tend to like mathematics better, persevere longer, and learn more. This finding is echoed by Langer-Osuna's (2015) study of a mathematics classroom that afforded students a great deal of autonomy, resulting in positive consequences for engagement, identity, and learning.

Positional perspectives study the discursive mechanisms that explain the development of particular mathematics-linked identities. In particular, this work illuminates how students take up, alter, and resist the opportunities for engagement, learning, and identification that are offered in particular mathematical spaces. It also illuminates the kinds of mathematical learning spaces that enable a greater range of students to construct positive mathematics identities, engage more deeply in learning activities, and take up learning opportunities more often. In doing so, this work enables possibilities for design-based research into equitable and productive mathematics learning spaces.

However, there are also limitations to this approach. Positioning analysis typically includes a deep dive into a specific case of interaction, which may last only a few minutes, to document the discursive mechanisms at play. The labor-intensive nature of this type of deep analysis makes it difficult to see patterns across participants and learning spaces. This theoretical approach to identity lends itself to focusing on the details of the learning process rather than generalizing across groups of learners. As this work builds in number of cases considered, a metasynthesis would help the field gain a sense of process-related patterns across populations and contexts; however, this requires researchers to be far more transparent about the theoretical assumptions and methodological techniques used in each case. A narrative approach, which we discuss next, enables examinations of these patterns, but offers less data about the impact of particular techniques or strategies for teaching and learning.

Narrative Identities: Stories From Students and Teachers of Mathematics

As people reflect on and make sense of their experiences in mathematical spaces, they tell stories about their mathematical selves. Sfard and Prusak (2005) argue that identity should be defined *as* the stories we tell about ourselves and about other people. They state, "Lengthy deliberations led us to the decision to *equate identities with stories about persons.* No, no mistake here: We did not say that identities *were finding their expression* in stories—we said they *were* stories" (p. 14, emphasis in original).

Identity-as-story, or narrative identity, is framed in opposition to many theories of identity that assume that identity is a real object (like a tree or a foot, a circle or a line) and that the researcher's job is to approximate it through representations (like stories). When identities are defined instead *as* stories, or "collection of stories told about persons" (Sfard & Prusak, 2005, p. 16), some problematic assumptions that make identities particularly difficult to research are resolved. Rather than being internal and unknowable, identities as stories are human made; shaped by society; changeable across time, context, and narrator; and accessible to researchers through empirical methods such as interviews, observations, or collecting written biographies.

In Sfard and Prusak's formulation that identities *are* stories, it is plausible that these stories arise from our experiences positioning and being positioned by others across the many social practices that make up our lives. In other words, narrative identities can be thought of as the reification (Wenger, 1999) of positional identities. How we frame, narrate, and make meaning of these experiences with others shape how we understand ourselves and may change over time as new frames become available. Although Sfard and Prusak (2005) argue that their approach differs significantly from Wenger's, in that Wenger focused on experience as opposed to stories, we believe that both argue that participation in various contexts influences the stories we tell, and those stories have power to shape future possibilities for participation. Indeed, Wenger argues that we make meaning of our forms of participation; we shape stories, and stories shape us.

Narrative identity is not a single story, but a collection of stories, told by different narrators and to different audiences (Sfard & Prusak, 2005). This definition reflects the social nature of identity; one is never entirely in control of one's identity. However, empirical research that takes up narrative identity tends to focus on stories told about the self, thus implicitly framing an identity narrative as akin to a self-concept. Methodologically, research on narrative identity would do well to imitate the positioning literature, which emphasizes not only how one positions oneself, but how one positions and is positioned by others. For instance, collections of stories about learners by the learners themselves, as well as their parents and teachers, may offer a more complete sense of the possibilities available for a given student's identity as a mathematics student.

Studies of students' narrative identities illuminate the centrality of belonging. It is quite common to hear people assert that they are "not a math person," linking mathematics to some part of their self-concept (Boaler, 2002a). Students' stories about mathematics tend to focus on how they develop a sense of belonging or exclusion (Bartholomew, Darragh, Ell, & Saunders, 2011; Rodd & Bartholomew, 2006; Solomon, 2007). For example, Rodd and Bartholomew (2006) found that students' relationship to mathematics could not be separated from their social and emotional lives. Indeed, Rodd and Bartholomew's study showed that a student's sense of belonging was tied more to issues of identity than to mathematics achievement (Solomon, Lawson, & Croft, 2011).

Studies of teachers' narrative identities illuminate how past, personal histories as mathematics learners relate to teachers' approaches to mathematics instruction (Adams, 2013; Akkoç, YeÎildere-Ðmreb, & Ali Balkanlıo°luc, 2014; Teixeira & Cyrino, 2014; Williams, 2011). These identities, based on who teachers narrate themselves to *be,* are connected to what teachers *do* in the classroom (Battey & Franke, 2008). Many studies of teacher identity focus analytically on shifts in teachers' stories after particular professional development experiences (Battey & Franke, 2008; Wager & Foote, 2013). Stories written before and after professional development are examined to locate possibilities for shifts in practice.

Narrative identity research highlights both the importance of mathematical experiences that allow students to feel a sense of belonging to school mathematics and possible avenues for teachers to implement effective pedagogies. However, it remains unclear *how* teacher and student identities actually shape one another. Further, stories are told at a broad grain size, one that is meaningful to the person telling the story, but which cannot capture the details of classroom interaction that contribute to the creation of these stories. This level of detail, and the relations between teacher and student identities, is better captured in positional approaches, which examine the construction of identity in local interactions and the role of relational power in organizing such interactions. However, unlike positional approaches, narrative approaches tend to draw on interview studies or autobiographies and can analyze the stories of many more individuals within one study, enabling analysis of patterns of experiences and stories. Together, these approaches might offer a researcher both a sense of patterns of belonging within a particular classroom, school, or community, as well as a deep dive into a sample case that illuminates the interactions that lead to a sense of (un)belonging.

Psychoanalytic Theories of Identity

In the North American mathematics education literature, sociocultural approaches to identity are by far the most common, with some representation of poststructural traditions. Mathematics education research, with

roots in cognitive approaches to learning, has a tendency to focus on the rational. Sociocultural approaches to identity often share this tendency, concerned primarily with identity as it relates to content learning and focused on rational and intentional decisions on the part of both students and teachers. Poststructural approaches consider the relation of everyday acts of becoming to broader systems of power. By contrast, psychoanalytic approaches, used particularly in the United Kingdom, look more closely at how identities relate to emotions, anxieties, and subconscious desires.[4] Bibby (2010) states that psychoanalytic theories can provide "different sets of metaphors and give attention to the difficult bits: the fears and anxieties, the fantasies and desires, the loves and hates, the less than rational and the strange logics of our passions and our unconsciouses" (p. 3). Researchers in mathematics education draw concepts from psychoanalytic theory and method and apply them to an understanding of narratives or classroom interactions. Concepts utilized in this work include defenses and defense mechanisms, psychic reality, the unconscious, and "mirroring" (Bibby, 2010; Black et al., 2009).

Psychoanalytic approaches to understanding mathematics identity have some points of connection with sociocultural theories. For instance, consider the psychoanalytic concept of psychic reality. Psychoanalysts use the term to describe our interpretation of, and conscious and unconscious responses to, the world around us (Bibby, 2010). Our psychic reality is both internal and external. It is shaped by, and shapes, our experiences with the world. Bibby quotes Frosh and Baraitser (as cited in Bibby, 2010) to say that psychic reality is "what the subject *lives in*" (p. 8, emphasis in original). This suggests the psychic reality may be akin to a figured world (Holland et al., 1998). The difference is that psychic reality is more individually focused, with an emphasis on how individual people interpret the world around them, whereas figured worlds are broadly shared storylines about our lived experiences.

Another point of connection is the psychoanalytic concept of mirror, which echoes positioning theory. Bibby (2010) draws from Lacan, who argues that we use our interactions with others as a kind of mirror: the way others treat us shows us who they see, who they think we are. In the classroom, teacher assessments and interactions with peers function as a mirror that students have to integrate into their sense of self: "We come to recognise and make sense of ourselves by looking to others for the mirror-functions they provide" (Bibby, 2010, p. 32). Methodologically, analyses of mirror can look strikingly similar to positioning analyses, with perhaps a sharper focus on emotional responses to classroom interactions: the pleasure of being mirrored as good or clever, the shame and humiliation of being mirrored as ignorant. This enables a view of identity development that goes beyond the here and now of the mathematics classroom to consider human longing, desire, and shame.

For example, Black et al. (2009) present a psychoanalysis of three of the authors' mathematical autobiographies. They point out how the construction of "mathematical ability" in school led these three authors to anxiety, despite their high mathematical achievement. This anxiety led the women to construct a series of defenses: replacing the old self with a new self that held a new relationship to mathematics; using mathematics as a way to build relationship with others (in one case, with her father); and compensating with success in other, related fields. These analyses focus on the drives for connection that interact with "phantasies" of mathematics to "provide us with ways to support our sense of self" (p. 14).

Relationships Between Individual and Social Identities

We focus here on a subsection of mathematics education research on identity that explicitly connects individual identity development with social membership identities such as race, gender, and language. This connection is typically framed in relation to a sociopolitical stance on social identities. These researchers argue that if sociopolitical structures are left unaddressed, school mathematics privileges heteronormativity (Esmonde, 2011), masculinity (Langer-Osuna, 2011; Mendick, 2006; Solomon, 2007), whiteness (Russell, 2012; Varelas, Martin, & Kane, 2012), wealth (Esmonde, 2014), the dominant language (Moschkovitch, 2010), and its intersections (Esmonde & Sengupta-Irving, 2015). For example, one classroom case study found that peers positioned displays of authority by a boy positively, whereas the same peers rejected displays of authority by a girl, ultimately leading to her marginalization in the group (Langer-Osuna, 2011). This analysis illuminates ways that identities of power were not equally available to all students in a given classroom. This lack of access to powerful mathematics identities was not an explicit choice by the teacher and may not have been a conscious choice by the students; rather, the intersecting identities of powerful student and African American girl created tensions that served to shape how her performance of power—in this case, her role as group leader who issued directives—was interpreted and responded to by others.

In this section, we review the theoretical basis for research that coordinates mathematics-linked individual

identities with social identities such as race, gender, and language. As we mapped the theoretical space of research that coordinates identity development across individual and social identities, we considered only research that theorizes these social memberships as changeable, influenced by others, and multiple. We therefore do not focus on bodies of research that use the word identity to refer to social memberships but that do not theorize identity shifts. For example, the vast body of research on stereotype threat in social psychology considers how a person's race, gender, and affiliation with mathematics influence achievement on experimental tests (see, e.g., Gresky, Ten Eyck, Lord, & McIntyre, 2005; Schweinle & Mims, 2009; Spencer, Steele, & Quinn, 1999; Steele, Spencer, & Aronson, 2002; Tagler, 2012; Tine & Gotlieb, 2013; Tomasetto, Alparone & Cadinu, 2011). Although this research offers critically important insights into how social memberships matter in educational environments, it cannot explain how these social memberships are coconstructed with individual identity development. Further, much of the research related to mathematics learning is also hampered by an overwhelmingly binary view of race and gender. Research typically categorizes gender as either/or, and race as a set of checkboxes, rather than social constructs to which people have relationships. The two of us (Langer-Osuna and Esmonde), for example, have very different gender identities (and specifically, relationships to the category woman), despite both being designated girls at birth. Likewise, the racial identity of one of us (Langer-Osuna) shifts in relation to particular geographic locations, where local definitions of whiteness sometimes explicitly include or reject her and sometimes remain ambiguous and tenuous. The complexity of our social memberships and how they change over time and location is not captured in research that considers social identities to be simple binaries. Analytic methods and theoretical frameworks that take this complexity into account enable insights that matter when applying this work across various communities.

Another theoretical frame that is frequently drawn into mathematics education research concerned with social identities is critical race theory (Martin, Anderson, & Shah, 2017, this volume; Stinson & Walshaw, 2017, this volume). Rather than a theory of racial identity, however, critical race theory is a theory of race and racism in the United States and how institutional structures are shaped by social constructs around race (Ladson-Billings & Tate, 1995). Again, the complexity of individual relationships to race and how these relationships change over time or place—key concerns in theories of identity—are typically not explicitly considered. Thus, stereotype threat theory or critical race theory could be *drawn into* a study of identity to help highlight some aspects of social membership, but they are not themselves theories of identity.

Therefore, in this section we discuss how researchers coordinate theories of identity development with a variety of sociopolitical frames or insights as a way to consider how individual and membership identities are coconstructed. To illustrate how this is done, we offer two examples: one that draws from critical race theory and one that draws from feminist queer theory (e.g., Esmonde, Takeuchi, & Dookie, 2012). In the sections that follow, we elucidate which theories of identities are used and how they are understood in light of sociopolitical perspectives. We note again that the review above drew distinctions across the four theoretical perspectives—poststructural/discursive, positional, narrative, and psychoanalytic—for the purposes of clarity. Indeed, many scholars draw upon more than one approach in their work. In the discussion below, we note when multiple approaches are used and the insights careful conceptual coordination can offer.

Theorizing Racial Identity and Mathematics

From a narrative perspective, research focused on identity highlights ways in which the process of belonging to mathematics can organized by race. At times, identities of nonparticipation in mathematics are chosen for learners, as exemplified in Martin's (2006) interviews with African American adults. When these adults reflected on their experiences as learners in K–12 schools, they reported many instances of being ignored, criticized, or pushed into low-track mathematics classes despite interest and achievement in mathematics. Some learners internalized these stories and began to believe that they were not smart enough for mathematics; others recognized the racism in the way they were treated but were not able to change the stories others told about them. Berry (2008) offers stories of mathematically successful African American boys that highlight racialized experiences that served as possible obstacles, as well as support systems.

Varelas et al. (2012) offer the content learning and identity construction framework (CLIC) as a way to examine African American mathematics learning identities by focusing on the intersection between disciplinary identities as doers of mathematics, racial identities as African Americans, and academic identities as participants in academic tasks and classroom practices. The CLIC framework coordinates both narrative and positional perspectives on identity with critical, sociopolitical insights.

That is, identity is conceived as a set of stories (Sfard & Prusak, 2005) and as performances within figured worlds (Holland et al., 1998). Concepts from critical race theory are then used to frame the construction of identity in a country (the United States) where the racialized social hierarchy is embedded within social structures at every level (Martin, 2013). This coordination of perspectives enables analytic interconnections between three types of identity: (1) disciplinary identity (e.g., identity with respect to mathematics), (2) racialized identity, and (3) academic identity (i.e., identity as a school student). All three identities are shown to influence one another in various ways. The framework emphasizes what Sfard and Prusak call "designated identities" and what Holland et al. (1998) call "figured identities." Designated or figured identities arise when other people have expectations about the identities we will or should achieve. Racial stereotypes influence these expectations in pernicious ways.

Drawing from their analyses using CLIC, Varelas et al. (2012) argue that educators can encourage positive connections across identities by supporting the following student actions: (*a*) reflecting on their engagement in disciplinary practices, (*b*) imagining and presenting themselves doing mathematics in and out of school as well as later in life, and (*c*) considering similarities and differences between themselves and professional and disciplinary practitioners. The CLIC framework focuses on, but is not limited to, racialized identities and can be used intersectionally to consider more than one membership identity at once (e.g., race and gender; Gholson & Martin, 2014).

Theorizing Gender and Mathematics

Research on gender and mathematics has often taken a binary view of gender, and even a deficit view of girls (Esmonde, 2011; Lubienski & Ganley, 2017, this volume). However, there is a small body of research that takes up narrative, poststructural, and psychoanalytic theories to investigate the relationship between gender and school mathematics. For example, Rodd and Bartholomew (2006) studied young women undergraduate mathematics students and found that the women were in an identity conundrum, constructing identities in which they were simultaneously invisible (unnoticed by the men, both students and professors) and special (highly visible and seen as unique). This conundrum contributes to the phenomenon that Solomon et al. (2011) describe, in which many young women develop "fragile identities" with respect to mathematics; these identities are apt to change at a moment's notice when the women are judged by others.

To understand the myriad ways gender relates to mathematics, Mendick (2006) turns to feminist queer theory to inform her understanding of mathematical identity, "key elements of [which] are that gender is something we do, not something we are, and that masculinity and femininity are constructed in opposition to each other, with maths firmly fixed on the masculine side of the divide" (p. 1). Mendick's interviews with adolescent mathematics learners revealed conceptions of mathematics as ordered, logical, structured, authoritative, and reliable. These are all qualities that have, in the West, been associated with men and masculinity. Therefore, to do mathematics well is akin to performing masculinity, a task that is distinctly different for people of different genders. That is, performing masculinity is no neutral or simple project. Women's performances of masculinity can be interpreted as inappropriate in mathematics classrooms (Langer-Osuna, 2011) and beyond (Brescoll, 2011).

Mendick (2006) suggests "making choices social, supporting gender transgression and opening up mathematics" (p. 2). First, making choices (to pursue mathematics or not) social means to stop considering choices as reflections of individual identity. Instead, choices are made in a social context. The choice to pursue mathematics is also heavily reliant on constructions of mathematical ability, which align with designated identities of masculinity as rational, logical, and authoritative. Second, supporting gender transgression goes well beyond approaches that characterize girls as essentially different from boys. These approaches ask girls to be more assertive (i.e., masculine), without recognizing that a girl's display of assertiveness is taken up differently than a boy's (Langer-Osuna, 2011). Instead, Mendick argues that "we need to make a wider range of [gender] subjectivities available to a wider range of people" (2006, p. 112). Finally, opening up mathematics means to acknowledge that in addition to being precise, logical, and authoritative, mathematics is also creative, intuitive, and collaborative.

Implications and Directions for Future Research

Learning mathematics is fundamentally about identity work. As stated by Wenger (1999), "Learning is a process of identity formation and, conversely, identity formation is a process of learning" (p. 143). What would students' mathematical stories, performances of identity, and emotional landscapes be like if they were based on experiences that more robustly enabled intersecting individual, membership, and mathematical identities? Supporting teachers' capacities to design such classrooms, and students' capacity to navigate them, is arguably at the heart of much of the research on mathematics-linked identities. We thus conclude with a discussion on the implications of this body of research for the *identity work*

that students and teachers engage in, as well as possible directions for new and needed research. The sections below are organized as follows: First, we discuss the implications of this body of research on the differential identity work linked to mathematics teachers and students. Second, we discuss implications for the role of power in teacher and student identity work in mathematics classrooms. Finally, we close with directions for future research.

Teacher and Student Identity Work

Research focused on either student or teacher identity in mathematics reveals insights as to how identity work is conceptualized differently for students and teachers. Teachers' agency in developing their identities is framed around a meta-awareness of choosing the kind of teacher they want to be. For instance, in narrative approaches, teachers are framed as agentive in bringing particular aspects of the professional development experience into their stories as mathematics teachers. Often, this work is meant to support connections between teachers' increased sociopolitical awareness through equity-focused professional development and their sense of themselves as teachers. In contrast, rarely are students asked to choose new identities for themselves through reflective story writing. Rather, students' agency is framed in terms of the degrees of freedom they experience in being able to intellectually engage with mathematics. The onus of the identity work lies not so much in students choosing what kind of learner they want to be reflectively and consciously, but rather in students experiencing themselves as competent mathematical thinkers and problem solvers in local interactions with collaborating others. Thus, a precursor to positive student identity work is the kind of teacher identity work that supports the creation of genuinely inclusive classrooms (Clark, Badertscher, & Napp, 2013; de Freitas et al., 2012).

Interactional or positional approaches are used far less often to understand teacher identities. Although teachers are key players in many positioning analyses that focus on students, the body of work to date does not tend to consider how classroom interactions contribute to teachers' identity development (for an exception, see Walshaw, 2008). Analyses of teacher positional identities in the classroom could shed new light on how the context of teachers' work within particular schools, districts, or policy climates shape teachers' practices in school mathematics, and so their identities. Further, students' uptake or resistance to particular instructional approaches are critical shapers of teachers' identities. Where students seem to succeed, teachers are positioned as competent; where students collectively struggle or resist particular kinds of activity, teachers are positioned as incompetent. These acts of positioning may shape how teachers take up new instructional practices. This seems particularly important given that teachers are expected to engage students in cognitively complex forms of mathematical thinking, which students, at least initially, may resist and which, by design, students struggle through.

The Role of Power in Identity Work

A related implication of this body of work is that students' and teachers' identity work is organized around relationships of power and those relationships of power are connected to a sense of belonging to mathematics. Stories students tell about mathematics highlight the struggle to belong and can pinpoint consequential events in a person's life course that shaped a long-lasting relationship to mathematics. Positional perspectives, and in particular, analyses of classroom positioning, enable insight into the workings of power in the moment-to-moment and longer term construction of identities as learners. In mathematics classrooms, relationships of power include who holds the mathematical authority, and who is positioned as competent (Dunleavy, 2015; Gresalfi & Cobb, 2006; Gresalfi et al., 2009). For example, Gresalfi et al. (2009) argue that competence is not an individual attribute but rather emerges out of participation in classroom activity systems. Classroom activities that offer multiple possible ways to engage in mathematics while holding students accountable for making sense of their own and peers' ideas can serve to position students with mathematical authority and forms of competence (Gresalfi et al., 2009). For instance, in Boaler and Humphreys (2005), a middle school mathematics teacher asks students to explain the logic behind common mistakes, inquires as to whether students understand a peer's mathematical ideas, and names students as authors of different problem-solving methods. All these moves serve to position a range of students, including those who made errors, as contributors to collective and productive mathematical sense making. Likewise, students' opportunities to author, justify, and debate mathematical ideas position them with mathematical authority. These subject positions, when experienced over time, support the construction of mathematics-linked identities that include belonging and a sense of intellectual power.

Although this work has begun to show how mathematics classrooms might be designed to foster powerful positional identities, we also need studies that illuminate the differential consequences when students from stereotyped groups speak out, take up leadership roles, offer

help, and otherwise claim these positions of mathematical power. How could classroom contexts be designed to frame aspects of social identities in ways that enable positive mathematics identity work? As an illustrative example, in many parts of the United States, the Spanish language is often framed as a less academic language than English by virtue of not being the dominant language of instruction. Turner, Dominguez, Maldonado, and Empson (2013) illuminate the positional identity work of teachers and students in a mathematics-learning context where not only were mathematical activities designed in ways that enabled greater mathematical authority among students, but also the Spanish language was explicitly framed as a language of mathematical work on a par with English. Students relied on one another both to author and debate mathematical ideas and to translate for one another, creating a dynamic Spanish-English bilingual space. Mathematical work was centered on both languages. This enabled typically silenced Spanish speakers to contribute to the collective work and monolingual English speakers to experience their Spanish-speaking peers' mathematical competence and respond to their ideas. The learning context was designed for both robust learning and powerful mathematical identities for all learners.

Moving Forward: Directions for Future Research

There are great possibilities ahead. We close with some suggestions that we believe will be helpful in moving forward. First, researchers studying identity in mathematics education must more clearly communicate which theoretical frameworks and analytic methods are used in their work. Clearer communication about the theories and methods we bring to this work will enable our field to recognize which ones are best suited to answer particular kinds of questions and have implications for particular areas of practice. Second, the development of mathematics-linked individual and membership identities both need to be further theorized and studied. These theories should reflect greater integration of sociopolitical insights.

Methodologically, coordinating individual and membership identity development remains a challenge. Narrative approaches are better suited to capture common experiences across particular groups of people, as well as how students and teachers make meaning of their social experiences with mathematics. Discursive and positional approaches can shed light on mechanisms at play—how students and teachers negotiate their identities in situ as local and structural forces act upon them. These approaches have the potential to work well together. Additionally, we see a need for further theorizing and methodological advances to guide our field in understanding and designing learning contexts that centrally take into account the process of becoming mathematics teachers and learners.

Notes

1. Black et al. (2009) posit these four approaches as three, folding positional and narrative approaches to identity into a single sociocultural category and contrasting with discursive and psychoanalytic. We have decided to distinguish between the two sociocultural approaches because they draw from different methodologies and make different claims about identity, how it develops, and why it is important.

2. Figured worlds are the socially constructed and historically situated storylines that shape both possible actions by individuals and how those actions are interpreted by others. Figured identities are the available subject positions offered within particular storylines. For example, in the figured world of schooling, the figured identities of teacher and student are available. The actions of individuals, say, issuing an order, are interpreted through the available storyline. A teacher issuing an order to students is interpreted as appropriate, whereas a student issuing an order to teachers is interpreted as a breach of conduct. The socially constructed and historical nature of figured worlds is evidenced through local differences and temporal shifts in the storylines themselves. For example, today's classrooms might interpret a student issuing an order to peers as an appropriate element to student-led collaborative work, signaling broader, historical shifts in the figured world of schooling. Yet, these interpretations vary across local settings, where particularly progressive schools and more authoritarian "no excuses" schools contrast sharply on their interpretations of student actions that signal student authority.

3. We follow research in this area by denoting some acts of positioning and identities as "positive" and others as "negative." Although, strictly speaking, we cannot assess the value of an act of positioning or an identity, the literature generally refers to acts of positioning that frame a student as competent or worthy as positive and identities that include an appreciation for the value of mathematics as positive.

4. As Valero (2009) points out, psychoanalytic studies in mathematics education seem to rarely use the word "identity," preferring instead "relationship." For ease, we use the term identity throughout this section, although recognizing that in this theory, more so than the others discussed in this chapter, it is not the preferred term.

References

Adams, G. (2013). Women teachers' experiences of learning mathematics. *Research in Mathematics Education, 15*(1), 87–88.

Akkoç, H., YeÎildere-Ðmreb, S., & Ali Balkanlıo°luc, M. (2014). Examining professional identity through story telling. *Research in Mathematics Education, 16*(2), 204–205.

Bartholomew, H., Darragh, L., Ell, F., & Saunders, J. (2011). "I'm a natural and I do it for love!": Exploring students' accounts of studying mathematics. *International Journal of Mathematical Education in Science and Technology, 42*(7), 915–924.

Battey, D., & Franke, M. L. (2008). Transforming identities: Understanding teachers across professional development and classroom practice. *Teacher Education Quarterly, 35*(3), 127–149.

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.

Bibby, T. (2010). *Education—An "impossible profession"?: Psychoanalytic explorations of learning and classrooms.* New York, NY: Routledge.

Black, L., Mendick, H., Rodd, M., & Solomon, Y. (2009). Pain, pleasure and power: Selecting and assessing defended subjects. In L. Black, H. Mendick, & Y. Solomon (Eds.), *Mathematical relationships in education: Identities and participation* (pp. 19–30) London, United Kingdom: Routledge.

Boaler, J. (2002a). *Experiencing school mathematics: Traditional and reform approaches to teaching and their impact on student learning.* New York, NY: Routledge.

Boaler, J. (2002b). Paying the price for "sugar and spice": Shifting the analytical lens in equity research. *Mathematical Thinking and Learning, 4*(2–3), 127–144.

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.

Boaler, J., & Humphreys, C. (2005). *Connecting mathematical ideas: Middle school video cases to support teaching and learning* (Vol. 1). Portsmouth, NH: Heinemann Educational Books.

Boaler, J., & Staples, M. (2008). Creating mathematical futures through an equitable teaching approach: The case of Railside School. *Teachers College Record, 110*(3), 608–645.

Brescoll, V. (2011). Who takes the floor and why: Gender, power, and colubility in organizations. *Administrative Science Quarterly, 56*(4), 622–641.

Clark, L., Badertscher, E., & Napp, C. (2013). African American mathematics teachers as agents in their African American students' mathematics identity formation. *Teachers College Record, 115*(2), 1–36.

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.

Davies, B., & Harré, R. (1999). Positioning and personhood. In R. Harré & L. van Langenhove (Eds.), *Positioning theory: Moral contexts of intentional action* (pp. 32–52). Malden, MA: Blackwell.

de Freitas, E., Wagner, D., Esmonde, I., Knipping, C., Lunney Borden, L., & Reid, D. (2012). Discursive authority and sociocultural positioning in the mathematics classroom: New directions for teacher professional development. *Canadian Journal of Science, Mathematics and Technology Education, 12*(2), 137–159.

Dunleavy, T. K. (2015). Delegating mathematical authority as a means to strive toward equity. *Journal of Urban Mathematics Education, 8*(1), 62–82.

Engle, R. A., Langer-Osuna, J., & McKinney de Royston, M. (2014). Towards a model of influence in persuasive discussions: Negotiating quality, authority, and access within a student-led argument. *Journal of the Learning Sciences. 23*(2), 245–268.

Esmonde, I. (2009). Mathematics learning in groups: Analyzing equity in two cooperative activity structures. *The Journal of the Learning Sciences, 18*(2), 247–284.

Esmonde, I. (2011). Snips and snails and puppy dog tails: Genderism and mathematics education. *For the Learning of Mathematics, 31*(2), 27–31.

Esmonde, I. (2014). "Nobody's rich and nobody's poor … It sounds good, but it's actually not": Affluent students learning mathematics and social justice. *Journal of the Learning Sciences, 23*(3), 348–391.

Esmonde, I., & Sengupta-Irving, T. (2015, April). Leveraging feminist theory to disrupt gendered mathematics teaching and learning: Classroom perspectives. Paper presented at the Research Conference of the National Council of Teachers of Mathematics, Boston, MA.

Esmonde, I., Takeuchi, M., & Dookie, L. (2012). Integrating insights from critical race and queer theories with cultural-historical learning theory. In *Proceedings of the 10th International Conference of the Learning Sciences* (*ICLS 2012*)—*Volume 2* (pp. 491–492). Sydney, Australia: International Society of the Learning Sciences.

Foucault, M. (1982). The subject and power. *Critical inquiry, 8*(4), 777–795.

Frosh, S., & Baraitser, L. (2008). Psychoanalysis and psychosocial studies. *Psychoanalysis, Culture & Society, 13*(4), 346–65.

Gholson, M., & Martin, D. B. (2014). Smart girls, black girls, mean girls, and bullies: At the intersection of identities and the mediating role of young girls' social network in mathematical communities of practice. *Journal of Education, 194*(1), 19–34.

Gresalfi, M. S., & Cobb, P. (2006). Cultivating students' discipline-specific dispositions as a critical goal for pedagogy and equity. *Pedagogies, 1*(1), 49–57.

Gresalfi, M., Martin, T., Hand, V., & Greeno, J. (2009). Constructing competence: An analysis of student participation in the activity systems of mathematics classrooms. *Educational Studies in Mathematics, 70*(1), 49–70.

Gresky, D. M., Ten Eyck, L. L., Lord, C. G., & McIntyre, R. B. (2005). Effects of salient multiple identities on women's performance under mathematics stereotype threat. *Sex Roles, 53*(9–10), 703–716.

Holland, D., Lachicotte, D., Jr., Skinner, D. D., & Cain, C. (1998). *Identity and agency in cultural worlds.* Cambridge, MA: Harvard University Press.

Ladson-Billings, G., & Tate, W., IV. (1995). Toward a critical race theory of education. *Teachers College Record, 97*(1), 47–68.

Langer-Osuna, J. (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. *Canadian Journal of Science, Mathematics and Technology Education, 11*(3), 207–225.

Langer-Osuna, J. (2015). From getting "fired" to becoming a collaborator: A case on student autonomy and the co-construction of identity and engagement in a project-based mathematics classroom. *Journal of the Learning Sciences, 24*(1), 53–92.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, MA: Cambridge University Press.

Lubienski, S. T., & Ganley, C. M. (2017). Research on gender and mathematics. In J. Cai (Ed.), *Compendium for research in mathematics education* (pp. 649–666). Reston, VA: National Council of Teachers of Mathematics.

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: Lawrence Erlbaum.

Martin, D. B. (2006). Mathematics learning and participation as racialized forms of experience: African American parents speak on the struggle for mathematics literacy. *Mathematical Thinking and Learning, 8*(3), 197–229.

Martin, D. B. (2013). Race, racial projects, and mathematics education. *Journal for Research in Mathematics Education, 44*(1), 316–333.

Martin, D. B., Anderson, C. R., & Shah, N. (2017). Race and mathematics education. In J. Cai (Ed.), *Compendium for research in mathematics education* (pp. 607–636). Reston, VA: National Council of Teachers of Mathematics.

Mendick, H. (2006). *Masculinities in mathematics.* Maidenhead, United Kingdom: Open University Press.

Moschkovich, J. N. (2010). *Language and mathematics education: Multiple perspectives and directions for research.* Charlotte, NC: Information Age.

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

Nasir, N. I. S. (2005). Individual cognitive structuring and the sociocultural context: Strategy shifts in the game of dominoes. *The Journal of the Learning Sciences, 14*(1), 5–34.

Rodd, M., & Bartholomew, H. (2006). Invisible and special: Young women's experiences as undergraduate mathematics students. *Gender and Education, 18*(1), 35–50.

Russell, N. M. (2012). Classroom discourse: A means to positively influence mathematics achievement for African American students. *Curriculum and Teaching Dialogue, 14*(1–2), 35.

Schweinle, A., & Mims, G. A. (2009). Mathematics self-efficacy: Stereotype threat versus resilience. *Social Psychology of Education, 12*(4), 501–514.

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.

Solomon, Y. (2007). Not belonging? What makes a functional learner identity in undergraduate mathematics? *Studies in Higher Education, 32*(1), 79–96.

Solomon, Y., Lawson, D., & Croft, T. (2011). Dealing with "fragile identities": Resistance and refiguring in women mathematics students. *Gender and Education, 23*(5), 565–583.

Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology, 35*(1), 4–28.

Steele, C. M., Spencer, S. J., & Aronson, J. (2002). Contending with group image: The psychology of stereotype and social identity threat. *Advances in Experimental Social Psychology, 34,* 379–440.

Stinson, D. W. (2013). Negotiating the "white male math myth": African American male students and success in school mathematics. *Journal for Research in Mathematics Education, 44*(1), 69–99.

Stinson, D. W., & Walshaw, M. (2017). Exploring different theoretical frontiers for different (and uncertain) possibilities in mathematics education research. In J. Cai (Ed.), *Compendium for research in mathematics education* (pp. 128–155). Reston, VA: National Council of Teachers of Mathematics.

Tagler, M. J. (2012). Choking under the pressure of a positive stereotype: Gender identification and self-consciousness moderate men's math test performance. *The Journal of Social Psychology, 152*(4), 401–416.

Teixeira, B. R., & Cyrino, M. C. D. C. T. (2014). O estágio de observação e o desenvolvimento da identidade profissional docente de professores de matemática em formação inicial [Classes observations and the development of preservice mathematics teachers' professional identity]. *Educação Matemática Pesquisa. Revista do Programa de Estudos Pós-Graduados em Educação Matemática, 16*(2), 599–622.

Tine, M., & Gotlieb, R. (2013). Gender-, race-, and income-based stereotype threat: The effects of multiple stigmatized aspects of identity on math performance and working memory function. *Social Psychology of Education, 16*(3), 353–376.

Tomasetto, C., Alparone, F. R., & Cadinu, M. (2011). Girls' math performance under stereotype threat: The moderating role of mothers' gender stereotypes. *Developmental Psychology, 47*(4), 943–949.

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, 44*(1), 199–234.

Valero, P. (2009). What has power got to do with mathematics education. In P. Ernest, B. Geer, & B. Sriraman (Eds.), *Critical issues in mathematics education,* (pp. 237–254). Charlotte, NC: Information Age.

Varelas, M., Martin, D. B., & Kane, J. M. (2012). Content learning and identity construction: A framework to strengthen African American students' mathematics and science learning in urban elementary schools. *Human Development, 55*(5), 319–339.

Wager, A. A., & Foote, M. Q. (2013). Locating praxis for equity in mathematics lessons from and for professional development. *Journal of Teacher Education, 64*(1), 22–34.

Walshaw, M. (2008). Developing theory to explain learning to teach. In T. Brown (Ed.), *The psychology of mathematics education: A psychoanalytic displacement* (pp. 119–138). Rotterdam, The Netherlands: Sense.

Walshaw, M. (2013). Explorations into pedagogy within mathematics classrooms: Insights from contemporary inquiries. *Curriculum Inquiry, 43*(1), 71–94.

Wenger, E. (1999). *Communities of practice: Learning, meaning, and identity.* Cambridge, MA: Cambridge University Press.

Williams, J. (2011). Teachers telling tales: The narrative mediation of professional identity. *Research in Mathematics Education, 13*(2), 131–142.

Wood, M. B. (2013). Mathematical micro-identities: Moment-to-moment positioning and learning in a fourth-grade classroom. *Journal for Research in Mathematics Education, 44*(5), 775–808.

Wortham, S. E. F. (2006). *Learning identity: The joint emergence of social identification and academic learning.* Cambridge, MA: Cambridge University Press.