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EXPLORING THE NARRATIVELY-CONSTRUCTED MATHEMATICAL IDENTITIES OF LATINA BILINGUAL MIDDLE SCHOOL STUDENTS

ABSTRACT

This study involved exploring the mathematics stories of two first-generation fluent English proficient (FEP) seventh grade Latina students. The mathematics stories of a caregiver for each student and their mathematics teacher were also explored. A primary goal for this project was to understand the factors that attributed to the formation of the young girls' mathematical identities and how these identities informed their decisions to engage with mathematical activity through narrative inquiry. The results from the study showed that the mathematical identities students created were influenced by the messages they perceived were narrated by their primary caregivers and their mathematics teacher. Students used these relationships as a way to read their mathematics classrooms and make decisions regarding their level of engagement with mathematical activity.

Introduction

Students' mathematics scores on standardized assessments are often used in placement decisions which determine both students' access to advanced coursework in mathematics, as well as their admission to colleges and universities, and ultimately career selections. Yet, Latin@ (see note at end of section) students continue to underperform on these achievement measures, and are therefore underrepresented in advanced mathematics courses and degree programs as well as mathematics related careers when compared to their White and Asian peers in the United States (NCES, 2008, NAEP, 2011). Thus, attention to students' mathematical identities is important work as the identities that students create within their mathematics classrooms have the potential to illuminate how students make sense of their mathematical experiences and then make choices about how to act in relation to them.

This study involved exploring the mathematics stories of two, first-generation adolescent fluent English proficient (FEP) Latina students who attended an urban middle school in the southwestern United States. In this study, the mathematics stories of one primary caregiver for each student as well as that of their mathematics teacher were also explored. The goal for this study was to understand the factors that attributed to the formation of the young girls' mathematical identities and how these identities informed their decisions to engage with or disengage from mathematical activity. At the same time, this study sought to illuminate how middle school FEP Latina students constructed their mathematical identities and the nonmathematical influences such as relationships at home and in school that informed these identities. From this perspective, students are engaged in interpretive work with respect to these relationships, and this work is critical for making connections to mathematical contexts and constructing meaning. Furthermore, although studies that connect identity and mathematics

learning are increasing), there are few studies that examine students' construction of their mathematical identities through narrative inquiry and, in particular, middle school FEP Latina students' mathematical identities. By expanding mathematics scholarship to include students' mathematical identities, researchers are able to consider the extent to which students, as members of particular groups, have come to develop a relationship with and come to value mathematics. Researchers are also able to consider how mechanisms and relationships outside of the mathematics classroom contribute to students' mathematical identities.

Additionally, Latin@ students, in general, tend to have poor attendance records, low test scores, high drop-out rates, and small numbers of these students attending college. Research has long indicated that Latin@ students often encounter unpleasant and ill-equipped learning environments coupled with insufficient instructional materials and ineffective teachers (Anyon, 1997; Conchas, 2001; Orfield, 1998; Trueba, 1998). These are all testaments to schools' failure to meet their needs. I argue that by examining through narrative identity inquiry how Latina students construct their mathematical identities, wider understanding of how to support this particular growing student population with higher levels of mathematics achievement can be realized even though they may be faced with challenging learning environments.

A Note

I use the term Latin@ to remain consistent with the new terminology recently used in the research literature and to be more inclusive of gender diversity among Latinas/os.

Narrative Identity & Mathematical Identity Studies

This study is framed by prior research in the area of narrative identity inquiry and mathematics learning (Black, Williams, Hernandez-Martinez, Davis, Pampaka, & Wake, 2010; Sfard & Prusak, 2005). Narrative identity inquiry focuses on questions of how individuals seek to

make meaning of their lives, both how they understand themselves as unique individuals and as social beings who are multiply defined by gender, ethnicity, class, and culture. At the core of these efforts regarding self-understanding is the role of the narrative. To understand the identity formation process is to understand how individuals craft narratives from experiences, tell these stories internally and to others, and ultimately apply these stories to their knowledge of self, others and the world in general. The aim of narrative as a research tool is to build understanding of why humans conduct themselves (Bruner, 1994). As a result, narrative identity inquiry allows for a more cogent understanding of how middle school FEP Latina students' form their mathematical identities.

Bruner's work emphasized the significance of narrative both in constructing how we come to understand ourselves in relationship to the world and in regards to the realities we operate in. Bruner's (1994) ways of thinking and knowing serves as an important starting point for the use of narrative as a research tool. According to Bruner, people manage and organize their knowledge of the world in two distinct ways: logical-scientific and narrative modes of thought. The first seems applicable for thinking about physical objects while the second seems appropriate for thinking about people and how they make sense of their lives. Gee (1999) also argued that narratives are important sense-making mechanisms that utilize cultural models and situated meanings in order to construct socially situated identities. Thus, using a narrative identity framework that draws attention to the identities that students create within their mathematics classrooms has the potential to illuminate how students make sense of their mathematical experiences and then make choices about how to act in relation to them.

Research in mathematics education has begun to use identity as a research construct in an effort to better understand the relationship between students' decisions to engage with mathematical activity and the construction of students' mathematical identities (Bishop, 2012; Black, et al., 2010; Boaler & Greeno, 2000; Cobb, Gresalfi, Hodge, 2009; de Abreu, 1995; Gutstein, 2002a, 2002b; Martin, 2000; Nasir, 2002, Sfard & Prusak, 2005; Turner, Dominguez, Maldonado & Epson, 2013; Wood, 2013). The identities that students bring into the classroom intersect with those available while engaged in mathematics and the mathematical identities that students construct are affected by the ways they interpret current situations through the lenses of previous experiences and identities. Thus, the responsibility for interpreting the relevance of a given task, assigning meaning to a particular practice or deciding how to engage lies with both the students in addition to the teacher and the curriculum.

Sfard and Prusak (2005) defined identity as a collection of narratives that are discursive. They contended that one's identity is the actual narrative itself as it is through discourse that an individual's identity is shaped, negotiated and people position themselves and are positioned by others. From this perspective, learning goes beyond simply constructing new and flexible understanding. It entails becoming a different person with respect to the practices and modes of interaction dictated by an individual's learning environment. Thus, the ways students talk and interact with each other can significantly influence who they are, and the potential they have to become with respect to mathematics.

Boaler & Greeno (2000) examined through interviews the compatibility between students' mathematical identities and classroom mathematics practices in an effort to better understand how the alignment between the identities available to students in their secondary mathematics classrooms and their personal identities supported their participation and learning.

They found that the students in both the United States and the United Kingdom classrooms where the teachers encouraged individual work that these students unanimously described mathematics as a procedural, rule-bound subject that was absolute and concrete with only one right answer. As a result, the students wanted to be successful at mathematics but they did not want to be successful mathematicians. This study supports my assumption that in-school experiences are important because they shape how students think about themselves as mathematics learners.

Martin's (2000) ethnographic study argued that factors such as socio-historical, socioeconomic, community, and family coupled with elements such as school, classroom, curriculum and peer groups must be studied in context in order to fully understand mathematics learning for African-American youth and how they construct their mathematical identities. His attention to the intersection of ethnic identity with students' mathematical identities is an important one because it acknowledges the culture inherently created in all learning communities (Cobb & Hodge, 2002). Martin (2000) contended that by ignoring culture a critical component of students lived experiences was ignored as students used their cultural contexts to shape their identities. This means that out-of-school relationships matter for how students think about themselves as mathematics learners. Additionally, his framework's inclusion of community and family influences as data sources reflects and reinforces my assumptions that students sometimes use non-mathematical influences in the construction of their mathematical identities such as the relationships students have outside of school.

Cobb, Gresalfi, and Hodge (2008) proposed an interpretive scheme for analyzing students' identities developed in mathematics classroom. They compared and contrasted middle school students' forms of agency in two mathematics classrooms where knowing and doing

mathematics significantly differed. In one classroom, the teacher's instructional routine for supporting students' learning typically involved reviewing homework, modeling procedures for solving new types of math problems and then assigning similar problems for homework. In the design experiment classroom, the teacher took an investigative approach to engaging students in a conceptual understanding of important mathematics. They found that the identities students developed in relation to mathematics significantly differed between the two algebra classes. In the first classroom, students needed to identify with a form of mathematical activity that did not encourage the students to exercise high level of disciplinary agency. This contrasted with the identities the students in the second classroom formed which allowed them to exhibit a high level of conceptual agency as they investigated important mathematical ideas. Like the Boaler and Greeno (2000) study, this study demonstraed how teacher moves and instructional descions can signficantly impact students' mathematical identities.

Black et al. (2010) opted to use narrative analysis as a way to explore how students engaged in the process of reconstructing the "self" as they reflected on their mathematics experiences during the interview process. Their study drew on cultural historical activity theory to explore the narratives students told regarding leading activities that influenced the construction of students' leading identities relative to mathematics. They found that the students' leading identities were crucial to the way they narrated they related to mathematics.

More recently, Wood (2013) focused her study on mathematical identity by using positioning theory. She demonstrated how mathematical identities can shift in significant ways in response to minor changes in the learning context. She showed that a student might be in one moment engaged in an identity that negates learning and then in another moment engaged in an academic identity that promotes learning. This study supports my position that young students

have mathematical identities that are fluid, constantly shifting and changing depending on the context in which the learning is taking place.

Theoretical Framework

Sfard's and Prusak's (2005) contended that narrative identity serves as a conceptual link between the individual and the collective as a unique salient property of identity is its power to shape human action. Identity is the intersection of the individual and the collective as the individual influences the collective and vice versa. Sfard and Prusak (2005) defined identity as "collections of stories about persons" (p. 16) and claimed that "the adherent of the narrative perspective is interested in the stories as such, accepting them for what they appear to be: words that are taken seriously and that shape one's actions" (p. 21). In other words, an individual's mathematical identity is manifested when she tells stories about her relationship to mathematics. Sfard and Prusak (2005) argued that an individual's mathematical identity describes the relationship of a person to mathematics which can be expressed through narratives that are reifying, significant and endorsable. This means that a person's mathematical identity is always under construction. Moreover, Sfard and Prusak (2005) described narrative identity as: *the relationship between the act of identifying and other human activities*. They based the above definition on the idea that identities are stories or narratives that create visions of one's own experiences or visions of other people's experiences. In other words, an individual's narrative *is* that person's identity (Sfard & Prusak, 2005).

In relation to narrative identity inquiry, reification is the act of replacing sentences about processes and actions with statements about states and objects. For example, "a student unsatisfied with her progress in mathematics is likely to reify herself as a terrible mathematics student or a slow learner (Sfard, 2008). Reifying statements about an individual are recognized

through the use of verbs such as *be*, *have* or *can*, and with the adverbs *always*, *never*, *usually*, which stress a person's repetitiveness of actions. A story about a person is considered *endorsable* if the narrator considers the narrative to accurately reflect the "state of affairs in the world", and a narrative is regarded as *significant* if any change, more than likely, will affect the narrator's feelings about the identified individual (Sfard & Prusak, 2005).

The negotiation between multiple identities is a necessary part of the construction of students' identities. This illumination of identity as multifaceted and constructed has several implications as it excludes the belief that students come with ready-made and universal identities. Instead, the perception of identity presented in this study allows students to construct identities that are unique, relevant, meaningful and ever changing. To understand identity construction as a process of narrative is useful, because it opens up an understanding of students as active agents in their own lives and the construction of students' mathematical identities as a dynamic and changing activity (Ochs & Capps, 2001). Moreover, a focus on narrative construction illuminates how for any given moment there can be a myriad of different interpretations for the same event. For example, the same person might, at different moments, narrate the same event in very different ways and different people will narrate an experience in different ways. One experience may result in several different identities for the same person as stories are told and retold (Clandinin & Connelly, 1990; Ochs & Capps, 2001). Narrative identity inquiry illuminates these stories and sheds light on how students come to construct their own identity stories including which features of events students notice and incorporate into their identity narratives.

Actual & Designated Identities

Sfard's and Prusak's (2005) identity framework sorted narratives into two distinct categories: actual identity and designated identity. A person's actual identity consists of stories

about the actual state of affairs whereas a designated identity consists of narratives that present a state of affairs which is expected to be the case either now or in the future. Actual identities are told in present tense and are formulated as factual assertions.

Designated identities are stories told using the future tense, and are believed to have the potential to become a part of one's actual identity in the future. Designated identity stories shape the kinds of mathematical identities narrators might imagine and have the potential to influence mathematical engagement and learning at the moment by accepting or limiting an individual's capacity to learn and do. Of particular importance is the notion that designated identities that have been crafted during childhood are particularly difficult to change (Sfard & Prusak, 2005).

In Sfard and Prusak's (2005) seminal study, they examined reasons for individual students' different participation patterns. They used participant observations in order to examine the students' patterns at the moment of learning. They examined the narratives students authored about themselves to their teachers regarding who they believed they were (actual identities). They also included the students' expectations of who they would become in the future (designated identities). Their findings indicated that mathematical fluency was highly important to the immigrant students' designated identities as mathematical fluency was considered by these students to be a significant link to becoming the person they eventually wanted to be. As such, the students' designated identities were a key factor in motivating each of them to become more fully engaged in their individual mathematics learning. However, these findings significantly contrasted with the findings of the native Israelis student participants. These students simply regarded mathematics as being a necessary requirement for entrance into college and future careers. They did not consider mathematics to be an important part of their designated identities. However, mathematical fluency was critical to the immigrant students' designated mathematical

identities and was considered to be a persuasive link to the individuals they sought to become. The researchers determined that the students' mathematical identities significantly influenced their engagement with mathematical activity. In short, a student's designated mathematical identity may lead them to seek changes in their mathematical activity and, this in turn, changes their learning. Sfard's and Prusak's (2005) findings can be used to shed light on how students' ideas about their designated mathematical identities ties to their current engagement in their mathematics courses. However, their study suggested that actual and designated identities are always linked. This study pushes on this notion by illuminating that actual and designated identities do not always influence one another.

Significant Narrators

In addition to schools and classrooms, students are constantly shaping identities through the interactions they have with significant narrators. Individuals have multiple identities as different authors narrate different identities about an identified person. Significant narrators are those that own the most influential voices for the identified person, and they narrate those cultural messages that will have the greatest impact on an individual's actions (Sfard & Prusak, 2005). The mathematics teacher and one primary caregiver were significant narrators for each of the two FEP Latina students. These significant narrators narrated messages regarding the students' mathematics skills and abilities that impacted the students' actions regarding their engagement with mathematical activity.

Stories created by significant narrators can be one important source of one's designated identity. However, whether or not a story told by somebody else finds its way into an individual's own designated identity depends on how significant the storyteller is in the eyes of the identified person. Further, using students' and significant narrators' stories as a starting point

makes it more difficult for the researcher to essentialize and generalize Latin@ students' cultures, learning styles, and learning needs and to view these differences as deficits and excuses for low achievement.

Background Of The Illustrative Cases

The cases that I use to illustrate the mathematical identities narrated by the students and their significant narrators include two seventh grade students who had the same mathematics teacher during the same period of instruction. These students were selected from a larger pool of four students. The students attended an urban Title 1 middle school that was located in the southwestern part of the United Sates within a working-class Mexican-American community with a high percentage of first and second generation immigrants. The school had an enrollment of 1,033 students. Of these students, 20% were classified as ELL. This included the ELL students who had passed the state's English language assessment and were labeled FEP. Approximately, 93% of the students were classified as Hispanic. I emphasize that my purpose in documenting the factors that contributed to the formation of the students' mathematical identities is illustrative rather than evaluative.

The Students

I chose specifically to examine the construction of FEP Latina mathematical identities since the scholarship in this area has shown that gender differences in the areas of opportunity, choice, and achievement begin to emerge around the middle school years (Erikson, 1968; CCAD, 1989; Jackson & Davis, 2000). Additionally, research has shown that students who are labeled ELL consistently have lower mathematics achievement scores than their non-ELL peers (Abedi & Lord, 2001). A student's level of English language proficiency and immigrant status have also been shown to be sources of unequal educational opportunities (Wang & Goldschmidt,

2005). I wanted to glean insights the kind of instructional support FEP Latina students might need to develop positive affiliations with mathematics. Although this study focused only on two cases, their cases provided sufficient data to explore the influences regarding the development of the students' mathematical identities.

The two seventh grade Latin@ ELL student participants were identified from a group of FEP students who had been recently reclassified as fluent English proficient. I sought students who represented a range of mathematics achievement. To identify these students, I conducted one interview with the mathematics teacher to acquire her perspective on students she considered to be strong research participants and to explore her narrated actual and designated identities for the Latina FEP students she recommended. I then conducted two classroom observations in order to observe the students she recommended. From this data, I identified potential female FEP Latina students. I then purposefully chose one Latina FEP who the teacher described as being an "average" mathematics achiever, and one FEP Latina student who the teacher described as a student who tended to struggle with mathematics. In addition to the Latina FEP students, I also included one primary caregiver for each of the student's to collect data on the students' actual and designated identity as narrated by a significant third party.

The Mathematics Teacher

As with each of the students' primary caregivers, I was interested in the narratives of the students 'mathematics teacher as I sought to examine the mathematical identities of the Latina FEP students through several different lenses. I was particularly interested in how these lenses may be informing the actual and designated mathematical identities that the students narrated. The mathematics teacher who participated in the study was a middle-aged, monolingual English speaking Hispanic teacher who was part of a seventh grade team of five subject matter teachers.

She had ten years of teaching experience and struggled, like several of the other mathematics teachers at the school, with supporting students with passing both district and state mandated standardized assessments. Classroom observations indicated that her instruction tended to be teacher directed with approximately ten to fifteen minutes of group work available at the end of each class. Her overall goal was to support a range of student mathematical proficiencies. Typically, classroom instruction occurred in phases. During phase one, homework was reviewed with students and some were chosen to present their work and solutions on the whiteboard. Phase two included the teacher modeling a new procedure for solving a particular type of mathematics problem followed by two or three practice problems that students would either work on individually or with a partner. Phase three allowed some time for students to work in small groups to solve a similar set of problems together with problems not completed assigned for homework.

Data and Methods of Analysis

As part of this study, I conducted three digitally taped semi-structured interviews (Merriam, 2009) with four students to gather evidence of their actual and designated mathematical identities. I generated field notes from seven classroom observations and I collected student work artifacts such as grades, assessment scores and classwork. The classroom observations were important as Sfard and Prusak (2005) clarified that an investigation focused on the construct of identity needs to emphasize "why different individuals act differently in the same situations and why all those differences notwithstanding, there is often a distinct family resemblance between different individuals' actions" (p. 4). My goal in analyzing the data from the classroom observations was to document the students' general classroom obligations with a specific focus on the circulation of authority and the methods of agency that the two students

could reasonably exercise which might have influenced the development of the mathematical identities. Additionally, I conducted a brief exit interview with the students (three questions) immediately following the end of each classroom observation in order to gather additional data on each student's actual mathematical identity. I also conducted two semi-structured interviews (Merriam, 2009) with the mathematics teacher and one semi-structured interview (Merriam, 2009) with a primary caregiver of each student. The data illustrated here focus on two of the four students; Heidi and Genesis.

Localizing The Narrative

Educational studies are a form of experience, and narrative is a very suitable way for representing and understanding that experience. In this study, I used the narrative identity theoretical framework of Sfard and Prusak (2005) to look for evidence of each student's actual and designated mathematical identities. For Sfard and Prusak (2005), a narrative is a discursive activity that reifies the identified individual and must be endorsable and significant to the narrator. During the first phase of analysis, I looked for statements from each participant's narratives that were significant, endorsable, and reifying in order to identify a student's actual and designated mathematical identities. However, since my genre of data primarily consisted of interviews with adolescents who did not always speak in complete sentences, locating their narratives that reified each of them through *is* statements, or adverbs such as *always, never,* and *usually* was sometimes not possible. Therefore, I found it necessary to look to scholars whose narrative research work allowed me to identify each participant's narratives. The notion of narrative has a variety of different definitions stemming from its use across numerous disciplines and traditions. However, the criteria for identifying a narrative that I chose to use was pulled from researchers whose areas of research interest and data are similar to mine.

Linde (1993) recognized that life stories contained "narrative truth", and that these narrative truths may be meticulously linked, roughly similar or very far removed from historical truth. Linde (1993) noted that narrative truth is concerned with personal experience and, as such, is considered to be a representation of an actual event. From her definition of life story, Linde (1993) identified narrative as a subunit of a person's life story. A narrative then is one piece of the life story that contributes to a bigger whole. How then is a narrative identified from a life story?

Labov's (1972) contended that a minimal narrative is a series of at least two temporally sequenced clauses that are linked causally. This structural definition of narrative provided me with an additional research tool to discern what discourse was narrative and what discourse was not within each participant's larger telling of their mathematics life story. At the same time, I was still able to use Sfard's and Prusak's (2005) criteria that a narrative is reifying, endorsable, and significant. As such, I looked for verbs such as *be, have, or can* and adverbs such as *always, never, and usual* to discern a narrative from a string of discourse. When this was not possible, I looked for at least two clauses that were casually linked yet still implied a reification of the identified recipient and were significant and endorsable to the narrator.

The second phase involved a more thorough analysis of the data using a process of decontextualization (Silverstein and Urban 1996). Using this process, I looked for patterns and trends across contexts in order to create categories. I then conducted several categorical-content readings (Lieblish, Tuval-Mashiachand, & Zilber, 1998) of the interviews so I could dissect each participant's story in order to isolate narratives that indicated an actual or designated identity for each of the students. A categorical-content reading "focuses on the content of narratives as manifested in separate parts of the story, irrespective of the context of the complete story"

(Lieblish, Tuval-Mashiachand, & Zilber, 1998, p. 16). As I located narratives that addressed each of the categories I had created in phase two, I placed each narrative in a chart. I used the charts to identify potential narratives that were reifying, significant and endorsable to each of the students and their primary caregivers. When possible, I identified the parts of each participants narrated story that were "*is sentences"* (p. 16) and patterns of actions that were identified through the adverbs such as usually, always and never. I noted whether these statements were repeated over the course of the three interviews in order to identify statements that were significant and endorsable. I then began to look for general themes. Once I had established the themes, I began to look for data that highlighted potential narratives that identified the students' actual and designated mathematical identities. To identify the students' actual mathematical identities, I looked for narratives told in present tense and were formulated as factual assertions. To identify students' designated mathematical identities, I looked for the use of future tense verbs in response to questions about the students' participation and use of mathematics in the near and distant future.

Finally, as I collected and analyzed the data, I was sensitive to the differences in race and class between the students and myself and how these differences might affect my interpretation of the students' narratives. I am a middle-class White woman. The two students were recent Mexican immigrants who came from poor working class families. I recognized that our differences in class, race, and social status provided each of us with different ways of experiencing and understanding the worlds in which we lived. This necessitated my constant attention to the complexities inherently involved with collecting, analyzing, and reporting the data. Moreover, I recognize that my interpretation of the participants' narratives are inherently

problematic and that validity is never a black and white matter (Gee, 1999). Others readers of the same data may see different meanings and stories at play.

Next, I highlight the findings from two cases; Heidi and Genesis. I link the construction of their mathematical identities to the non-mathematical resources that influenced their mathematical identities and to each student's level of mathematics engagement.

Findings

This study builds on the research that demonstrates how mathematical identities are constructed and used. However, I suggest this study offers a number of features which distinguish it from previous methods for exploring identity as it relates to mathematical learning. In particular, this study illustrates 1) the complex connections between actual identities (those that describe students at the moment of the narration) and future identities (those that describe who the students may become; 2) the many influences students use to construct identities (both actual and future) and; 3) how narratives sometimes coincide and sometimes contradict those of the students' significant narrators.

Actual & Designated Identities

Designated identity stories shape the kinds of mathematical identities narrators might imagine and have the potential to influence mathematical engagement and learning at the moment by accepting or limiting an individual's capacity to learn and do. Sfard and Prusak (2005) argued in their study that if a student imagines she is a capable mathematics learner, she is more likely to engage in mathematics activities. Yet, Sfard and Prusak's students each had salient designated identities that included mathematics. As a result, they concluded that the way in which an individual imagines mathematics in her designated identity impacts how that individual

currently engages in mathematics. However, the context of my study was vastly different from the context of Sfard and Prusak's study.

When asked about their futures, the students' responses revealed a few of the ways they saw their future relationship to mathematics. Although Genesis and Heidi were unclear about the role of mathematics in their distant futures, they were clear about the role of mathematics in their near futures as learners in their seventh grade math classroom. Although, Genesis stated that she did not believe that mathematics would play a role in her career as an adult, she did express a more immediate mathematical future identity as she spoke about how she might not be able to enroll in honors mathematics courses at the high school level. She based this vision on her test scores, the multiple narratives she told herself about her struggling mathematics skills as well as her interpretation of the messages she perceived her mother and her mathematics teacher narrated.

Like Genesis, Heidi could not specifically describe how she might use mathematics as an adult which is not unusual for a middle school student. Additionally, the idea that Heidi's mother also saw herself as a person who could not "do" did little to support the idea that Heidi would be readily able to articulate her distant future relationship with mathematics. Yet for both Genesis and Heidi, their actual mathematical identities were not influenced by their negative or ambiguous descriptions of their designated mathematical identities as they still sought to be successful seventh grade mathematics learners.

There are a number of potential possibilities that might be adequate reasons for explaining this phenomenon. First, Genesis and Heidi may have designated identities they did not talk about during the interviews that were driving their goal of becoming successful mathematics learners. These identities might have included things as pedestrian as just imagining

themselves graduating from high school because they had met the state requirements of which passing mathematics is one of them. Second, both girls might have been motivated to do well in school for the sake of doing well in school, and, in turn, this was what motivated them to want to do well in mathematics. Third, Genesis and Heidi may have wanted to learn simply because they enjoyed learning. Finally, it may be that the students had constructed more immediate *future* mathematical identities; identities that are less binding and deterministic than designated identities. It may be that these more immediate *future* identities were driving the Genesis and Heidi's desire to be successful mathematics learner.

From Sfard and Prusak's (2005) study, the designated mathematical identities of the native Israeli students and the Russian immigrant students appeared to be, in part, heavily influenced by sociocultural and sociohistorical contexts. Moreover, although designated identities are malleable, one might infer that these identities have a tendency to be long-lasting. The notion of *future* identities provides more nuanced insights into the mathematical identities of young students who have not yet created a full vision of themselves as adults.

Future Mathematical Identities

This study highlights that identities are multi-faceted and dynamic. Yet, self-narrated designated identities imply an obligation to self and/or to others. Neither Genesis nor Heidi was able to articulate a salient designated mathematical identity. However, they did use their actual mathematical identities to imagine a more immediate mathematical *future* identity. I propose that a future identity is less prescriptive and freer of what an individual or others might expect. Perhaps for many young middle school students, the idea of an immediate future identity is more readily visible and meaningful than a salient designated identity. From this perspective a future identity takes into account the very near future – tomorrow, next week, by the end of the school

year or even during the high school years. For Genesis and Heidi, their desire to be successful math students in spite of their self-labels of not "smart" and not "good" may be explained by the relationship between an actual and future identity. Thus, Heidi and Genesis' cases allow for the exploration of the idea that there is something other than the single relationship between actual and designated identities – the relationship between an individual's actual and a more immediate *future i*dentity. Yet, this does not exclude the notion that all middle school students are unable to narrate a salient designated mathematical identity.

Influences Used to Construct Actual, Future and Designated Mathematical Identities

Both Heidi and Genesis used mathematical *and* non-mathematical influences to create their actual and future mathematical identities. In Genesis' case, she used her test scores to create her actual mathematical identity as well as to narrate a *future* mathematical identity as a student who might not be able to enroll in honors mathematics courses in high school. She also used non-mathematical influences such as the messages she perceived her mother to narrate for her as a slow learner who needed to be tested for learning disabilities. She also used her relationship with the mathematics teacher. Finally, Genesis used the notion of time. Genesis was a student who wanted to persevere. Yet, time was a factor in regards to her ability to cement understanding of a particular math concept before the next new concept was presented. Thus, Genesis constructed an actual mathematical identity of a student who was currently 'slow" at doing mathematics and a *future* mathematical identity as a high school student who would not be able to enroll in honors mathematics courses.

Heidi also used her test scores to develop both an actual and a *future* mathematical identity of a student who may not pass eighth grade or graduate from high school because of her mathematics performance. However, in addition to these scores she used her isolation from being

seated alone, her relationship with the teacher, and her participation in mathematics class to create her actual and future mathematical identities. It is also not outside the realm of possibility to suggest that Heidi was aware of her mother's own narrated actual mathematical identity and that this narration influenced Heidi's self-narrated actual mathematical identity.

Significant Narrators Primary Caregivers: Stories That Coincide.

The stories told by these two middle school Latina students and their caregivers contribute to a growing understanding that students enter their mathematics classroom with varied mathematical experiences that are uniquely intertwined with influences from family members who become significant narrators. In Genesis' case, she was regularly exposed to the story of her birth. This eventually became a story that labeled Genesis as a "slow learner" which, in turn, became an integral part of Genesis' actual mathematical identity. Genesis knew she struggled with learning mathematics in the required time frame the state mathematics standards dictate. Moreover, since being a "slow" learner was a trait that both Genesis and her mother believed she was born with, Genesis had no reason to expect that her future relationship with mathematics would be different. Her designated mathematical identity was also one of a slow learner who was not "good at mathematics, and that she would not be able to engage in higher levels of mathematics in high school. Yet, neither her own designated mathematical identity narration nor her mother's designated mathematical identity narration of Genesis prevented Genesis from wanting to persevere in her seventh grade mathematics learning.

Heidi was not repeatedly exposed to any stories regarding her mathematics abilities or future relationship with mathematics from her mother. Unlike Genesis' home conversations, mathematics was simply not a topic of family discussion or focus other than to encourage Heidi to do her best. This may not necessarily be unlike many family discussions regarding

mathematics. Additionally, Heidi's mother narrated an actual mathematical identity for herself as a person who simply was not capable of "doing" mathematics. This resonated with Heidi's narrative of not being a "smart" mathematics student. Additionally, Heidi stated that she was unsure about her relationship with mathematics as an adult. At best her designated mathematical identity was ambivalent. Yet, this did not temper her goal of wanting to be a successful mathematics learner in the seventh grade. Thus, Genesis and Heidi's cases push against the notion that actual and designated identities always influence each other.

The Mathematics Teacher: Conflicting Stories.

While students construct identities as mathematics learners within their classrooms, they also use their understandings of how others perceive them as ways to read their mathematics classrooms. Heidi and Genesis constantly used non-mathematical influences to construct their actual mathematical identities as they translated teacher moves through their understandings of themselves as mathematics learners. Often the students' actual mathematical identities contradicted the actual mathematical identities the teacher narrated about each of the students. Overall, the teacher held positive beliefs regarding the actual mathematical identities of Heidi and Genesis. She narrated an actual mathematical identity for Genesis that included her desire to persevere in her learning and the notion that her mathematics skills were improving. For Heidi she narrated an actual mathematical identity that included "catching on" to new mathematics content quickly. Yet, both Genesis and Heidi narrated negative actual mathematical identities for themselves. How Heidi and Genesis translated their teacher's moves illuminates how different people will narrate different identities for the same identified individual based on the same event (Connelly & Clandinin, 1990; Ochs & Capps, 2001).

Research Implications

Identity as a research construct is fairly new in the field of mathematics education. However, the studies that have focused on identity have uncovered important new issues relevant to the field. Although it would not be prudent to use Heidi and Genesis' cases to make generalizations regarding the construction of Latin@'s mathematical identities, their cases do illuminate the need to consider how the construction of Latin@'s mathematical identities influence their engagement with mathematics. To further understanding of issues related to participation and achievement in mathematics for FEP Latin@ students, it is necessary to understand the broader socio-historical contexts in which students, schools, classroom, and teachers are situated. This will expand the available information and perspectives about students and mathematics learning by changing the unit of analysis and afford opportunities for students to explain how they understand themselves, their social worlds, and the residue of previous lived experiences form their personal perspectives.

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