This is to certify that the
dissertation entitled

TRANSLATED MATHEMATICS: IMMIGRANT WOMEN'S USE OF SALIENT IDENTITIES AS CULTURAL TOOLS FOR INTERPRETATION AND LEARNING

presented by

Lisa M. Jilk

has been accepted towards fulfillment
of the requirements for the

degree in

Ph.D. Teacher Education

Major Professor's Signature

11/01/07

Date

TRANS
IDENTI

TRANSLATED MATHEMATICS: IMMIGRANT WOMEN'S USE OF SALIENT IDENTITIES AS CULTURAL TOOLS FOR INTERPRETATION AND LEARNING

By

Lisa M. Jilk

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Teacher Education

2007

TRANSL
IDENTITI

A g

mathematic

U.S. citizen

today (NCE

participatio

via availab

mathematic

2002; Sfard

of their ma

relation to

to culture

pursuits.

Thi

El Salvado

Language

mathematic

My overarc

identity as

mathematic

ABSTRACT

TRANSLATED MATHEMATICS: IMMIGRANT WOMEN'S USE OF SALIENT IDENTITIES AS CULTURAL TOOLS FOR INTERPRETATION AND LEARNING

By

Lisa M. Jilk

A gap in secondary mathematics enrollment and achievement in higher-level mathematics courses between young women and men, between immigrant students and U.S. citizens and between Latinos, African Americans and White students continues today (NCES, 2005). Recent research in mathematics education asserts that patterns of participation in school mathematics may be affected by the identities afforded students via available learning practices as well as the identities students bring into their mathematics classrooms (Boaler & Greeno, 2000; Boaler, 2002; Martin, 2000; Nasir, 2002; Sfard & Prusak, 2005). Such research illuminates how students construct meaning of their mathematical experiences and subsequently make choices about how to act in relation to them, which prevents completely attributing students' achievement or failure to culture while simultaneously recognizing the role of the individual in academic pursuits.

This study foregrounds the life stories of four young immigrant women from El Salvador, Guatemala, Mexico, and Nicaragua who began high school as English Language Learners and successfully completed four years of college preparatory mathematics in a program that used Complex Instruction as its primary pedagogical tool. My overarching questions were about the young women's mathematical successes. I used identity as a research construct to understand why the women participated in high school mathematics, narrative methods as a principal tool for inquiry and analysis, and case

study to hi

experience

mathemati

which they

personal co

most salien

My

result of ho

identity, wh

particular m

supportive

places wher

narratives to

unable to le

and practice

education re

homogenize

correspond

of-school co

developmen

classrooms s

interpretive

their mathem

study to highlight the "local particulars" (Dyson & Genishi, 2005) of the women's experiences. The women shared stories about their home countries, school and mathematics classes in the U. S., their families and the out-of-school communities in which they participated. Narrative methods provided me with access to the women's personal constructions of self and the culturally constructed identities they considered most salient to their lives (Holland, Lachicotte, Skinner & Cain, 1998).

My findings suggest that the women's mathematical successes were partially a result of how each translated her mathematics experiences through the lens of her salient identity, which in turn supported her participation and learning. In addition, there were particular mathematics practices available to the young women, which they considered supportive of further identity development, making secondary mathematics classrooms places where they could act authentically. This research provides powerful counter narratives to dominant stories often told about immigrant Latinas who are uninterested or unable to learn meaningful mathematics and has important implications for both research and practice. In particular, I argue for the use of narrative methods in mathematics education research to illuminate the diversity within student groups who are too often homogenized or constructed such that categories of race, ethnicity and gender do not correspond to participants' sense of selves. Additionally, research must attend to the out-of-school communities in which students participate as important sites for identity development. Finally, I contend that spaces must be created within mathematics classrooms such that students have opportunities to use their salient identities as interpretive resources to connect to relevant strengths and prior knowledge to support their mathematical learning.

Para mis chicas, con mucho respeto y mucha cariña.
Thank you for letting me into your worlds and for sharing your stories with me.
I have learned so much with you.

Acknowledgements

"No one of us is as smart as all of us together," and this project was no exception. There are so many people who have supported me throughout this doctoral program and especially during my dissertation process. First, I thank Alan, Ana, Barbara, Carlos, Christina, Emily, Eric, Estelle, Gina, Hannah, Karen, Kari, Kristina, Laura, Lisa, Phil, and Suzanne for providing me with a community in which I learned and grew as a teacher. Your open doors, curricular ideas, passion for learning, and commitment to young people forever changed how I think about the purpose and potential of mathematics education. Thank you also to the students at Railside who shared their lives with me. I learned so much from you. You are my role models.

Many thanks to the California crew for all of your help during data collection; the Bartlett Family for opening your home to me; Ana Ruiz - translator extraordinare; Stacy Priesman for your time and fabulous cat care; Jo Boaler, Karin Brodie, Ruth Cossey, Melissa Grasalfi, Vicki Hand, Joanne Lieberman, Emily Shahan, and Megan Staples for paving a research path that provided me with a strong foundation from which to build.

I am very thankful to Lani Horn who inspired me to enter a doctoral program and provided me with opportunities to expand my CI practice as a teacher educator; to Ruth Tsu for her friendship, for including me as a colleague in the groupwork course, and for her unwavering dedication to creating a more just world; to the many teachers around the country, and especially in Seattle, who invited me into their classrooms, embraced Complex Instruction, and continue to work with diligence and passion to provide *all* students with access to high quality mathematical learning opportunities. Through these

experiences I d
inform my thin
Thank y
Marcy, Sandra
coffee and frien
to Sandra Cresp
Steve Ryan, Jac
opportunities du
of education, soc
Thank yo
Wood who helpe
impossible to ima
you for asking th
clarify my thinkin
you helped me to
are brilliant! Thar
to get anything or
possible and help
Many, ma
Nathalie Sinclair,
my research proc
a dissertation that
with a home at M

experiences I developed new understandings about CI in varied contexts that continue to inform my thinking and practice.

Thank you to my colleagues and friends at Michigan State University; to Kamila, Marcy, Sandra and Stef for our long talks, drives to Flint, yoga sessions, canoe rides, coffee and friendship. You are incredible women, and I admire each of you! Thank you to Sandra Crespo, Brian DeLany, Jay Featherstone, Anne Haas Dyson, Ernest Morrell, Steve Ryan, Jack Smith, Jon Star, and Suzanne Wilson who provided me with important opportunities during graduate school and challenged me to think differently about the role of education, social justice, and research.

Thank you to my Writing Group, Ann Lawrence, Patrick Halladay, and Marcy Wood who helped me create an identity as a writer. I learned so much from you. It is impossible to imagine this process without your consistent support and feedback. Thank you for asking the tough questions, for challenging my assumptions, and for helping me clarify my thinking and writing. Your time and efforts truly supported my vision. Ann, you helped me to bring my vision alive even when the forecast was pretty cloudy. You are brilliant! Thank you for teaching me how to write and what to do when I cannot seem to get anything on the page. You constantly challenged me to go beyond what I imagined possible and helped me to craft a dissertation that honors the young women in this study.

Many, many thanks to my committee members, Helen Featherstone, Lynn Paine, Nathalie Sinclair, and Steve Weiland. Each of you played an important role in guiding my research process. Your particular areas of expertise were critical for helping me create a dissertation that cuts across several different fields. Helen, thank you for providing CI with a home at MSU. Lynn, you have been my mentor from the beginning of this

process. Y
relationshi
for includi
asking imp
been extre
much from
Kri
invaluable
perspective
Thank you
early age a
forever gra
new knowle
journey, for
presentatio
for supporti

process. You believed in my ideas, honored my teaching experiences and my relationships with students, and recognized the intellectual value of my work. Thank you for including me in your projects, for reading numerous versions of my writing, for asking important questions, and for always knowing how and when to push. You have been extremely generous with your time, expertise, and guidance, and I have learned so much from working with you.

Kristina Dance, Greg Holmbeck, and Dorea Kleker, your friendship was invaluable during this time. You tolerated my uncertainties, helped me maintain perspective, and kept me grounded and sane when life got in the way. Thank you! Thank you to my parents, Steve and Jean Jilk, who instilled in me a joy for learning at an early age and always encouraged me to pursue my intellectual interests. Finally, I am forever grateful to James Gray, my life partner who inspires me daily with his quest for new knowledge and quirky ideas. James, thank you for accompanying me on this journey, for all of your tech support, for being the sole audience for my mock-presentations, for delivering the tough news when my ideas really did not make sense, for supporting me and our "kids," and for always believing that this was possible.

Fo

great resp

I knew the

and to hav

pieces of th

struggles o

system. my

in refugee c

these extrem

country whe

learning mat

I sper

home to their

home visits. I

a small part o

sense of who t

social structure

roles reversed.

understood the

thank you, and e

were met with g

PREFACE

My Trajectory: Coming to this Project

For a decade as a high school mathematics teacher, I worked in awe and with great respect with many students who came to my classroom from around the world. I knew these young people to be hungry for new knowledge, eager to build relationships, and to have a strong desire to share who they were, where they had come from, and pieces of their lives that existed beyond the four walls of our classroom. Amidst the struggles of learning a new language and adapting to a new social and educational system, my students periodically told me stories about the loss of parents to civil war, life in refugee camps, attending school on a dirt ground. I wondered, why? In the midst of these extremely challenging circumstances, having lost family and friends and come to a country where you do not speak or understand the language, why did they care about learning math and why was it that they were so often mathematically successful?

I spent some time during summers traveling home with a few of my students, home to their homes, to their home countries. I guess I could call these international home visits. I wanted to know where these young people came from. I wanted to glimpse a small part of their lives outside of school. I wanted to meet their families and get a sense of who they were and how they acted when they understood the language, the social structures, how to place an order at a restaurant or flag a taxi. In these visits, our roles reversed. My students became the teachers, and I became the student. I no longer understood the street signs or how to count money. My attempts to say hello, goodbye, thank you, and excuse me (the four words I absolutely must learn when I travel abroad) were met with giggles. I followed my student guides from site to site, having no choice

but to let th

me to bathr

me. I felt st

something, i

in constant r

students felt

I lear

so much abo

learn mathem

history of the

their lives? D

connect with t

histories, socia

of their experi

claimed that al

speak Spanish?

circumstances,

best misunderst

mathematics?

I came to

students' mathem

challenges, so ma

were mathematica

but to let them take charge of my daily comings and goings. They ordered my food, led me to bathrooms, directed my taxis, and translated everything I said or that was said to me. I felt stripped of all that I knew, all of my resources. When I wanted to say something, I had no knowledge of the language to express myself. I felt incompetent and in constant need of care. I wondered if I was experiencing even a small bit of what my students felt in the U.S., in our school, in my classroom.

I learned many things on these trips, but most importantly I learned that there was so much about these young people that I did not know. How could I possibly help them learn mathematics when I did not understand their previous schooling experiences or the history of their countries? Were my math tasks at all relevant to how they thought about their lives? Did the context for the homework problems make sense? How would I connect with these young people whose lives were so different from mine, whose histories, social and political contexts I did not understand? How were they making sense of their experiences in the United States? What did they think about when someone claimed that all Asian people looked the same or that anyone from "down there" must speak Spanish? Why, after having left so much, and often times under horrific circumstances, and then arriving in a place where they likely felt completely ignored or at best misunderstood, did they care about and work so hard to be successful in school mathematics?

I came to graduate school with vague questions about how to support immigrant students' mathematical success, but also wanted to know why, in the face of such social challenges, so many of the immigrant students at Railside High[1], a school where I taught, were mathematically successful. I thought the answers to these questions lay somewhere

outside of mathematics education, because aside from concerns about the lack of English proficiency impacting students' mathematics learning, I had not heard or read of anyone in mathematics education exploring my concerns. Moreover, it was rare to find mathematics education research that included the voices of students, especially stories about how they thought about themselves, their families, and their lives outside of high school. Similarly, the literature I read about multicultural education and culturally relevant curriculum and pedagogy was often absent of content. There was a lot of discussion about how to establish respectful classroom environments, honor the diversity of students' languages and backgrounds, and hold students to high academic standards. But, what did that mean about how to teach and learn mathematics?

Lynn Paine played matchmaker and started me on my current research path when she arranged for me to meet David Pimm at a PME-NA conference in Toronto. Lynn was convinced that David could help me locate the math in my ideas, and she was right. As I shared my teaching stories with David, who is always the most avid listener, he helped me understand where the math was in my story. Secondary mathematics was the setting in which my concerns about immigrants, girls, student-teacher relationships and identity existed.

A presentation by Danny Martin and his research about African American mathematics students and their mathematical identities, with a focus on out-of-school communities, introduced me to emerging work regarding the socio-cultural aspects of mathematics education. In particular, Martin's presentation, book, and subsequent conversations supported me to make connections between what I had assumed to be two mutually exclusive bodies of work - women's identity and mathematics education.

---

[1] Railside High School is a pseudonym.

Danny's work provided me with a real-life model that matched what had before only existed in my imagination. This chance meeting with Danny pushed me one step closer to making sense of my project.

Another important catalyst for my research was Jo Boaler. Jo and her team spent several years on a project focused on the mathematics teaching and learning at Railside High, a school where I had taught for five years. In her findings Jo described a success story. She claimed that while our mathematics department was certainly not perfect and was constantly searching to improve its practices, many students, and especially students who traditionally were not successful in school mathematics, were learning meaningful mathematics and actually enjoying it. I took this as a sign that we were doing something right and had a hunch that our success had much to do with the use of Complex Instruction. My experiences working with Jo and my repeated readings of her work continue to push my thinking about teaching and learning mathematics and in particular, what it means to do this work in the context of Railside High.

While all of these "math people" challenged me to continue searching for the relevance of mathematics in my work, this project is not all about the math. Working with students who had immigrated to the United States had been my initial catalyst for this project, and I wanted to maintain a strong connection to the educational literature about immigrant students and in particular, Latina immigrants, throughout this project. In many ways, this was a difficult connection to manage, because these fields rarely merge. I have found that the immigrant literature rarely takes up content-specific contexts, such as mathematics, and research in mathematics education rarely considers the experiences

of immigrant students outside of issues of language. It was both intellectually challenging and exciting to bring these fields together.

When I experience something wonderful, it often feels quite random, and I usually attribute the opportunity to good luck and being in the right place at the right time. Now, in retrospect, I see how each of these events and each of these people were important stepping stones that led and supported me to eventually conceptualize my own work, and for that I am grateful. However, even with everyone who helped me reach a place where I knew what I wanted to study, this would have been a completely different project if not for the four young women who agreed to share their lives with me and with all those who read this book. Amelia, Emily, Mariana, and Sandra spent countless hours sharing their ideas, their feelings, their memories, and their lives. Their courageous spirits and powerful insights were inspirational and motivational. I know they will make a difference.

Overview of the Study

Chapter One frames my study within a current research agenda concerned with relationships between culture, identity, and mathematics learning. I use the literature to show why my research questions are important to consider as both researchers and practitioners try to ease "cultural conflicts" (Bishop, 1991) between students' identities and the cultures of secondary mathematics communities. In this chapter I also explain what I mean by identity, which is a key concept used in this project.

In Chapter Two I present the research questions that concern this study: What are the salient identities created by Latina immigrants who were academically successful in their secondary mathematics classes, and in which communities of practice are they being

shaped
mathem
through
study. I
primary
methods
particula
informati
concept c
to illumin
for data a
and my ur
explore th

In

Emily, Ma
entire proje
woman's ca
current issue
review at the
a particular w

The p
but taken toge
mathematics e

shaped? How do Latina immigrants who were academically successful in secondary mathematics interpret the practices for teaching and learning secondary mathematics through the lenses of their salient identities? I also discuss the methods I used for this study. In particular I explain why narrative inquiry afforded the use of story as my primary tool for data collection and how case studies expand the repertoire for research methods in mathematics education and gave me the opportunity to examine the "local particulars" (Dyson & Genishi, 2005, p.3) of each woman's identity. I include information about the women, the setting, data collection, and analysis. I describe the concept of "salient" identity and explain why I decided to use the Diversity Toss activity to illuminate the salient identities of each woman and use the results as the starting point for data analysis. Finally, in this chapter, I reflect on my role as a "borderland" researcher and my unique relationships with both the women and the high school they attended as I explore the affordances, limitations, and challenges of this position.

In Chapters Three, Four, Five, and Six, I present the individual cases of Amelia, Emily, Mariana, and Sandra whose stories form the core of this study. While I framed the entire project and research questions using relevant literature in Chapter One, each woman's case is a case of something particular, and I used each to extend and challenge a current issue in the field of mathematics education. Therefore, I provide a short literature review at the beginning of each chapter to explain how each case intervenes in the field in a particular way.

The power of these young women's stories lies in their richness and complexity, but taken together they provide insight about the women's construction of their secondary mathematics experiences and highlight some important features that likely contributed to

their academic success. Specifically, these cases together: (1) demonstrate the broad diversity within a group of students often assumed to be homogenous, (2) make visible the interpretive work these young women were doing in their mathematics communities, (3) show how each woman translated mathematics teaching and learning practices through the lens of her salient identity, and (4) illustrate how students' identities are intellectual resources for learning mathematics. Finally, in Chapter Seven I consider the implications of this study for mathematics education researchers and teachers in socio-culturally diverse classrooms.

Before I share these stories, I want to clarify a few things. Spanish was the primary language of each participant in this study, however I conducted all interviews with Amelia, Emily, Mariana, and Sandra in English. This is the language that we have always used to communicate with each other. Some of their words or sentences might read a bit strangely, because they were using a second language to express some very difficult and emotional stories. I have chosen to include the exact words they used, rather than change their grammar to make them sound more polished as English speakers. When the women read their own chapters, they were all very sensitive about this. They did not want people to think they were stupid only because their use of English was not grammatically correct. This was most definitely *not* my purpose! I explained that I did not want to tweak their speech to make them sound differently. The genuine authenticity with which each spoke lends power to her stories and ideas. I hope readers can look past the grammatical errors to appreciate the abilities of these young women to express such phenomenal ideas so eloquently in a second language.

All i

were done i

interviews o

asked the int

each woman

English. In th

tables. I have

the dissertatio

In this way, m

English transl

Throug

Latina to encou

When I talk abo

define herself. V

spoken to me. T

themselves Hisp

had a fascinating

include in Appen

ethnic terminolog

countries from w

All interviews with Julia, Gloria, Lupe, and Carla, the mothers of the participants, were done in Spanish. Unfortunately, my Spanish was not good enough to conduct these interviews on my own, so I hired a translator-friend of mine from Mexico to help me. I asked the interview questions in English, my friend translated my questions into Spanish, each woman responded in Spanish, and my friend translated the stories back to me in English. In this way we carried on conversations in their homes and around their kitchen tables. I have chosen to use Spanish, the primary language of these women, throughout the dissertation, in an effort to represent the women's words as they were spoken to me. In this way, my goal is to represent their stories as accurately as possible. I have included English translations for non-Spanish readers when necessary.

Throughout the book, when I refer to the participants as a group, I use the term Latina to encompass the diversity of women from different Latin American countries. When I talk about one woman in particular, I use either her name or the term she used to define herself. When I use direct quotes from the women, I insert their terms as they were spoken to me. The women did not all identify as Latina. Sometimes they called themselves Hispanic, other times Latino or Latina, or by their various nationalities. They had a fascinating conversation about these issues during a focus group meeting, which I include in Appendix B. This discussion confirmed my decision regarding the use of ethnic terminology and also helped me realize that I should include a map of the countries from which each woman came.

TABLE OF CONTENTS

Table 1. Cha

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

Framing the Study

Introduction

Why, in the face of so many social challenges and structural barriers, have some Latina immigrants been successful in secondary mathematics? I come to this question after several years of working with immigrant students in high school mathematics classrooms and watching in awe and with great respect the young women from countries outside of the United States successfully navigate the complex and often conflicting terrain of public high school. This question is important and timely given that Latinos are currently the largest minority population within the United States and simultaneously make up the largest percentage of high school dropouts, a figure that increases significantly when placement in English language courses is considered (Garcia, 2001). The literature in multicultural education, culturally relevant theory, and immigration studies points to many ways that schools and teachers "subtract" resources from Latinas and in turn how they can support these young people by changing school structures, curriculum and pedagogy, and classroom environments. These fields also provide us with some insight into how Latinas make meaning of their schooling experiences and understand themselves in relation to U.S. schools and their peers given the racial, class and political structures in which they are embedded. However, this work tends to be broad and largely focused on factors at the school-level and general classroom practices; it rarely considers how Latina's learning experiences might look in content-area courses and in secondary mathematics in particular.

Mathematics education research, on the other hand, has traditionally focused on learning from the perspective of the individual. A cognitive or acquisition perspective frames learning as the accumulation and "ownership over some kind of self-sustained entity" (Sfard, 1998, p.5). Once an individual acquires the information, it can be used, transferred, and shared. However, sociocultural theory and the recent attention given to identity formation both inside and outside of schools provides a new and potentially rich frame from which to explore students' sense-making of school mathematics (Foreman, 2003; Greeno, 2003). Insight into the ways that students shape ideas of themselves as learners of mathematics is critical for informing teachers' practices and classroom structures. In addition to attention to identity formation within classrooms, communities outside of school, of which students are members, are important influences in students' lives, shaping the identities students bring to school and from which they make decisions about participation and learning.

This project involved exploring the stories of four, first-generation Latina immigrants who attended an urban public high school in Northern California. In addition to graduating from high school, these young women chose to enroll in, and successfully completed, four years of college preparatory mathematics, including Advanced Placement Calculus. My goal for this project was to understand how each young woman thought about her secondary mathematics experiences and to what she attributed her academic success. I work from an assumption that each woman acted from a sense of self created both inside mathematics classrooms and in out-of-school communities.

Situating the Problem

In the following section, I demonstrate how my research questions have developed from the relevant literature, and how I use this study to join the conversations currently taking place about culture, identity, and mathematics learning. Given my interest in working with students who have emigrated from countries outside of the United States, it feels most appropriate to begin my discussion with a focus on the ways in which culture, mathematics, and learning mathematics intersect. I then turn to the work being done about culturally relevant pedagogy and Complex Instruction as efforts to "bridge the culture gap" for students who are learning mathematics in a country different from their own. I argue for a focus on students' personal identities rather than "cultural conflicts" (Bishop, 1994) to better understand the discrepancy in mathematical engagement and achievement and assert that any focus on identity and learning must attend to the identities students create both within mathematics classrooms and in their out-of-school communities. Finally, I claim that students' narratives should be foregrounded as primary data from which to understand which identities students value and the meanings they assign to them.

Culture and Mathematical Learning

An assumption that mathematics lacks culture often leads to solely blaming immigrant students, who are also English-language learners, for their mathematical failures. Based on this reasoning, language learners are often tracked into low-level courses (Losey, 1995) or marginalized programmatically by teachers and counselors who often assume that these young people are "not college material" and will likely drop out of school prior to graduation (Oakes, 1990; Olsen, 1997; Romo & Falbo, 1996).

Gender also contributes to how immigrants are positioned in schools by teachers and staff. For example, female immigrants are often constructed as romantic figures or as persons destined for a life with romantic love at its center rather than as intellectually competent students with futures that require strong and rigorous academic training (Olsen, 1997; Raissiguir, 1995). These assumptions about young immigrant women are often used to justify the severely low academic expectations teachers often hold for them.

An understanding of culture as a set of local, instantiated practices that are dynamic and improvisational in nature (Cobb & Hodge, 2002; Gutierrez, Baquedano-Lopez, & Tejeda, 1999) suggests that mathematics is not culture free. Bishop (1988) argued that the knowledge assumed to make up what is called mathematics has a cultural history. It has been developed over time and as a result of various activities situated in particular contexts. In this way, mathematics is a cultural by-product, rather than a universal truth, generated by many peoples and in many different ways dependent on the situation. For example, people engage in mathematical practices in different ways. Reasoning, naming and using symbols, and working with various number systems are just a few of the different ways in which people might construct mathematics. According to Bishop (1988), "mathematics is a pan-human phenomenon...Just as each cultural group generates its own language, religious belief, etc., so it seems that each cultural group is capable of generating its own mathematics" (p. 202).

In addition to the differences in the content of mathematics, people practice mathematics differently. Through the use of curriculum and pedagogies, certain practices are valued more highly than others. Bishop (2000) explains that "the symbols, practices and products of mathematics do not have any values in or of themselves, but the people

and institutions of which they are a part can and do impart their values, whether implicitly or explicitly, through decisions about curriculum and pedagogy" (p. 3). Therefore, not only do there exist different cultures of mathematics but an elitist version of mathematics, which is often privileged in U.S. public schools, frequently ignores mathematical contributions generated and practices used outside of educational institutions (Bishop, 2000; de Abreu, 1995).

The relationship between culture and mathematical learning has gained increased attention in the mathematics education community and has provided a more complex and nuanced understanding of mathematical persistence and achievement for students who are most often underrepresented in school mathematics (de Abreu & Cline, 2003). Since both mathematical activities and the criteria for knowing mathematics are culturally organized, and different communities assign different value to what it means to know or learn mathematics, there is potential for children to experience "cultural conflicts" (Bishop, 1991) in school mathematics. For immigrants, this cultural dissonance between home and school may be exacerbated by a variety of factors. School mathematics in their home countries may have been constructed in ways that are not congruent with mathematics in the United States. In fact, the entire notion of school mathematics in a U.S. public schooling context may be in direct conflict, or in the least, incompatible with the meaning of school mathematics as it was constructed in students' home countries (Bishop, 1988). These conflicts or dissonance in educational experiences may affect students' abilities to be academically successful, and these situations allow for other explanations of failure and success besides the attributes of the learners themselves (Bishop, 2000).

Bridging the "Culture Gap" with Culturally Relevant Pedagogy

These "cultural conflicts" (Bishop, 1991) are the focus of much recent educational reform conversation. Literature about culturally relevant pedagogy (Ladson-Billings, 1995; Ladson-Billings & Tate, 1995) and culturally responsive teaching (Gay, 2000) suggest that it is possible and effective for teachers to implement curriculum and pedagogy that addresses the cultural disconnect felt by many students in classrooms. Several researchers (Gay, 2000; Ladson-Billings, 1995; Ladson-Billings & Tate, 1995) argue that teachers should build upon students' cultural knowledge and incorporate cultural elements and images into classroom experiences as a way of helping students connect with mathematics and understand its relevance in their lives. Gutstein, Lipman, Hernandez, & Reyes (1997) provide an example of how this might be done. In an elementary/middle school in an urban Mexican American community, Gutstein et al. explained how teachers collaborated with parents to create classroom cultures that mirrored students' own home cultures and built on students' Spanish language abilities to promote cultural excellence and biculturalism. Additionally, several teachers at this school used students' prior experiences in Mexico and their knowledge about Mexico as starting points for their mathematical problems and discussions.

I agree that culturally relevant curriculum and pedagogical practices can be effective for supporting students academically, especially those for whom school mathematics might feel like an alienating experience. It is critical for teachers to hold all students to high academic standards and work with an expectation that they *will* learn and they *will* achieve without forcing students to give up their cultural competencies. Additionally, helping students to develop a socio-political and critical consciousness

using disciplinary knowledge supports students' understanding of their local positions in society and advocates for them to work against social inequities (Ladson-Billings, 1995).

The use of culturally relevant pedagogy has been shown to improve students' mathematical knowledge (Gutstein et al., 1997) and marks a significant stride both in educational research and pedagogical development in the effort to create more socially just and equitable learning experiences for students in U.S. public schools. However, I have three particular concerns regarding its use. First, designing learning experiences that complement the different learning-styles of particular ethnic groups is a practice that tends to be overly deterministic and superficial in its application. This includes the use of students' primary languages in curriculum and instruction. Those who create these experiences most often work from outside of the culture they intend to assist and use superficial characteristics of groups of people from which to construct their curriculum and practice. For example, Khisty's (1995) research with elementary mathematics teachers and students who were primary Spanish-speakers explains how an assumption that bi-lingual instruction supports a cultural connection between students and mathematical content is superficial. While many assume that directly translating written text or instructional procedures benefits students' mathematical understandings, this assumption ignores that people construct meanings of language within social contexts. Without knowledge of the cultural meanings students assign to mathematical terminology or the opportunities to co-construct meaning within mathematics classrooms, teachers' use of students' primary language to facilitate mathematical learning mathematics can often act as an impediment (Khisty, 1995).

Additionally, an approach to easing educational dissonance through the use of culturally relevant tasks or instructional practices tends to essentialize students based on a group label and fails to consider an individual's past experiences and prior knowledge as critical factors relevant to their learning (Gutierrez & Rogoff, 2003). Finally, placing the authority with teachers to identify students' cultures for the purpose of creating a cultural match between students and the curriculum or pedagogy assumes the characteristics of cultures to be fixed and exist "independently of the people active in creating and maintaining them" (p.21). This approach also fails to acknowledge that students are constantly interpreting any given situation through the lenses of their lived experiences. Given the infinite variation in how students live their lives, it is impossible to know how they are making sense of content and pedagogy assumed to be culturally relevant.

Complex Instruction as a Tool for Promoting Equity in Mathematics

Complex Instruction[1] is another pedagogical approach used to encourage more students to engage with and learn mathematics. Based on the work of Elizabeth Cohen and Rachel Lotan at Stanford University, Complex Instruction (CI), is a pedagogical framework that "enables teachers to teach at a high intellectual level" (Cohen et al., 1999) through the use of collaborative groups in heterogeneous classrooms. Those who use Complex Instruction do not base curricular examples from students' cultures or deliberately aim to align instructional practices with students' out-of-school practices. However, at the core of CI is an awareness of the structural inequities that are generated both in the larger society and within schools and classrooms, which often translate into an assumed hierarchy of competence. Complex Instruction aims to eradicate these

[2] I capitalize the term Complex Instruction to differentiate between a particular version of instruction rooted in the work of Cohen (1994) at Stanford University and instruction that is generally complex.

hierarchies within classrooms and to promote equal-status interactions amongst students, creating opportunities for all students to engage with and learn from rigorous mathematical tasks within a cooperative learning environment.

Research done in classrooms using Complex Instruction shows that, compared to students in traditional classrooms, more students engage with mathematics and for longer periods of time (Boaler, 2002; Cohen, 1997), students create knowledge about and appreciation for each other as people and mathematics learners (Boaler, in press), and both teachers and students develop an appreciation for diverse mathematical practices (Boaler & Staples, in press). In her research at Railside High, Hand (2003) claims the use of CI created "space" for mathematics students to engage in learning such that their participation influenced the daily agenda and course of lessons, allowed teachers to build upon their students' prior experiences, and created classroom cultures that supported a wider range of participation practices. In mathematics classrooms, it is often the case that the only valid "space" for participation is determined by a teacher's formal agenda and is therefore fairly limited regarding the amount of time available for participation and the type of activities allowed. However, according to Hand, students at Railside had many opportunities to practice mathematics without interference from their teachers. The mathematics teachers were not completely absent, but played a role akin to a knowledgeable guide, rather than sole expert who governed the available information, processes, and directions for learning.

To date, the research that examines how this "space," created by the use of Complex Instruction, gets filled is limited to one study focused on how students speak and act relative to the mathematics practices available (Hand, 2003). This is critical work,

first because it recognizes that "space" does exist in CI classrooms for students to assert their intellectual agency. These spaces and students' participation in them also facilitates teachers' abilities to connect with students' ideas, support their thinking processes, and help shape the ways they think about themselves relative to learning mathematics. However, there are some important questions left unanswered by a research design that foregrounds instructional programs or mathematics teachers and under-examines the experiences and perspectives of students. Concerns about easing the cultural dissonance potentially felt by minority students might prompt such questions as, Who is participating in these "spaces?" Why do they choose to participate or not? Are there different ways of participating that are more or less supportive of learning mathematics in this particular setting? How do the students make sense of their participation? How do they interpret and connect to the mathematical practices available to them as cultured beings?

Mathematics Classrooms as Cultured Communities of Practice

Culturally relevant pedagogy and Complex Instruction together remind us that culture is important to consider, and both seriously engage issues related to culture and learning. However, both approaches also have limitations in terms of how they help us understand and address culture and mathematics learning. In this study I argue that identity, as a research construct, is a useful tool for exploring some of the questions I have posed above. I begin this argument by acknowledging a shift in learning theory, from one focused on the individual to one focused on learning that happens within social settings. I then describe how mathematics classrooms are learning communities and in particular, communities in which culture is co-constructed by its members and individuals shape ideas about who they are relative to available teaching and learning

practices. My argument suggests that to better understand why students engage with mathematics and the ways in which they choose to participate, it is necessary to explore these identities they are shaping.

A sociocultural perspective of learning supports further understanding about the link between mathematics learning and culture. While it was once common to focus on learning as an individual acquisition of information and formation within the individual mind, sociocultural theory posits that learning happens in practice with others, in a community of learners where the social aspects of interaction and discourse are critical factors (Lave & Wenger, 1991). Wenger's (1998) construct of community of practice makes it possible to understand mathematics classrooms as such communities. Wenger (1998) provides fourteen factors that define a community of practice and differentiate it from other, less closely related social groups. From these fourteen, I suggest that the following three broader categories are most important for my purposes: (a) mutual engagement, (b) a negotiated enterprise, and (c) a shared repertoire of resources (p. 73).

Cobb and Hodge (2002) posit that as people participate in communities of practice, they generate a culture. This culture is based on the mutual engagement and negotiation of learning mathematics through the use of physical and symbolic artifacts. For example, in a secondary mathematics classroom, students create a culture around what it means to "do math." In some cases, "doing math" might mean sitting quietly at a desk, completing a worksheet, using the textbook as a resource and turning in the completed assignment prior to class ending. In another community, "doing math" might mean something very different. It could mean presenting homework problems at the board, discussing an idea with a partner, or writing an article. In either case, the students

and teacher are mutually engaged with particular tools, which they use to negotiate their mathematical learning. They constitute a community within a particular situated context while working towards a common goal and simultaneously co-constructing a new culture.

Within this culture of any mathematical learning community, Wenger (1998) claims that in addition to learning, students create identities through their individual agency and participation. Research in mathematics education has recently begun using identity as a research construct in an effort to better understand the relationship between learning and identity within mathematical communities of practice (Boaler, 1997; Boaler & Greeno, 2000; Boaler, 2002; Cobb & Hodge, 2002; Cobb & Hodge, 2007; Martin, 2000; Nasir, 2002; Sfard & Prusak, 2005). This is important work, as attention to the identities students create within the local cultures of their mathematics classrooms has the potential to illuminate how students make sense of their school mathematical experiences and then make choices about how to act in relation to them. Additionally, understanding learning as a process that encompasses the construction of new ways of being provides for a unique balance between personal agency and influences from the broader communities in which students participate. This perspective prevents us from completely attributing students' failure or achievement to cultures located outside of school and simultaneously recognizes the role of the individual in academic pursuits. Before elaborating on the ways in which these studies pushed the field forward and how I am building from them, I will explain the definition of identity with which I am working.

Defining Identity

Identity is often constructed from a psychological perspective, which views the formation of identity as an unconscious process and one that is assumed by growing older

and moving through life (Erickson, 1968). From this viewpoint, identity formation is an individual process and identity something that is stable over time. However, I am taking a sociocultural perspective with this research which recognizes that people shape identities through a dynamic process of living in the world. I view identities as "self-understandings with strong *emotional resonance* that people tell themselves or others and then try to act in accordance with" (Holland et al., 1998, p.3). Identities are located in the narratives people tell about themselves. These narratives may consist of "expressions implying a subjective sense of oneself as an actor/subject, embedded in claims about others, or expressed directly in pontifications about the self by specialists" (p.19). Identities provide direction to one's actions. They are "important bases from which people create new activities, new worlds and new ways of being" (p. 5).

I understand identities to be in constant flux, dynamic and fluid, and in this project I acknowledge that I never truly capture an identity, but only a snapshot of an identity that is constantly in process of being developed. I believe that one must choose to take on an identity. This may not be a deliberate or conscious choice, but identity cannot be given to someone or only absorbed through participation. In my work, I am less concerned with "cultural identities," or identities that "form in relations to major structural features of society: ethnicity, gender, race, nationality, sexual orientation" (Holland et al., 1998) and more interested in identities that form in relation to practices and activities situated in socially constructed worlds. Therefore, I assert that people may have multiple identities. Identities may overlap and be intertwined, and may not

be easily bounded or distinguishable, which may potentially cause "tensions between past histories and present discourses and images that attract them or somehow impinge upon them" (p. 5).

Identity and Mathematical Learning

The research that has been done about identity and mathematics learning has determined a reciprocal relationship between identity and practice. That is, within any learning community, inside or outside of school, students construct identities in practice. They shape self-understandings relative to the cultural activities afforded them, meaning that their participation affects the construction of their identities (Wenger, 1998; Nasir, 2002). Simultaneously, identities affect participation. Students come to a practice with ideas about who they are and their purposes for engagement which were situated in specific cultural contexts. Students understand practices and are motivated to practice in particular ways because of these identities. In the following section I elaborate on the reciprocity between identity and practice using the work of Nasir (2002), Sfard and Prusak (2005), and Boaler and Greeno (2000) and then build from their research to situate my study.

In her work with African American elementary, secondary and adult domino players, Nasir (2002) explained how the participants constructed identities in relation to their domino practice. Nasir found differences in the goals and identities players developed based on the level of complexity of the games in which they participated. As the level of complexity increased, players set higher goals for themselves, and the nature of their engagement shifted as they came to identify more as expert players. Nasir claimed that although identities were formed by individuals, they were influenced by the

social practices available during the game. These included different types of play, the language used while playing, and interactions with other players. Participation in communities therefore, governed by the norms for participation and artifacts of a practice, affect how individuals shape their identities.

Similarly, Sfard and Prusak (2005), intrigued by what appeared to be substantially different mathematical learning practices in secondary mathematics between recent immigrants and native Israelis in a secondary school in Israel, explored reasons for students' different participation patterns. In addition to participant observations, Sfard and Prusak used the stories students told about themselves to their teachers about who they were (actual identities) and who they expected to become (designated identities) as primary data sources in addition to participant observations. Their findings suggest that mathematical fluency was critical to the immigrant students' designated identities and was considered a critical link to becoming "the complete humans" they desired to be. The students' designated identities motivated them to engage more fully with their mathematical learning, whereas Native Israelis considered mathematics as key to opening doors necessary for entry into college and future professions, but not necessarily a critical element of their designated identities. Sfard and Prusak concluded that the behaviors students exhibited in mathematics classes were motivated by the stories they told about themselves regarding who they wanted to become and how they understood mathematical achievement to be central to that goal. In other words, their identities influenced their mathematical participation.

Boaler & Greeno (2000) examined the compatibility between student identities and mathematics practices in an effort to better understand why some students continued

to enroll in upper-level mathematics classes although they had already met their graduation requirements. Boaler and Greeno (2000) concluded that students chose more mathematics courses when they were invited to use more agentive mathematics practices. They understood the reason to be that the identities students were forming as young adults were more compatible with mathematical learning that positioned them as active participants rather than passive receivers of knowledge. The alignment between the identities available to students in their secondary mathematics classrooms and the personal identities students' held for themselves supported their participation and learning. This work suggests that out-of-school identities are important because they shape how students think about themselves and intersect with identities available in other practices.

One of the limitations of Boaler & Greeno (2000)'s work is that they did not consider culture as part of their research design. "Students" were taken as a homogenous group without consideration for the multiple social contexts in which they were situated outside of school and how these contexts shaped their ideas about what it meant to be a young person and a mathematics learner. Similarly, Sfard and Prusak (2005) did not explore the diverse and potentially critical narratives students' might tell about what could be called their immigrant identities, ethnic identities, or gender identities, all of which are rooted in various socio-cultural contexts and similarly might motivate their decisions and actions. While the researchers allude to the "uncontrollable diffusion of narratives that run in families and communities" (p. 21), which then impact how students mold their identities, information about students' cultural stories/identities which originated outside of classrooms was not available.

Martin's (2000) research extends the work of Boaler and Greeno (2000) by claiming there were several social forces acting on African American middle-school students as they constructed "mathematical identities" or beliefs about themselves as mathematical learners. These included socio-historical, community, and school forces, which, to a large degree, were characterized by racism, discrimination, and explicit messages about limited opportunities for African Americans in Oakland, California. Martin explicitly notes that students "were not passive recipients of these experiences" (p.170). Many resisted these forces with help from family and constructed mathematical identities that reinforced high expectations and academic success. In particular, Martin's work supports Boaler and Greeno's (2000) argument that the out-of-school communities in which students participated affected how they thought about who they were and how they should engage in school mathematics. However, more specifically, Martin extends the literature by naming ethnic identity, and in this case, African American identity, as a significant factor affecting the mathematical identities students created within school. This means that not only do out-of-school communities matter for how students think about themselves as learners, but particular out-of-school communities may matter in different ways.

Martin's (2000) attention to the intersection of ethnic identity with students' mathematical identities is significant, because it acknowledges the culture inherently created in of all communities of practice (Cobb & Hodge, 2002). Ignoring culture means ignoring a critical component of students' lived experiences, which they use to shape their identities, and simultaneously contributes to the homogenization of young people by presenting an incomplete and inaccurate portrait of their lives. Likewise, researchers

cannot assume ethnic identity to be the most important identity from the perspective of participants. Martin took for granted that being African American was meaningful to his subjects and that what it meant to be African American was similar across all cases. Different versions of the African American experience were not explored, nor did Martin consider the many different identities other than ethnicity available to students. Therefore, we are left wondering about the unique meanings students assigned to their identities as African Americans and whether or not there were other critical identities students relied on as resources from which they constructed meanings of their middle-school mathematics experiences.

Shifting the Focus of Research: Let's Hear from the Students

All of the previously named researchers have moved mathematics education research forward in important ways. Their work demonstrates that students are shaping identities within mathematics classrooms and using a sense of self, created outside of school, to make decisions about how to engage in classroom practices. My goal is to extend this work by shifting the focus away from the teachers, programs, and classrooms as the units of analysis and instead focusing on students. Using individual students as primary data sources affords opportunities to hear directly from young people about the identities they are shaping, how they think about these identities, and how they use their identities to connect with and learn mathematics. In the following section I first restate and further elaborate my argument, which advocates for the analysis of intersecting identities formed both inside and outside of schools from students' perspectives and then return to the literature about "space" in classrooms that implement Complex Instruction.

My goal is to demonstrate how the intersection of these two branches of literature support my research questions.

Students do not come to schools and classrooms as blank slates on which specific ways of thinking and being are imposed. They do not form mathematical identities separate from their cultural ways of being. Students develop identities "as an outcome of living in, through and around the cultural forms practiced in social life" (Holland et al., 1998, p. 8). Therefore, all communities in which students are members contribute to their understandings of self and of their selves in relation to the rest of the world. In addition to schools and classrooms, students are constantly shaping identities through participation with family, ethnic enclaves, church organizations, peer groups, and larger social and class structures. The out-of-school identities students bring into classrooms intersect with those available while learning mathematics (Boaler & Greeno, 2000; Martin, 2000). The mathematical identities they construct or are willing to construct are therefore affected by the ways in which they interpret given situations through the lenses of previous experiences and identities. The responsibility for interpreting the relevance of a given task or assigning meaning to a particular practice, deciding how to engage or which prior knowledge to build from, lies with students in addition to the teacher and textbook. Students' current and previous lived experiences and the identities they are forming as a result affect the kind of mathematics learners they choose to become.

From this perspective, I argue that students are constantly engaged in interpretive work, and this work is critical for making connections to mathematical content and constructing understanding. However, for students to do this sort of interpretation, they must have space for it while they are learning mathematics. Hand's (2003) research at

Railside extends the work about culturally relevant pedagogy and suggests that "space" is created by mathematics teachers who are using Complex Instruction as their main pedagogy, and that these "spaces" provide opportunities for students to construct meaning of mathematical ideas, make connections between school mathematics and prior knowledge, and engage in sense-making through the lenses of the identities they bring into classrooms. These "spaces" that Hand has identified are excellent sites in which to explore the sorts of questions about the interpretive work I claim students must have the opportunity to do. What connections do they make between their out-of-school practices and those offered in their mathematics classrooms? How do the identities students' bring with them shape how they interpret their participation in these "spaces?"

As part of the exploration of the interpretive work students are doing within the "spaces" provided by Complex Instruction pedagogy, I also argue that if researchers are interested in further understanding students' interpretive work and the meanings they assign to their mathematics experiences as a result of this activity, then we must attend to the identities that are valued by students and the meanings assigned to each. While it is important to understand how identities are shaped relative to major social structures, such as ethnicity, class, and gender, and how they influence students' thoughts about themselves and their mathematics experiences, it is also necessary to understand which identities students believe are important. Again, the many communities of practice in which each student participates potentially affect how she thinks about herself. If there are infinitely many ways to participate in a combination of communities, then there are infinitely many identities to be constructed. What do these identities mean to students and how do they choose to enact them in their daily lives? A methodological approach that

begins with students, their stories, and understandings of their lives has the potential to provide a more complex and nuanced portrait of all students, and immigrant students in particular. Using students' stories as a starting point supports an effort to move research beyond categories of identity assumed to be created in relation to particular sites (i.e. academic identity) and structural forces (i.e. gender, ethnicity, class) to include multiple and dynamic identities as understood by the individual.

This project foregrounds the voices of Latina immigrants who participated in a secondary mathematics program that employed Complex Instruction as its principal pedagogical tool. My focus on identity in a setting where students were afforded "space" to connect with and build from their multiple identities allows for further exploration of the relationships between culture, identity, and mathematics learning. Some of the useful information that might be garnered by this approach includes: Which identities are students constructing through their experiences in the many communities of which they are part? How do students think about themselves relative to these experiences? How do students use their identities to make sense of their mathematical experiences and what is the sense they are making?

Using students' stories and perspectives as a starting point makes it more difficult to essentialize and generalize students' cultures, learning styles, and learning needs according to such things as language, hair color, or home country. By probing for understanding about these intersecting identities with students who have traditionally been marginalized by mathematics, yet continue to achieve mathematical success, there exists potential for gaining clarity on some of the questions that continue to plague this

field. In the following chapter I identity the research questions that guide my work and explain my methodological choices.

CHAPTER TWO

Methods

To dispel views of Latina immigrants as homogenous, this study was designed to investigate and understand the "self-understandings" (Holland et al., 1998, p. 8) and "representations of self" (p. 29) described by four young immigrant women from El Salvador, Guatemala, Mexico, and Nicaragua. Each woman began high school as an English Language Learner and successfully completed four years of college preparatory mathematics, including Advanced Placement Calculus. This study relies heavily on the stories told by these young women about their lived experiences in their home countries, in the United States, and in their secondary mathematics classrooms. My goal with this research is to contribute to a growing understanding of the relationships between identity and mathematics learning.

The research questions that framed this study were:

> (1) What were the salient identities created by Latina immigrants who were academically successful in their secondary mathematics classes, and in which communities of practice were they shaped?
>
> (2) How do Latina immigrants who were academically successful in secondary mathematics interpret their experiences with Complex Instruction through the lenses of their salient identities?

I have organized the following chapter into three main sections. Each section further explains the methods used in this study, the affordances and limitations of each, as well as some personal accounts of what happened when I used these research tools. In the first section I discuss my use of narrative inquiry and case study to access the participants' identities and then present them in a way that honors their complex and unique meanings. In this section I also explain my use of a multi-level framework, which supported my

inclusion of out-of-school contexts as important sites for inquiry about identity. In the second section, I describe the young women whose stories make up the core of this project. I include a little information about each woman, their families, and their immigration experiences. Readers will become much more familiar with each woman through the reading of her specific case. I provide a thorough description of the mathematics program at Railside High, including Complex Instruction. I discuss my relationship to both the participants and Railside and how these relationships affected my research. In the third and final section of this chapter I describe how I approached data collection and analysis. In particular, I explain the Diversity Toss activity (Nieto, 2004), which was critical to this project, and I elaborate on the "content-oriented approach" (Lieblich, Tuval-Mashiach & Zilber, 1998) to narrative analysis, which shaped my reading of the women's stories.

Exploring Lives and Identities through Narrative Inquiry and Multi-Case Studies

Using Narrative Inquiry to Explore Identities and their Meanings

Narrative inquiry is not often utilized in mathematics education research. However, a narrative definition of identity necessitates the use of narrative inquiry for a study focused on understanding how students think about themselves and their experiences within multiple communities of practice. Many claim is that a person's stories are not windows into identities as separate entities that exist outside oneself. Instead, the stories people tell, in both facets of content and form, *are* their identities (Bruner, 1996; McAdams, 1993; Sfard & Prusak, 2005). Stories imitate life and present an inner reality to the outside world. Simultaneously, stories shape and construct the

narrator's personality and reality. "The story *is* one's identity, a story created, told, revised, and retold throughout life" (Lieblich, Tuval-Mashiach, & Zilber, 1998, p. 7).

Narrative inquiry allows for people to talk about their lives, make points about themselves, and articulate coherent interpretations of the past and the projected future from present standpoints. It requires moving back and forth in time, and between the social and the personal, as a way of reconstructing personal accounts of different events in life (Clandinin & Connelly, 1994). The story told may not follow the exact sequence of events observed by an outsider, but only through relating the elements of experience to each other through the telling of a personal story can the teller assert their meanings (Rosenwald & Ochberg, 1992). Identities are not separate entities residing outside the storyteller. They are "discursive counterparts of one's lived experiences" (Sfard & Prusak, 2005, p. 17), and only through the participants' telling of their stories can a researcher gain access to how participants understand their inner worlds.

I conducted three waves of interviews with each of the women in this project, and in each I asked the women to tell stories about a variety of events. In the first wave I asked them to discuss lives in their home-countries. This included what they remembered about their families, homes, schools, the role of men and women, and the role of education. I also asked each woman to talk about her immigration story, how she and her family came to live in the United States. The second wave of interviews was about general high school experiences, including anything they could recall about their teachers, classes, friends, extra-curricular activities, after-school jobs, school dances, and dating. We also spent some time specifically focused on their secondary mathematics experiences. The third wave of interviews included several follow-up questions to the

second interview and focus group meetings. We also discussed life after high school, the role of mathematics in their lives, and their future goals.

The open structure of these conversations took us in many directions, such that no one interview was the same. The women made connections between new ideas and memories, families, schools, and their out-of-school communities. This was obviously emotionally challenging work, which I had not expected. My questions and their willingness to share, sometimes for several consecutive minutes without interruption, stirred up a lot of emotions. Amongst the many positive stories, the women also expressed anger, resentment, sadness, and grief, especially when they spoke about emigrating. This concerned me. While I had already established a relationship with each woman when we were at Railside, we had never delved into such serious topics or topics that had evoked so much expression. I had to consider my role as the catalyst in this situation. My questions caused them to revisit situations they might not otherwise had entertained. What was my responsibility for supporting them when it was my research and their openness to respond that was causing such difficulty?

Trying to find and then maintain this role was difficult and I am not convinced that I ever found the right balance. I have continued a relationship with each of the women, and it will be interesting to watch how the processes and stories we shared as researcher and participant develop over time. Throughout this process, I also recognized my role as both interviewer and analyst (Mishler, 1992, p. 35). Although my goal was to establish a beginning and end for each interview and let the women determine the story's trajectory in-between, my role as interviewer required that I actively participate in several ways. I probed for further information, asked for missing pieces, and requested

clarification based on my understanding of the right elements and necessary features of a "good" story, especially relevant to my research questions. About halfway through data collection, I also recognized that two of the women began shaping their story-telling styles to correspond with my interviewing strategies. Emily, in particular, was brilliantly aware of how much information would satisfy me. After sharing a short story, she would consistently ask, "So, now you're going to ask, why, right?" or she would tell the other women during a focus group conversation, "You have to explain, why. She wants to know why, right Ms. Jilk?"

From the beginning of this project, I struggled with the desire to present as much of the women's stories verbatim with my responsibility as a researcher to interpret and make use of their words to support my arguments. In the end, I recognize that I, like Lutrell (1997) and Fine (1992) straddled two narrative stances, one of "ventriloquist" and the other as "activist." As the ventriloquist, I have sometimes "mistakenly assumed myself to be an anonymous transmitter of the women's voices, as if I had no hand in the telling or no voice of my own" (Lutrell, 1997, p. xiv). As the activist I wanted to provide a space for the women to tell their stories, and I wanted to ensure that these stories were heard in a certain way so as to interrupt the negative assumptions too often made about Latina immigrants. Again, I tried to strike a reasonable balance and through my interpretations and analyses strove to stay as close to their meanings as possible. Yet, even when I think I am letting their stories speak for themselves, I still have interpreted them through my own cultural lens. In fact, by the time these stories reach an outside reader, they will have gone through several translations. First, the women spoke to me in

English, which is a second language for each of them, and I then translated these stories through my particular social and academic lenses.

Asking people to recall and assign meaning to past events can be problematic. Experiences may be difficult to remember, stories may fail to include important details, and interpretations of life events inevitably change over time. The young women who participated in this project had graduated from high school anywhere from two to seven years prior to our interviews. Therefore, what they remembered, how they made sense of their memories and then chose to share them through story-telling were all affected by time and context. Stories are grounded in culture, and "constructing a narrative as a form of self-representation takes into account the past in order to understand the present" (Budgeon, 2003, p. 49). When these women spoke about secondary mathematics, post-high school experiences likely shaped how they understood and then told their stories. For example, they often compared their high school and college mathematics classes, teachers and curriculum. Had we spoken four years earlier, they may have understood and explained their secondary mathematics classes differently since they would not have had college courses to use as a point of reference.

There are always better and worse re-constructions of history, and the question about how much of story is fact or fiction always exists. I acknowledge this tension in the use of narrative inquiry in general and the reliance on memory in particular. However, I posit that the use of narrative affords information about young people, their ideas about their selves as well as their schooling experiences that are not available through other research methods. There is never only one "true" version of a story, and it is important to consider how all stories told by research participants are constructed in a particular time

and space and are, in their essence, recollections of past events. It is not my goal in this research to provide the "truth," but rather a version of truth as understood by my participants, in the moment in which our conversations were had. These stories are snapshots taken at one particular time. There is no certainty that the women would have told these same stories while they were in high school or that an outside researcher would observe similar stories in action had she conducted participant observations of these women in their secondary mathematics classrooms.

I am less interested in what might have been recorded through participant observation in the moment in which these women were engaged with mathematical learning and much more concerned with their constructions of those events given their personal and social histories (Rosenwald & Ochberg, 1992). My overall goal was to explore a phenomenon as it was understood by those who participated in it, especially from young people whose stories are rarely told or heard. This approach provides insights into identities, mathematics learning, and relationships between the two that are not available through other research methods.

Out-of-School Sites as Important Areas for Inquiry

> What youths learn, teach, believe in, long to know, and most fundamentally, how they form and re-form identities – takes shape within spaces both within and outside school (Weis & Fine, 2000, p. xi).

Since I was interested in the multiple communities outside of school in which these young women had participated and shaped ideas of themselves, it was important to situate their stories within a frame that attended to these multiple sites. Others have called attention to the need to explore the social contexts outside of schools in which students participate and the messages they receive from the larger society about their abilities to

learn mathematics and the purposes for doing so. In particular, Reyes and Stanic (1988) identified "the family, the community in which the child lives, religious institutions, the mass media, and the implicit messages that result from the pattern of prevailing occupational and other societal roles held by members of particular groups" (p. 33) as an important starting point for such research.

The multi-level framework (Figure 2) created by Martin (2000) supported two critical assumptions for my study. First, the framework's inclusion of sociohistorical and community influences as data sources reflects and reinforces my assumptions that students participate in many out-of-school learning communities which influence their beliefs about self and mathematics. However, these larger social forces are not linear or deterministic. While it is commonly understood that individuals must work within these multiple contexts and are impacted by those in which they are located, (Figure 1), it is also true that individuals act and react, as do the other players, at each level of the framework (Figure 2). This is a continual and reciprocal process, all the while changing the form, structures, limitations and opportunities that exist within each context.

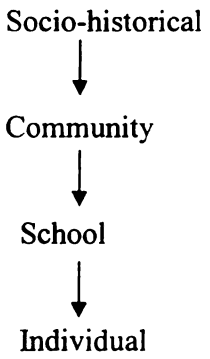

Figure 1: Multiple Contexts of Analysis

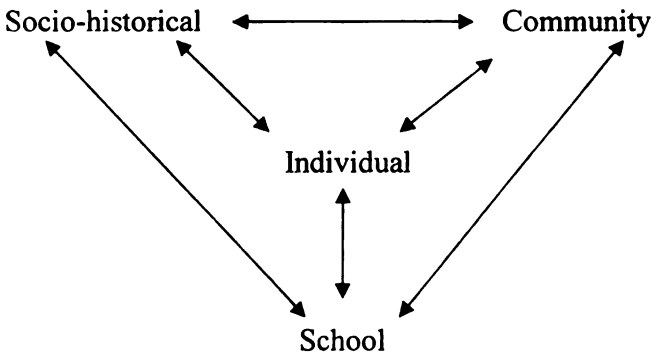

Figure 2: Individual Agency and Mathematics Socialization (Martin, 2000)

Martin's (2000) framework becomes even more complex in this study, since the participants are young women who came to the United States from different countries. Each piece of the framework was once located in a completely different sociocultural context before shifting to the United States (Figure 3). This means that both the home and host country contexts and the relations between them must be considered as potential forces with which the students are interacting.

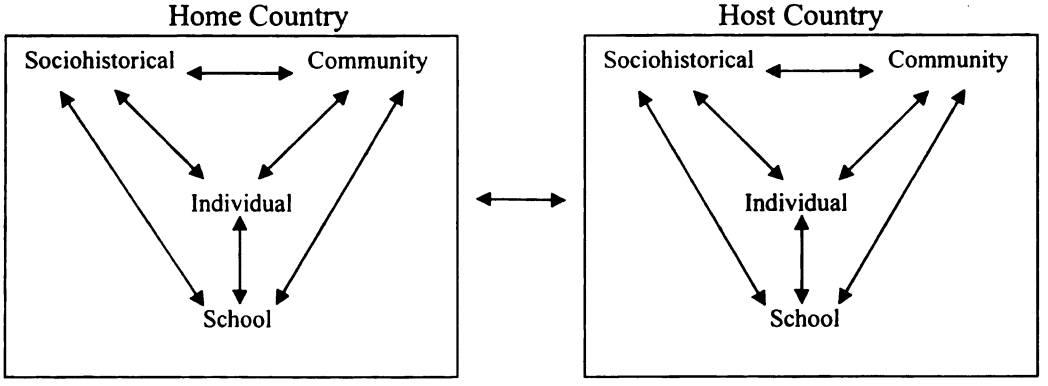

Figure 3: Agency and Mathematics Socialization in Home and Host Country

Stories Provide both Breadth and Depth Through the Use of Case Study

It is rare for research in mathematics education focused on students and their learning to employ methods that extend beyond surveys, tests, and questionnaires, and I must admit that I am usually left wishing researchers would include more data about the participants' stories. I yearn for more information about participants in addition to richer details about their thoughts and lives. It was my goal in this study to present a portrait of each woman and the social worlds that contributed to their creation of selves so that readers might get a sense of these women as people, as young adults with families and friends who have lived short, yet remarkable lives outside of mathematics classrooms that impact the unique people they are today. The use of case studies allowed me to do this.

Case studies provided me with the opportunity to examine the "local particulars" (Dyson & Genishi, 2005, p. 3) of each young woman's identity and experiences as related to the more abstract phenomenon of learning mathematics. As a research design, case study emphasizes "the role of organizations, communities, crucial events, and significant others in shaping subject's evolving definitions of self and their perspectives on life" (Bodgen & Biklen, 2003, p. 57). This focus coincides with my multi-level framework that includes the multiple communities of practice in which each woman participated as important sites for identity formation. In particular, the cases presented in this project focused on the intersection of each individual woman's salient identity with her life experiences, especially those related to her home country, immigration, and secondary school mathematics.

I do not assume that the women's salient identities or the meanings assigned to them are generalisable across all Latina immigrants. That assumption would essentialize young women and work against the very purpose for this study. To highlight the immense diversity within the broad community of Latina immigrants, I purposefully chose four women who emigrated to the U.S. from different Spanish-speaking countries. The identity codes and themes that I used emerged directly from the women's stories. Additionally, I did not ask about how all Latinas understood their lives as women or how their gendered experiences as women drove their decisions and actions. Instead, I asked how each individual in this study understood the identities she named as important. For example, I wanted to understand how are *you* a woman? How are *you* an Evangelical Christian? How are *you* "liberal?" As the cases unfolded, it became clear that the varied

contexts in which these women were situated affected how they thought about themselves and framed their interpretations of their secondary mathematics experiences.

It is also important to clarify that I am not making any assumptions about a causal relationship between the particular mathematics practices on which students focused during their interviews and their academic success. I am not making recommendations for the adoption or use of any particular instructional program or curriculum. My goal for this project was to understand the "residue" of secondary mathematical experiences as they were recalled and understood by these particular young women, all of whom participated in several years of Complex Instruction. This study contributes to both the research about the Railside mathematics department and the use of Complex Instruction as a pedagogical practice while offering a new perspective on identity and mathematics learning that is not often considered. I propose that the women's stories and what is learned from each case can be extended to other situations with which readers are familiar. They present a more complex portrait of identities that will contribute to different ways of thinking about immigrant students, their identities, and mathematics learning.

Participants, Setting, and the Researcher Role

Choosing and Finding Participants

I chose to include Latina immigrants in this research for a variety of reasons. First, as the Latino population in the United States continues to grow, statistics show that Latinos drop out of school at a higher rate than White, Asian, and African American students. Garcia (2001) explains that the immigrant experience is linked to these high dropout rates and only foreign-born Latinos are at greater risk of dropping out of high

school than are native-born youth. For Latinos, the dropout rate of 46.2 percent for immigrants is two and one-half times the dropout rate of 17.9 percent for young adults born in the United States. Additionally, research has shown that Latinos and African American Students enroll in fewer secondary mathematics courses and score worse than their peers who are White and Asian/Pacific Islander (NCES, 2005).

I also focused on Latinas in this project because both girls and Latinas are too often homogenized in educational research. Girls are often constructed as a generic category, and the mathematics experiences of White girls have been researched more frequently than the experiences of girls of color (Boaler, 1997; Campbell, 1995; Fennema & Leder, 1990). Literature in sociology (Connell, 2002) and feminist theory (Collins, 2000) argue that people experience gender differently depending on their location in society's hierarchical structures. Therefore, one girl may experience schooling and mathematical very differently from another even when they participate in the same school and classrooms.

A similar argument can be made for Latinas. Educational research has been inclined to focus on immigrants from Spanish-speaking countries, but often fails to consider the socio-cultural and socio-historical contexts of these countries and how they affect students' experiences in secondary mathematics (Bettie, 2003; Flores-González, 2002; Meador, 2005; Rolón-Dow, 2004; Valenzuela, 1999; Weiler, 2000). In an effort to build from and complexify knowledge about girls, Latina immigrants, and their mathematics experiences, I chose four young women from four different Spanish-speaking countries to participate in this study. Specifically, the young women come from El Salvador, Guatemala, Mexico and Nicaragua. It is important to understand that the

largest number of Latin immigrants in California are either from Mexico or Central America, making young people from these countries the largest growing student population in California schools (NCES, 2005).

In addition, educational research tends to construct Latina immigrants as deficits, emphasize their school failures, and analyze solutions from this perspective (Barrington & Hendricks, 1989; Beck & Muia, 1980). Again, this is important work and over time this research has positively affected how some schools work with Latina students and their families. However, I wanted to take a different approach in this study by attending to school success rather than failure, and in particular, success in secondary mathematics. This approach has potential to unearth different information about Latinas and their mathematics experiences while foregrounding strengths and resources rather than weaknesses. Unlike research that focuses on failure, I chose to focus on "successful" students who have graduated from high school and completed four years of secondary mathematics, including Advanced Placement Calculus, with a GPA of 2.5 or higher.

Finally, I acknowledge the call for research that includes second and third generation youth in a time when these student populations are growing in the United States, and especially in California (Portes & Rumbaut, 2001). However, there are two principal reasons why I chose to specifically include Latina immigrants who came to the U.S. between the ages of 5-15 (This group is commonly referred to as the 1.5 generation.). First, there is very little research in mathematics education that has explored the lived experiences of any immigrants and their mathematics experiences in general. That which has been done has focused on issues of language learning as it relates to mathematics. This study aims to broaden this conversation by recognizing that learning

mathematics in a second language is a critical issue, but it is not the only challenge with which immigrant students are faced, or the only issue that affects their mathematical learning. Additionally, the 1.5 generation came to the U.S. during an especially critical time in their lives. Developmentally, early adolescence can be a difficult for many, and this generation often has less human and social capital from which to build given the little time their parents have been in this country. These young people often feel that they have much more to lose by leaving their home-lands. They find it more difficult to let go of the lives they have established and transition to a completely new context where the language and rules that govern daily life can differ greatly. These were factors that I was especially interested in as I thought about how Latina immigrants might experience their secondary mathematics classes.

Once I had a general idea about who I would focus on in this study, I needed to find some willing participants. Since I taught several years of Sheltered Algebra at Railside, I had many connections with students who had immigrated from Mexico and Central America. As soon as I was in touch with a few of them, the word spread that Ms. Jilk needed help with a school project. I expected it to be difficult to explain the criteria for participation, since I had decided to include only young women who had completed Advanced Placement Calculus, but no one seemed to consider *not* completing so many mathematics classes in high school as a failure. This was an important observation on my part. In any case, I approached Amelia and Emily first, since I had been in contact with them more often since I had left Railside. When they both agreed to join the project, I realized that I wanted to capitalize on the fact that they came from two different countries, so I made an effort to recruit young women who came from other places in

Central America. These criteria significantly limited my options. Finding four young women from four different countries who had each begun secondary mathematics as English Language Learners and eventually completed Advanced Placement Calculus was a lot to ask for. It was then that I turned to my old course rosters and colleagues at Railside and found Sandra and Mariana.

I had never firmly decided on exactly four participants. At one point I proposed eight and was told that was too many, but I also knew that I wanted more than two. One of my primary goals had always been to illustrate the rich diversity within any group of young people who were often assumed to be homogenous. Furthermore, I wanted deep, intense conversations with my participants and the time to meander wherever a story might take us. This combination of criteria with regards to mathematical achievement, geographical homeland, and time led me to settle on four.

At one point during my data collection I decided to interview more young Latina immigrants who had attended Railside but had not enrolled in Advanced Placement Calculus. This decision was prompted by a conversation I had with a former student who was working at a local café near Railside while I was waiting for an interviewee. We started talking and I wanted to take advantage of the wonderful conversation, so I asked her to join me after work, and we completed a full interview. I did this a few more times with other students I could find through the Railside network. It was not difficult. If I stayed long enough at this same café, they often found me. The idea of including a variety of stories from Latinas who had different histories with secondary mathematics at Railside was exciting. I thought these stories would round out my data and offer a more full and interesting story overall. In many ways these extra interviews supported the

stories I heard throughout the first wave of data collection and in no way seriously challenged the mathematics stories about Railside. However, I did not pursue second or third interviews with these women, since time was a real factor, and now I wonder how I would understand their mathematical interpretations if I had made time to listen to more of their life stories. I imagine including young women with more diverse secondary mathematics experiences in my next project.

Backdrop for this Project

There was no specific site for this study. As I have previously explained, the stories I asked the young women to share spanned time and social contexts, both inside and outside of school, and both inside and outside of the United States. Railside High School, however, was the one community that all participants had in common. Furthermore, I spent five years teaching mathematics at Railside and had once been deeply familiar with its students, staff, and academic programs. I thoroughly enjoyed working at this school. It challenged me to think differently about my purposes as an educator and my instructional practices. My experiences working with young people from around the world pushed me intellectually and sparked my curiosity about issues of culture and learning and eventually led me to create this research project. In particular, I became intrigued with our use of Complex Instruction as a foundation for instruction and the ways in which this practice appeared to support our immigrant students' mathematical achievement.

The mathematics department at Railside has a history of detracking, use of Complex Instruction, and a strong commitment to equity, making it somewhat of an anomaly in the secondary mathematics world. These efforts towards reform make this

department an interesting site, rich with potential for learning about mathematics teaching and learning. During the past decade, there have been many studies conducted at Railside which document students' mathematical success in a variety of forms (Boaler, 2000; Boaler, 2004; Boaler & Staples, in press; Cossey, 1997; Horn, 2002; Lieberman, 1997). My goal is to contribute to this growing body of literature and to support the Railside mathematics teachers in their efforts to learn more about their students and their students' mathematics experiences by including the voices of Latina immigrants, a small but growing population of students at Railside. In the following section I provide a brief history of the Railside mathematics department, describe its organizational structure, and explain the components of Complex Instruction more thoroughly. This information provides a picture of the larger school context in which the participants' mathematics stories are situated.

Railside High School and its Mathematics Community

All of the young women who participated in this study attended Railside High School for at least four years during grades 9-12. Three of the four women graduated from Railside in 2002, and one graduated in 2004. Although the school's demographics have not changed dramatically over the past ten years, in order to provide a more accurate picture of the school setting during a time when each of the women were students there, I am presenting demographic data for the 2000-2001 school year. This data is important because members of mathematics communities help shape the cultures in which women are creating identities and making sense of their mathematics experiences.

During the 2000-2001 school year, Railside had approximately 1500 total students. Of these students, 35% were Latino, 25% African American, 21% White, and

18% Asian or Pacific Islander, and 1% American Indian. In 2000-2001, 12% of all students at Railside received English language services, and of these 68% were Spanish speaking (Education Data Partnership, 2007).

The mathematics department at Railside High School has a long history of de-tracking its mathematics courses and working towards equitable access to higher-level mathematics courses for all of its students. Beginning in the early 1990s, the mathematics teachers at Railside eliminated its Pre-Algebra course and began admitting all 9th grade students into Algebra A, the first half of the Algebra course sequence. The school randomly assigned students to this course rather than making placement decisions based on previous grades or test scores. Students needed to earn a C grade or better in Algebra A to move on to Algebra B and then into other higher-level mathematics courses. In addition to the traditional Algebra – Geometry – Higher Algebra – Pre Calculus – AP Calculus college-preparatory courses, students could choose Geometry and Art, a course that relies on The Geometer's Sketchpad as its core tool for teaching and learning. Students with special learning needs were enrolled in mainstream courses or in a section of mathematics taught by a special education teacher. This decision was dependent on the student's Individual Learning Plan (IEP). Students who were not yet fluent in English began their mathematics careers in Sheltered Algebra A. This course used the same curricular content as the other Algebra A classes, but was taught by an instructor who was trained in Cross-Cultural Language and Academic Development (CLAD). The Railside mathematics department also provided a Sheltered Algebra B class. There were no other Sheltered mathematics courses offered at the school, so

students who were English Language Learners moved into "regular" classes once they passed Sheltered Algebra B.

Beginning in 1996, Railside worked with a 90-minute block schedule and students took eight classes each year. Each mathematics class was one semester long, with the exception of Algebra I, which was a year-long course made up of Algebra A and Algebra B. Students could enroll in more than one math class per year, so it was feasible to complete the college-preparatory mathematics sequence by the end of 11^{th} grade. More often, students at Railside took one math class per year and completed Advanced Placement Calculus during the 12^{th} grade, since there were several other graduation requirements to meet. According to Boaler and Staples (in press), 41% of Railside students took advanced classes of Pre-calculus or Calculus during their senior year.

The mathematics teachers at Railside High School worked with a deep commitment to supporting each student to be successful in mathematics. This meant many things. First, the teachers truly believed that each student was able to learn mathematics. They "held high expectations for students and presented all students with a common, rigorous curriculum" (Boaler & Staples, in press, p.20). This belief that all students, even those who arrived at Railside with fewer mathematical experiences or weak content knowledge, *could* and *would* be mathematically successful, drove the curriculum and pedagogical strategies teachers employed.

I have mentioned before that Complex Instruction was the overarching pedagogical practice used by the Railside mathematics teachers, and this was one of the reasons why I chose Railside as the setting for this project. Complex Instruction stems from a decade of research done by Elizabeth Cohen and Rachel Lotan (1997) at Stanford

University. At its core is the philosophy that students learn more when they engage with others around rich, open-ended tasks and have opportunities to discuss ideas, determine solution strategies, and build from each other as intellectual resources. Instruction is different from other programs of cooperative learning in that it directly attends to issues of status and aims to "disrupt typical hierarchies of who is 'smart' and who is not" (Sapon-Shevin, 2004, p. 3). Cohen (1994) documented the many ways in which dominance and inequities within the larger society are reproduced within small groups. When people work together, inequalities in interaction and a status order based on *perceived* competence emerge and impact who participates, how people participate, and ultimately who learns. These inequities and hierarchies of competence emanate from many sources, both social and academic, and are likely to shift as students move from one setting to another (i.e. home to school, mathematics class to history class).

Here is one example of how status could interfere with students' learning. U.S. society values the English language more than other languages. Therefore, it is likely that students who are not fluent in English are often perceived as less smart in mathematics than native English speakers. This *perception* of intellectual competence based on language ability positions non-native speakers with less academic status, and often leads to lower academic expectations by teachers and peers and less participation by the student in a cooperative setting (Cohen, 1994). Similar status distinctions are often made on the basis of social class, ethnic groups, and gender. "These are general social rankings on which most people agree that it is better to be of a higher social class, white and male than it is to be of a lower social class, black or brown or female" (p. 32). Complex Instruction recognizes status issues and interferes with them through specific

curricular, pedagogical, and assessment strategies for the purpose of increasing both access and engagement with academic tasks. Three main components of Complex Instruction - groupworthy tasks, norms, and roles - are meant to be implemented simultaneously to prevent status issues. I describe each next.

Groupworthy tasks are "those that illustrate important mathematical concepts, allow for multiple representations, include tasks that draw effectively on the collective resources of a group, and have several possible solution paths" (Horn, 2006, p. 22). Another important characteristic of groupworthy tasks is that they require multiple abilities. While many mathematical tasks are narrowly constructed and solved using a single procedure, groupworthy tasks demand that students use several different mathematical skills within the context of a single task. These may include such things as organizing, explaining, analyzing, justifying, or solving problems using more than one strategy.

When students begin working together to solve problems, the norms for engagement must also change. Complex Instruction calls for teachers to create cooperative norms in their classrooms to support students while they are working together and engaged with mathematical content. There is no one set of common norms that all teachers are required to use, however, Cohen (1994) suggests a few: (1) ask your group before asking the teacher, (2) everyone participates and everyone helps, (3) you have the right to ask for help and you have the responsibility to offer it. It is important to recognize that these norms are not the same as classroom rules. While a teacher might have certain rules about tardiness, bathroom passes, or late homework, norms are different in that they are about how students are expected to engage with mathematical

content and with each other as they are learning mathematics. The purposes for classroom norms are to support effective groupwork, prevent issues of status, and promote individual and group accountability.

Placing students in small groups and telling them to work together does not guarantee quality group interactions in support of mathematical learning. By assigning students roles, teachers delegate authority to the students and support them to take responsibility for the functioning and the mathematical learning of the group. Roles are not used to manage students' behavior by keeping them busy or out of trouble, nor do they allow for the division of mathematical labor. Although each student has a different role to play, which means their responsibilities for managing the group differ from each other, each is equally responsible for participating as a mathematical learner. Roles are assigned randomly, which demonstrates a belief that each student is smart and capable of successfully carrying out the role.

Researching from the Borderland

"A borderland is a vague and undetermined place created by the emotional residue of an unnatural boundary. It is in a constant state of transition" (Anzaldúa, 1987, p. 25).

Relationship to the Site

During my five years of working at Railside High I was both a mathematics teacher and co-chairperson of the mathematics department. I taught several different mathematics courses, including Algebra, Higher Algebra/Trigonometry, and Advanced Placement Calculus. Additionally, I taught Sheltered Algebra, a course for students who were receiving English Language services. As a result of these roles, I occupied a unique position as researcher for this project. In retrospect I realize that I had begun thinking about this work long before I entered graduate school. Teaching mathematics, and

specifically, working with immigrant students, had been a passion of mine, and this passion had prompted many questions, much reading, and a lot of reflection over the years. However, when I started collecting data for this project, I had been out of the classroom for three years. At the time, I did not think that three years was very long to be away. However, I soon realized that I had lost my true "insider" status. I could no longer access the school's database. I did not know about some of the new hiring, programmatic, or curricular decisions that had been made. I had not kept up to date on the status of some of my former students, who had passed or failed courses, or which students had transferred to new schools or moved out of state.

As a researcher, I was not completely an "outsider" either. I definitely had fewer personal connections, and my understanding of that particular school system was not as strong as it had once been. However, I had maintained a connection to Railside during the three years I was gone. I had visited the school at least twice each year, always during my winter break and again for graduation. I still knew most of the staff and many of the students. I maintained a professional connection with the mathematics teachers through conferences and workshops and continued to mentor many former students via phone and email. I had an intricate knowledge base of the theoretical underpinnings of Complex Instruction, the foundation for Railside's mathematics program, and I understood it practically given my use of it as a classroom teacher. I knew the historical trajectory of many of the larger systems that guided the departments' hiring, mentoring, and curricular and pedagogical decisions. I knew the community in which Railside was situated. I had worked with the parents, watched many football, basketball and soccer games, attended high school dances, and chaperoned prom and club activities.

Much like the young women who agreed to participate in this project, I had become a border woman. In the Borderland literature, Anzaldúa (1987) asserts that Borderlands are more than physical boundaries that separate people, that define the safe from the unsafe, *us* from *them* (p. 25). There also exist psychological borderlands, sexual borderlands, and spiritual borderlands "wherever two or more cultures edge each other, where people of different races occupy the same territory, where under, lower, middle and upper classes touch, where the space between two individuals shrinks with intimacy" (preface). As a former mathematics teacher and current graduate student, I was working between cultures, the culture of a public high school and that of a University's College of Education. I had lived in both but was returning home with a new set of lived experiences, a new language, a new identity, and a new way of understanding the education world.

I struggled with feelings of alienation, sadness, and regret each time I returned to Railside for data collection. I grieved the loss of my home as a classroom teacher, my role as a teacher, and the connections I once had with students, teachers and the community. Simultaneously, I was excited about my new researcher role. In graduate school, "dormant areas of my consciousness had been activated, awakened" (Anzaldúa, 1987, preface), and I was thrilled with the idea of returning to Railside to reflect on what I once knew and practiced. I did not want to give up either position. Although uncomfortable, I wanted to maintain my existence as a borderland woman. I wanted to be a part of both worlds.

There were advantages and disadvantages to my role as a Borderland researcher, and this unique position shaped everything from my research and interview questions to

data analysis and writing. My local knowledge of Railside afforded me information about the school context and the work of its mathematics teachers to which an outsider would not have access. For example, I have an intricate knowledge base about both the theoretical underpinnings of Complex Instruction and its practical use in secondary mathematics classrooms. This knowledge supported me to ask different questions than someone who might understand Complex Instruction theoretically but has never used it in a classroom.

This same insider role required me to be sensitive to assumptions I might make while collecting, reading and analyzing data. To manage this tension, I did several things. I constructed interview questions that pointedly asked the participants about their secondary school and mathematical experiences while simultaneously leaving room for each to interpret my questions and make choices about how to respond. My follow-up interview questions and analysis of the women's stories were built from each woman's interpretation and response rather than a search and report for particular responses from an existing framework. It is therefore as interesting to note what each woman chose *not* to discuss about high school mathematics as it is to consider what she did talk about. I also acknowledge that there may be multiple interpretations of this data, and some may attribute these women's success stories to individual motivation or intelligence, since these factors are commonly used to explain students' academic achievement. As their cases unfold, it is apparent that these young women were both motivated and smart. However, their stories suggest that these are not isolated characteristics of special cases. Instead, there exist important relationships between the pedagogical practices used by Railside teachers, the women's determination to learn mathematics, and the ways in

which particular teaching and learning structures connected to and built from the women's intellectual strengths.

Relationship to the Participants

In addition to my relationship with Railside High and its staff, I must also acknowledge the relationships that exist between the young women in this study and myself. At one point, each of the participants was a student in one of my mathematics courses. Given the structure of Railside's mathematics program and the schools' master schedule, I was one of four mathematics teachers each woman had over the course of four years. Additionally, the women and I have maintained an on-going relationship since I left Railside in 2002. My role in their lives is best described as that of a mentor. It consists of frequent phone calls and emails as I have tried to support them through their transitions from high school to college. I know the women's families, but not intimately. They know me as Ms. Jilk, one of their daughter's high school mathematics teachers. In three of the four cases, this was the first time I had visited the women's homes or met their parents.

My relationship with each participant had its advantages and disadvantages. On the one hand, this relationship gave me access to the women, their lives and life stories in ways that others might not have experienced. We have worked together over time to construct relationships built on honesty and mutual respect, and we engage in these relationships with certain expectations for how the other will be. I acknowledge that these circumstances meant that the young women had an enormous amount of trust in me, and they cared about my opinions regarding what they said. In these ways, I was granted a lot of power during our interviews, which likely shaped what the participants told me, and

how they told it. On the other hand, the dynamic between us was different when the audio recorder was turned on, and I began asking questions. The women always knew that this project would one day "go public," and that I had a responsibility to make sense of their stories in ways with which they might not agree. Again, they had a lot of trust in me regarding what I would eventually do with their data, but simultaneously they understood that they were speaking to a larger audience.

Additionally, my role as one of their former teachers presumably affected how they spoke about their mathematics experiences in particular. We shared a certain amount of familiarity with Railside, which affected the questions I asked, their decisions about which information to share and how they expressed their ideas. They knew that I knew of the teachers and classrooms about which they spoke. Therefore, I sometimes had to carefully negotiate how I phrased something or when I probed for further information to confirm that I wanted them to speak honestly, especially when they had things to discuss that they assumed I would not like to hear.

In addition to these personal relationships, my role as a former teacher at Railside provided me a lot of power, as I had access to much more information about these young women than they sometimes chose to share. Several years ago, I was privy to their academic files and had conversations with other teachers and counselors about how to support these women as students both academically and socially. Ultimately, I assigned them grades for their work when they were students in my mathematics class, and these grades became part of a permanent record that follows them through life.

I am also aware of how the differences in our race and class may affect how I interpreted the narratives of these women. I am currently a middle-class, heterosexual,

White woman who was born and raised in a small town in southeastern Minnesota. English is my primary language. I was raised in a working-class family, and in the past ten years I have participated in several years of higher education. The young women in this project were born outside of the United States and currently live in urban areas of Northern California. Their first language is Spanish, and they come from poor and working-class families. Our differences in race, education, and perceived social status have perpetuated different ways of experiencing and understanding the world in which we live. The "frames of interpretation" (Erickson, 1986, p. 140) that each of us brought to the project affected how we made sense of different situations. These different frames necessitated my constant attention to the complexities of collecting, analyzing and reporting data, recognizing that "objectivity, truth, logic, and reason could no longer be construed as givens" (LeCompte, 1995, p. 99).

Given the long history of White people speaking for and about people of color, manipulating stories to meet their needs, and exploiting "others'" exotic ways to push forward personal and professional agendas, my position as a White woman doing research about women of color is highly political. Historically, women of color have been stereotyped, silenced, and stripped of their opportunities to speak about their own complex experiences and identities in a discourse outside of those requiring the use of the "master's tools" (Lorde, 1984). I acknowledge these structural and systemic oppressions, my unintentional role in maintaining them, and the fact that they have shaped who I am and how I interpret the world.

Data Collection and Analysis

Salient Identity

> I am black, but blackness is not the totality of my identity. *It is not even the core of my identity*...I have the freedom to define myself as I think best (after all, who's living my life?) and if I have to fight white and black America to retain that freedom, so be it (Lester, 1982, p. 84, emphasis added).

Rather than focus solely on ethnicity or gender identity, I wanted this research to foreground the identities each woman claimed as most salient in their lives. I wanted to attend to the identities the young women had authored "in relation to practices and activities situated in socially constructed worlds" (Holland et al., 1998, p. 3) and would describe with "emotional resonance" (p. 3), as well as the meanings they assigned to each. This decision reflected my assumption that students participate in multiple communities of practice in which they learn and create identity and also my decision to begin with the knowledge and voices of my participants and honor *their* understandings of their lived experiences (Bernal, 1998).

An analysis of the women's "cultural identities" (Holland et at., 1998, p. 7) might have begun with who a young woman is, how she acts, and what she believes about herself as a Latina immigrant from El Salvador, Guatemala, Mexico, or Nicaragua since gender and ethnicity are dominant social structures against which people construct a sense of self. For various reasons research most often attends to the relationships between cultural identities and learning with an assumption that ethnicity and gender are the identities that impact young people the most. However, Holland et al. (1998) assert that "it is folly to assume that members of a voluntary group or even members of an involuntary – ethnic or racial –group are uniform in their identities" (p. 190). People develop identities in different degrees of *salience* based on individual social situations,

histories, and varying amounts of involvement in particular communities, and the salience of an identity affects one's decisions and actions (Holland et al., 1998).

It would have been much easier, and maybe even considered more reasonable and productive by some, to approach the young women with an assumption that their "Latino-ness," or the salience of their Latino identity, was of utmost importance in their lives. Given that all of the women in this study have brown skin, long dark hair, and speak Spanish, they are likely most often *positioned* by outsiders as Latinas. This positioning often leads to a construction of the "other" based on stereotypes or limited knowledge of the countries and social contexts from which they come and in which they currently participate. Since my participants were all females, I might have approached this study similarly using assumptions about gender identity and its salience in the women's lives. In fact, one's cultural identities may also be the most salient. However, it cannot be assumed that this will always be the case only because cultural identities are identifiable by observable characteristics (i.e. language, clothing, and genitalia). While a researcher may choose to focus exclusively on cultural identities, this decision should be acknowledged and readers cautioned that these identities may not correspond to the identities most salient for the participant.

Additionally, it is often assumed that the meanings assigned to particular identities are the same for researcher and participants. However, what it means for one person to be a woman, for example, how that person acts as a woman, and the construction of woman in a person's life, may or may not correspond with the "version" of woman held by an outsider, even if this outsider is a woman. There are many "versions" of any one identity. Just as there are infinitely many ways to be a woman in

the world, there are infinitely many ways to be a Christian, a man, or Chinese. Research must attend to the meanings participants attach to their identities. The social construction of an identity -- how the world makes sense of and positions one as a woman -- may in reality be very different from the meanings assigned to the identity by its owner.

Exploring Salience through the Diversity Toss

I used an activity called Diversity Toss (Nieto, 2004) in an attempt to unearth the identities to which the women assigned the most salience. This activity required the women to write five different identities on five different note cards. I asked them to include an ethnic, gender, and religious identity, and the name they used most often. On the fifth notecard, each woman wrote an identity that she considered important. Once the notecards were completed, each woman gave up the identity that was least important. This process was repeated twice more, leaving each person with two cards. At this point, everyone turned to the person on her left and took one of her cards away, leaving only one identity.

This activity required the women to make decisions about the relative importance of their identities, and it encouraged a dialogue amongst the young women about identity, the meanings they assign to their identities, and how their identities are valued and acted on. While I initiated and directed the "rules" of the activity, the women quickly took over the conversation. They enjoyed the task and took it much more seriously than I had anticipated. While we all knew this was a game of sorts, I watched as the women manipulated the cards in their hands so that an important identity would not be taken away. I heard groans and expletives when someone lost an identity she wanted to keep. Although the Diversity Toss was thought-provoking on its own, it was the authenticity

with which the women engaged that made it a critical event in this study. The women spoke about identity using terms and descriptions that were familiar to them while generously providing me access to their feelings, ideas, and lives in ways that profoundly shaped how I approached this work.

I was intrigued by the results of this activity, for they were very different from what I would have assumed given my experiences with students and my reading of the relevant literature. For example, each woman gave up her name within the first or second round of the task and her ethnic identity during the third round. Religious, gender, and academic identities were held onto until the very end. Furthermore, the choices each made about how to name her ethnic identity sparked a lively conversation. Out of the four women, two named themselves Latinos, one named herself Hispanic, and Amelia used the term, Mexican-American. No one used the term Latina or Chicana, and aside from Amelia, no one referred to her ethnicity using the name of her country (i.e. Salvadoran, Guatemalan, or Nicaraguan). Emily insisted that using the word Hispanic was the same as using the term "nigger" when talking about African Americans. Sandra and Mariana insisted that if they used the terms Nicaraguan or Guatemalan no one would know what they were talking about, since they believed so few people even knew these countries existed. All of the women articulated a deep and sincere appreciation for their home-countries. "We LOVE our countries. We are PROUD of where we came from." Their choices about how to name their ethnic identities were based on terms they had heard and used in their local communities, which helped outsiders to recognize them.

It is also interesting to note what the women did *not* write on the 5th notecard when they had the option of naming any identity important to them. I had immediately

thought about what I would write and imagined including musician, teacher, or traveler, things related to my job or hobbies that occupy a lot of my time. The women, however, wrote "college student," "daughter," "older sister," and "education" and included nothing related to their jobs, future job aspirations, hobbies, languages, or immigrant status.

Interviews and Focus Groups

In addition to the Diversity Toss activity, my primary sources of information were the stories told by the young women. Their stories recount a variety of experiences from which they derived their interpretations of self and the communities in which they participated. I coordinated three waves of individual interviews over a six-month period of time. The interviews were semi-structured and most often became three or four hour-long conversations each time I was in town. Given the narrative structure of these interviews, no two were ever quite alike. The women often made connections to questions I posed in ways I had never considered. What started out as, "Ms. Jilk's school project," soon became monthly opportunities for the women to share their life stories either in their homes or at a local café. I was amazed by their eagerness to talk to me about their lives, the depth of our conversations, the astute connections they made between events and ideas, and the critical analyses they offered. I had known these young women as students at Railside High, but I soon realized how little I had really known them. Most poignant for me were their recollections of immigrating to the United States and the magnitude of the loss they expressed over leaving their homes and families. I was particularly struck by how much of their lives in their home countries, even after so much time and distance, still occupied center stage of the women's hearts and minds.

We convened as a whole group twice during the six months of data collection, once towards the beginning and once again towards the end. We met once in a mathematics classroom at Railside and our last meeting was held at the hotel in which I stayed. Each session lasted between three and four hours. These focus groups were opportunities for the women to take center stage, for their ideas to surface, and for them to navigate the trajectory of the discussion. While I suggested topics or led with particular questions, it was soon very obvious that I was not needed to keep the conversations going. The women developed a particular rhythm of their own which included a lot of terrific talk. They usually started with one idea, told some kind of funny story, laughed a lot, asked each other some questions, and finally reconnected to their initial topic. Sometimes they cried and other times they argued, but more often they laughed. Always, there was a sense of camaraderie and understanding in the room from which I felt somewhat distanced. These young women shared something that I would never know. They understood each other in ways that I could not comprehend. They moved fluently between English and Spanish and sometimes used a combination of both. Together, they created two, very memorable experiences of which I was privileged to be a small part.

Interviews with parents were semi-structured, lasted from two to three hours, and were held in parents' homes without their daughters present. I interviewed only mothers since the fathers of each participant had either died or were no longer part of the family for other reasons. Although the mothers all knew me as a teacher from Railside High School, our interviews felt much more formal than those I had with their daughters. I am certain that part of this formality was due to the fact that I do not know the Spanish language well enough to conduct interviews in Spanish and spoke with them through an

interpreter. I could understand much of what each woman said, but I am quite sure that my inability to speak with them directly in the language with which they are most comfortable was a major factor that contributed to the distance I felt between us. I found it very interesting how the women chose to spend our time together. One was quite formal and strictly held to the two hours I had recommended for the interview, while others regarded this as an opportunity to treat me to their homemade tamáles and horcháta, while showing me family photos. Always there was laughter and many tears as the women shared their stories.

Data Analysis

The Diversity Toss as a Place to Begin

The results of the Diversity Toss activity and the conversations provoked by it provided me with a starting point for data analysis. Each woman was left holding one card at the end of the task. This final card was either the identity each woman considered most important or second-most important, depending on how the activity had played out. When the young women talked about the identity each was left holding, this helped me know which identity they valued the most, why it was valued, the meanings it held, and how they understood it as catalyst for decisions and action. In addition, I heard the women make connections between their constructions of identities and their families, their lives in their home-countries, their in-and-out-of-school experiences.

I analyzed data using these identities as categorical themes, which I considered to be *salient* identities. I looked for their presence across the interview data, in the women's talk about school and mathematics classes, and in their stories about family and friends. Both form and content of stories offer valuable information about person's identities,

however given my focus on students' meaning systems and personal sense-making, I used a "content-oriented approach" (Lieblich, Tuval-Mashiach & Zilber, 1998, p. 12) to analyze the data. I dissected the women's original stories and analyzed smaller narrative sections aimed at getting to the implicit content by asking about the meaning conveyed by the narrative, which traits or motives of the individual were portrayed, and the relevance of the images invoked by each narrator (Lieblich, Tuval-Mashiach & Zilber, 1998). I considered the distribution of themes across the story as a whole. I attended to emphasis placed on particular words or phrases and considered the emotion with which the women spoke.

This approach to narrative analysis takes a much broader perspective about what "counts" as identity within a given narrative relative to that which has been recently put forth by Sfard and Prusak (2005). Sfard and Prusak limit the parts of a narrative that represent a person's identity to what they call, "*is*-sentences" (p.16), statements that are reifying, significant, and endorsable about a person. My decision to include implicit content as well as emotion may be considered less rigorous by some due to the subjective nature of this work. However, I chose to include these linguistic features in my analysis, because they are important indicators of significant emotions and events relative to the participants' stories (Lieblich, Tuval-Mashiach & Zilber, 1998). It is also my belief that by attending to these characteristics I was able to stay closer to the "truth" of the meanings of the women's identities, as they understood them, which supports my efforts to avoid contributing to commonly held stereotypes or misrepresentations of Latina immigrants.

I used these salient identities as one of the main themes I identified in the data but also as a lens through which to understand the women's stories. While the term used to name the salient identity was valuable as a category, it was the meaning assigned to the identity that was critical. As I analyzed data, these meanings replaced the meanings I might have used given my own lived experiences and understanding of the literature, which is what I did *not* want to have happen. I did not want to apply a generic category or the "White woman's version" of these identities to my data analysis. I wanted to work from the participants' meaning systems, the meanings of "woman" or "liberal" or "Hispanic" that they had derived from their experiences. This activity and the debriefing conversations afforded me different lenses through which I could interpret the women's narratives, lenses that were grounded in their worlds instead of mine. I also used information garnered from the Diversity Toss to examine transcripts from parent interviews as a way of exploring how these salient identities were discussed, or not, by the mothers of these young women. This was a way to triangulate the stories told by the participants, for identities are not only available in the self-narrative but in the ways people outside of the self describe the person's identities as well (Sfard & Prusak, 2005).

Further Data Analysis

All interviews were audiotaped, and I maintained a data-log where I recorded the date, place, and topic of each interview. During the interviews, I also took field notes that included observations, further questions, and ideas for interview revisions. Immediately following each interview, I wrote reflective memos. I recorded a summary of the information gathered from the interview, my general impressions about the quality of the interview questions, critical moments, and ideas for follow-up. These memos were

especially useful during data analysis, when, after months had passed, I could remind myself of specific conversations or points of interest that had been important at the time. These reminders often led me to pursue a line of inquiry I might not otherwise have considered.

During the six months of data collection, I alternated between individual interviews and focus groups. For example, in January I conducted the first wave of individual interviews with each participant, and in February I held a focus group meeting. During a month when there was a focus group rather than the individual interviews, I transcribed all parts of all interviews and reviewed the previous set of data. I used this information to support the construction of the next wave of interview questions. The broad outline of interview questions I had created at the beginning of the project was significantly enhanced due to this process. I was able to narrow my focus and pursue patterns and themes that were emerging in the data as the study evolved.

Throughout all phases of data collection and analysis, I tested working hypothesis. I open-coded the data looking for patterns and themes over time. I coded themes in the margins of the transcripts with colored pencils, made charts to organize the color-coding, and cut up copies of notes to make connections between themes, questions, and ideas I wanted to further pursue.

As the study evolved, there were critical statements from different interviews with each woman that I wanted to further explore. I took several excerpts to both focus groups and presented them to all four women for discussion. I presented the clips anonymously, although the person from whom it came most always claimed ownership for the idea. These were opportunities for the women to analyze their own data. They offered critiques

of the piece, made connections between it and other ideas, and often presented a more complete explanation than had initially been presented.

Throughout this project, I was concerned about representing the stories of these young women in a respectful way and including them in the analysis process. I sent each woman her individual case as it was completed and each version thereafter. They clarified my misconceptions and updated me on their own thinking about their stories over time. I also presented parts of this dissertation at different conferences throughout the past year. Since the women were unable to attend, I audiotaped my presentations so the women were aware of how I spoke about them in public.

Overview of Following Chapters

In Chapters Three, Four, Five, and Six I turn to the stories of each young woman. I describe their salient identities, the meanings they assign to these identities, and the out-of-school communities in which they were shaped. I then explore how each woman interpreted her secondary school mathematics experiences by drawing upon her salient identity as both a lens and an intellectual resource. In each case I emphasize the need for "space" in mathematics classrooms so that all students have the opportunity to translate the available teaching and learning practices such that they can make relevant connections to previous experiences and prior knowledge in ways that support their learning.

In Chapter Seven I discuss how this study contributes to research about culture, identity, and mathematics education, and I make suggestions for further research and teaching practices. In particular I stress the need for varied methods in mathematics

education research and specifically the use of narrative inquiry to better understand the complexity of the identities students are creating from their perspectives.

In the final section of this chapter, I introduce Amelia, Emily, Mariana, and Sandra. While in subsequent chapters I provide much more information about each woman, my purpose here is to present short biographical sketches. My hope is that these sketches will help readers begin to know these women in ways that supports the reading of each case, and in combination with the case studies develop a full and rich portrait of the women as whole people.

Introducing the Young Women

Amelia

Amelia spent the first years of her life in western central Mexico in the State of Aguascalientes. Her parents dropped out of high school after they met and became pregnant with Amelia. Amelia described herself as a child as " very, very loud, very talkative." She had a lot of spunk. She fiercely protected herself and her family against anyone from whom she sensed the slightest bit of danger. She explained, "Yeah, my cousins, kids in the neighborhood, kids at church, I would just beat 'em all up."

All of this changed when Amelia moved to the United States with her parents when she was five years old. Unlike some of the other women in this study, Amelia's immigration experience seemed pretty uneventful. Her father had been working in the United States for quite some time and decided one day that it would be better for the family if they all lived together. Amelia told me that when she left Mexico, she "became a totally different person, completely the opposite person." She went from being strong and bold to quiet and shy. Amelia struggled in school and described living in California as "living in prison" because

she stayed inside the house all day. Amelia's mother did not speak English and did not want to go outside for risk of getting lost. Amelia told me that she cried a lot in school. She could not understand her teacher or classmates and wanted desperately to return to Mexico.

Amelia's personality did not change when she began high school. She claimed that she was still shy even after she made some friends and improved her English. By this time, Amelia had four younger siblings, three sisters and a brother, who occupied the center of her world. She did all of the cooking and cleaning at home, shuttled her siblings back and forth to school, bought their clothes, and helped pay the mortgage on their house. Amelia did not participate in any sports or music programs in high school, mostly because she just did not have the time, but she became a member of the Movimiento Estudiantil Chicano de Aztlan (MECHA) club in her 11th grade year. Amelia's parents held her to very high academic standards, and expected her to earn straight As and eventually attend college. Although they had not finished high school, both of Amelia's parents hoped she would have more and better opportunities in life than had been available to them.

Emily

Emily presented herself as a very serious person, but she also had a sarcastic side that emerged every once in a while. When it was least expected, Emily would crack a joke but in such a way that I was unable to discern whether she was serious or trying to be funny. Emily was the youngest child in a family of five, but had many traits one would expect to find in the eldest. She took exquisite care of her mother by driving her wherever she needed to go, acting as her translator, and paying the mortgage for their home. To her niece and nephew, Emily was "Auntie Tita," co-mother, mentor, and friend.

Emily began her life outside of San Salvador, El Salvador, where she lived with her grandmother, three older brothers, and extended family. Emily's mother immigrated to the United States when Emily was five years old, and Emily never knew her father, who left before she was born. Emily's grandmother raised her when her mother left for the United States. Emily adored her grandmother and spoke of her fondly, often referring to her as "Honey." They had a very loving relationship, and Emily felt cared for when she was in grandmother's company. Emily also remembered very lonely times in El Salvador without her mother and told several stories about her aunties who treated her more like a servant than a niece.

Christianity was at the center of Emily's life. She walked with her grandmother to church each day and spent about two hours there praying on her knees. Sometimes they even attended services twice in one day, once in the early morning and again after Emily took her nap. Emily went to school in a two-story building that included grades K-8. She described this school as "very old" with old desks, old walls, and dirt floors. Her recollections of teachers were that they were "very, very strict," and did not tolerate any backtalk or misbehavior. Emily explained, "Over there, if it's green it's green, and if it's red it's red. You just deal with it." Emily was often sent home, because she was not considered clean enough, or her school uniform had not been ironed. She told me that she was not a very good student and often climbed through windows and skipped out of school with her cousin because she was bored.

Emily's mother returned to El Salvador and traveled with Emily to the United States when Emily was ten years old. Emily did not share much about her immigration experience with me. This part of her story was relatively brief. She talked about running across desserts

and swimming across lagoons. She and her mother spent a month living in Mexico with a cousin and then one day boarded a plane for California.

Emily spoke about her transition to life in the United States with as little emotion as she used to describe her immigration experience. The worst thing she mentioned was how "horrible" it felt to start school without the ability to communicate. When Emily first came to the U.S. she only spoke Spanish, but she was placed into an English-only classroom for her first two days where "they were always talking to me and I would just look at them. I didn't know what they were saying to me. The only thing my brother told me to tell them was, 'I don't speak English.' That was all. So that's what I said. 'I don't speak English.'

Ironically, Emily "liked school a lot" in California. She had proudly been named Student of the Month "a LOT" and had many certificates to prove it. The number of resources available to Emily in school left her awed. There they had crayons and coloring books, pencils and paper. She could check out books from the library and actually take them home. Emily told me that she never skipped school in the U.S., because it was just too interesting, and there were so many things she wanted to learn.

Mariana

Mariana began her life in the mountains outside of Guatemala City, Guatemala where she lived with her grandmother and six cousins. Mariana's father died in her country's civil war and her mother left for the United States when Mariana was three years old. Her older brother and best friend, Enrique, was sent to military school, and she could only visit with him during school breaks. Mariana spoke despairingly about her life in Guatemala. She recalled standing in the street crying and tugging at her mother's skirt begging her not to leave. She detested her grandmother, who treated her very poorly,

explaining that her grandmother hated girls and disdained having to take care of Mariana while her mother was away. At one point, Mariana literally became sick with sadness and was hospitalized for depression.

Mariana and all of the children "in the mountain" attended the same one-room schoolhouse nearby. Mariana's grandmother had never attended school, and her mother completed the 3rd grade. Mariana told me that her grandmother did not want to send her to school, but her mother insisted. The school had one teacher who traveled from the city to teach each week, and one table per grade. All of the 1st graders sat at one table. All of the 2nd graders sat at another, and so on. Mariana described school as "fun," a place where she could hang out with her best friend, but she did not remember much about what she learned there except for how to write in cursive.

Mariana's immigration story was very emotional and painful for her to share. She spoke for twenty minutes without interruption about how she walked, ran, and rode in the back of a truck from Guatemala to California. I was shocked by what I heard and amazed at the strength of this young woman who was then just a child of nine years of age. Mariana explained, "We walked for miles and miles and miles and miles" through the mountains. She wore "like six underwears and four pants" because she was not allowed to carry anything. Mariana traveled in the back of a truck, swam through rivers, ran across desserts, and jumped over walls only to arrive in Los Angeles where she did not recognize her mother or brother and felt more like a stranger than a daughter.

Mariana lived with her mother, brother, younger sister, and step-dad in California. She described a difficult transition after her move, because she did not speak English. However, Mariana absolutely adored going to school. She was awed by the size of the

school buildings and the resources available to her. Her teachers gave her pencils, and she read books at the library for free. Her school cafeteria was the size of six houses in Guatemala put together. She learned that there were planets in the universe and how stars were formed. School became a refuge for Mariana. It was a place where she could escape the monotony of her home, hang out with her friends, and learn interesting things. At school Mariana felt safe and comfortable. The look on her face when she described how she remembered grade school and high school suggested pure joy.

Sandra

Sandra grew up in a barrio of Managua, Nicaragua. She lived with her mother, father, younger sister, and grandmother in a two-room house covered with sheet metal and a backyard patio with an awning for her kitchen. Sandra was surrounded by family. Several aunts, uncles and cousins lived within the same neighborhood. Everyone adored Sandra, especially her cousins, who followed her everywhere and considered her a role model. Sandra was a tiny young woman, with tons of compassion and energy and the maturity and insight of a thirty-year-old. Whether she was studying, dancing, running the family store, or playing handball in the street, Sandra did it all with passion.

Sandra described her family as "so poor," but her mother still managed to work several jobs to earn enough money to send her to Catholic school. Education was *the* top priority in Sandra's family. Neither her mother or father had completed high school, but both were determined to provide Sandra and her sister with a quality education. Sandra's mother held several menial jobs to pay her school fees, while her father's job in a coffee factory paid the family's bills. Sandra enjoyed everything about school. She delighted in her friends, her teachers, and her classes. In general, Sandra just loved to learn.

Sandra left Managua for the United States with her mother and younger sister when she was fifteen years old. Leaving was terribly difficult, for almost her entire neighborhood had been her home and family. Sandra's father and mother had never been legally married, so when it came time to leave Nicaragua, her father had to stay behind. Sandra had always lived with her *abuelita* (her dear grandmother) who was really more of a second mother to her, so leaving both her father and *abuelita* behind was devastating. However, the financial and political situation in Managua at the time was such that her family could no longer afford to stay there. The opportunity to move to California presented itself, and they left.

The family of Sandra's mother also lived in California, yet they could not replace the love and camaraderie Sandra had felt in Managua. Sandra found her transition to California very difficult. No one in her family spoke English, her mother could not drive, and people maintained much more privacy than in Managua where people's lives often trickled out into the public streets. Sandra began school in the U.S. in the 9th grade. She did not know anyone and could barely say anything in English other than, "hello." Sandra recalled feeling very out of place because the clothes she wore were completely outdated. What was in fashion in Managua was years behind what her peers wore in California. Yet, even with the many challenges she and her family faced, Sandra persevered and dove into high school just as she had in Managua and never lost her drive to "become somebody."

CHAPTER THREE

Becoming a "Liberal" Mathematician

Efforts to reform traditional mathematical teaching and learning to support more students to engage with mathematics have led many to advocate for instructional practices that encourage more active student participation. These arguments suggest that opportunities for agentive behaviors makes learning more meaningful and supports students as they construct mathematical understanding and create mathematical knowledge. Furthermore, students' indicate that they enjoy mathematics more when they have the chance to be active learners. Compatibility between the identities they are forming as creative and independent thinkers and the identities available to them in their mathematics classrooms promotes more mathematical engagement. However, neither of these arguments considers students as cultured beings, young people who come into classrooms with different ideas for how mathematics learning should look, what it means to participate, and their purposes for doing so based on the multiple out-of-school communities in which they participate. In this first case, Amelia explains how she understood what it meant to participate in secondary mathematics at Railside High. Amelia interpreted specific learning practices through her salient identity and demonstrated the kind of interpretive work with which students are constantly engaged to make sense of their mathematical communities. Amelia's stories demonstrate how identities are used both as lenses through which students construct meaning of mathematics and as intellectual resources for mathematical learning.

Student Agency in Learning Mathematics

To support more equitable teaching and learning in mathematics education, many advocate for more student engagement and placing students' ideas, actions, and talk at the center of mathematical practices (Boaler 1997; Boaler, 2004; Chazen, 2000). The National Council for Teachers of Mathematics recommends that for students to "learn mathematics with understanding" (p. 20) they must have opportunities to actively engage in tasks and experiences designed to deepen and connect their knowledge. Reformers advocate for promoting classroom discourse (Lampert, 1992), using problem-solving based curriculum, and using pedagogical practices to encourage cooperative learning (Cohen & Lotan, 1997) to accomplish this.

Additionally, Boaler and Greeno (2000) have argued for a version of school mathematics that affords students more agency in an effort to support students to engage and stay enrolled in mathematics during the course of their high school careers. They claim that the secondary students in their study wanted to be active learners rather than passive receivers of information, "with opportunities to think, negotiate, and understand the procedures they encountered"(p. 190) instead of blindly accepting mathematical procedures as delivered by the teacher or text. Boaler and Greeno concluded that these young people thought of themselves as creative thinkers with intellectual contributions to offer, and the identities afforded them in school mathematics affected their academic decisions.

The use of identity as a research construct supports further exploration of different participation patterns in school mathematics. However, it cannot be assumed that agentive mathematical practices will always support students' mathematical engagement

without considering students' cultures, their unique understandings of self, and what they believe it means to be agentive. This approach also assumes that teachers and students understand what it means to be agentive in similar ways, such that teachers can then create appropriate opportunities that match students' goals for participation. This is a very technical approach to teaching. It encourages teachers to find the right task or construct appropriate opportunities for participation and then wait for student engagement to happen, while ignoring the fact that students are constantly interpreting and re-interpreting their surrounding contexts based on previous experiences and then making decisions about whether to participate and how.

When Amelia described her secondary mathematics experiences at Railside, she focused on the multidimensional nature of mathematics, especially the myriad ways to think, talk, and reason mathematically. Amelia's case complexifies the meaning of agency by showing how she interpreted Railside's version of mathematics as "liberal" mathematics through the lens of her salient identity. This chapter shows how Amelia made a cultural connection between her identity and her mathematical learning given the "space" for this interpretive work. This case suggests the expansion of secondary school mathematics such that it includes a variety of practices and demonstrates how important it is to provide "space" for students to both use their identities as learning resources and how mathematical learning practices become a resource for further identity development.

Who is Amelia?

I begin this chapter with some information about Amelia, her life in Mexico, her family, and her immigration experience. I then describe Amelia's salient identity as "liberal," explain what this identity meant to her, and in which communities outside of school she

shaped these ideas about herself. I choose to start Amelia's case in this way because I argue that the identities students create outside of school are critically important for how they make sense of their in-school communities. It is therefore necessary to better understand students more broadly in an effort to support them as mathematical learners.

Introducing Amelia

Just like any one of us, Amelia's multiple identities as a woman, student, daughter, Mexican American, immigrant, older sister and Catholic, just to name a few, were messy and intertwined. Anzaldúa (1987) asserts that the identities constructed by Latina immigrants involve complex interrelationships between their multiple identities due to the many geographical, emotional, and psychological "borderlands" (p.25) they straddle in their lives. There is no one Latina immigrant experience, and any attempt to frame Latinas as monolithic or one-dimensional results in a gross misrepresentation of their lives (Godinez, 2006).

Amelia self-identified as a Mexican American. She immigrated to the United States from a small town in rural Mexico with her parents by "basically walking" across the border. Her father, Humberto, had spent many years crossing into the U.S. on a monthly basis for work, and the time finally came when the family decided it would be easier to be together. Amelia was an only child at the time she and her parents immigrated. Humberto and Julia were young and unmarried when Amelia was born, and both dropped out of high school to raise her. Amelia was a feisty child - already rallying against potential inequity at an early age and asserting herself as independent. Julia explained that she was "*nacida con mucho enojo*" (born with a lot of anger), and was very active, very assertive, and assumed a lot of responsibilities at a young age by

working in her family's store and buying beer and tortillas for the family. Amelia explained:

> My mom says that I was very loud, very talkative. I would fight with all the kids and I would like beat up all the kids. She said that I was born with a lot of anger, so I would like beat all the kids up. When I was like three or four my mom left me alone and these people, customers, came in and started picking up the fruit. They just started picking it up to see which vegetables or fruit to take and I started yelling at them and I started saying, "Don't steal! Get out of here! Don't steal the fruit!" (laughs)

Amelia was very proud of her Mexican heritage. She enjoyed living in the United States where she "had more opportunity " for a good education and future job prospects. However, Amelia felt more "free" in Mexico. In Mexico Amelia was "free" from the dangerous streets of the urban "ghetto," free from crime, free from " being locked up, locked inside the house all the time." Amelia's fears about living in a large U.S. city were justified. During her first few years in California, Amelia watched her mother get mugged at knife-point, hid in a closet while police stormed her family's home in search of drug dealers, and spent much time locked inside an apartment with her mother who was too fearful to go outside. Below, Amelia explained what it meant for her to be "free" in Mexico relative to big-city life in California.

> There's MORE freedom [in Mexico] in the sense that you can, you don't have to worry about something bad happens to you if you go outside your door. You don't have to worry about going to the store and being kidnapped, a child being kidnapped. There's just not that kind of worry. Today's media makes it seem like it's dangerous just to go outside your door, to simply cross your street is dangerous, you know? To go to the next town is dangerous, and that's not true in Mexico. You can go to the next town without worrying that something bad is going to happen. You can go across the street. You can go to the store. That's the kind of freedom. You're not worried all the time. You're not scared.

Amelia struggled with her life as a Mexican immigrant living in Northern California. Although she was proud of her Mexican heritage and everything her family had achieved

after moving to the U.S., she adamantly refused the label 'immigrant.' She believed the term had negative connotations, as someone who was in the U.S. illegally and was especially lazy; a person who had rejected her home-country and escaped into the U.S. to exploit its social and economic systems. According to Amelia, being an immigrant was too often defined as a "bad thing," and she did not want to be associated with its implications.

> I mean I AM proud, you know. I AM proud that I'm an immigrant in what is MY definition and in what I believe it to be. I am PROUD that my parents brought me here and that I'm from another country. I'm proud of being Mexican. I'm proud of coming from where I'm from. I'm proud of that. I'm proud of being an immigrant, but I'm not going to go around and announce it.
>
> We don't want to be called an immigrant because of the way people define it. Because of the way people think of it. You know, people think of it as a BAD thing. But it doesn't mean we're not PROUD or it doesn't mean...I wouldn't have liked to have been born here, you know? I wouldn't CHOOSE to be born here over Mexico, you know? We LOVE our countries. We LOVE being who we are and where we came from.

It is important to note that my interviews with Amelia were conducted during a time when there was a lot of social and political tension in the United States regarding immigration policy. During the winter and spring of 2006, the U.S. government struggled with how to effectively deal with large numbers of illegal immigrants who already lived and worked in this country, and in this process, they tended to focus on illegal immigrants from Mexico and countries in Central America. The laws proposed by the U.S. House and Senate to solve such issues included criminalizing those who had once entered the country illegally, providing a guest worker program, giving amnesty to all immigrants who were already within U.S. borders, and toughening border security with Mexico. Some interpreted these proposals as a "racial attack on Hispanics" (O'Donnell, 2006), and the public reacted by rallying and participating in boycotts across the country,

and especially in California, where many people skipped work, and students walked out of schools.

"Liberal" as a Salient Identity: Have an Opinion and "be more independent!"

As I mentioned before, the Diversity Toss activity was central to my data analysis. When the young women participated with this task, they described themselves in such a variety of ways and with such depth that I was able to access salience without applying my own lens from personal assumptions or literature. In this way, the salient identities I discuss in each case, and through which secondary mathematics experiences are interpreted, emerged directly from the women and gave me opportunities to deliberately build on their ideas in our further conversations.

From the Diversity Toss activity, I learned that Amelia valued her identity as an older sister over all else. She gave up her name and female identity first and second respectively, and her Mexican American identity third. She "felt relieved" to have her religious identity, Catholic, taken from her in the next-to-final round of the task because she "was trying to protect the most important one," older sister.

Although Amelia strongly identified as an older sister in the Diversity Toss, I was unable to find this identity represented across her other data. She frequently talked about how important this role was for her and her family, but I could not locate the meanings she assigned to this identity when she discussed her other life experiences. On the other hand, being "liberal" permeated Amelia's conversations and consistently wove its way through her descriptions about herself. Being "liberal" spanned time and contexts. It was present in her talk about family, friends, dating, school, life in Mexico, and even in her religious life. For these reasons, I could not ignore "liberal" as a salient identify for

Amelia, and in our further conversations she came to agree with me that "liberal" was most definitely central to how she thought about herself and made decisions for how to act in life.

Amelia was not *a* liberal. She did not align herself with a particular political tradition. Nor was her liberal-ness rooted in a general world philosophy that governed her moral beliefs and practices. For Amelia, being "liberal" meant that she was liberated from people's authority over her ideas and opinions, her life decisions and actions, her choices for how to exist in the world. As a young woman, Amelia considered herself "very liberal," because she stood up for herself and made decisions about what was good for her life. As a daughter, Amelia was liberal because she "talked back" to her parents and refused to let her dad hit her. As an older sister, liberal meant speaking honestly and discerning between right and wrong, offering advice, and setting an example for her younger siblings by "doing what I need to do for my own good." Across each of these contexts, Amelia always constructed her definition of "liberal" relative to her understanding of the rigidly defined roles assigned to women in Mexico. Below is an example of how Amelia described what it meant for her to be "liberal" relative to the expectations held for her female cousins who lived in Mexico.

> Amelia: My cousins, my girls cousins are very, very GOOD daughters. VERY good daughters. They're very obedient. They're very respectful. They're very um...they're not liberal at all. They're very...they hold those...what my friends and I would call ancient beliefs or values. So, they're not liberal at all. I'm VERY liberal compared to them, even though I don't consider myself to be very liberal. But compared to them, I am (laughter).
>
> Lisa: What does it mean to be liberal?
>
> Amelia: To be independent of your family is liberal. To be independent of your parents, especially, to have a voice, talk back. I mean independent as in I have a voice. As in I'm allowed to be who I want to be. I can, even though I DO live at

> home, I can choose my schedule. I can choose what I want to do. I can still go out when I want to. I don't have to ask for permissions. In Mexico, you definitely have to have permission even if you're 22 and living at home. You have to have your parents' consent all of the time. They have to agree to what you do, to who you date, to who you speak, to who your friends are.

As a daughter, Amelia considered herself "liberal" because she often voiced an opinion based on her self-understandings, which might be different from her parents, especially from her father who was "really strict" and "expected to be served" by his wife and daughters. Again, acting as a "liberal" daughter was defined relative to the expectations for how daughters in Mexico should behave.

> Parents are supposed to be VERY well respected and obeyed. I remember once going to Mexico and arguing with my dad and I was yelling at him and talking back to him, and I wouldn't let him hit me, and I wouldn't let him yell at me. I was defending myself and my aunts just hated me for that. They just HATED me. They would talk really bad about me because I was disrespecting my father. I was supposed to respect him. I was supposed to obey him. I was supposed to do as he said. So, it's very different. It's very different.

Bi-annual family trips to Mexico from California fueled the tensions Amelia felt about her liberal-ness. Although Amelia often felt more "at home" when she was in Mexico, she was forced to navigate a different set of expectations for women when she was there. While in the United States Amelia found pockets of support for her "liberal" choices and actions, in Mexico she faced oppressive conditions that made her feel out of place amongst the people she loved.

> Lisa: How did it feel to go between these countries and have different expectations?
>
> Amelia: Well, I felt in a way I felt at home. I was a part of them. I was accepted. But then I also felt different because I spoke another language. I lived in the U.S. To them that's amazing that I live here. That's incredible that I speak another language. It's something they don't see very often. So, they're impressed. But then I felt different because I DID feel too liberal compared to my cousins, you know? 'Cause they were very…I remember this last vacation I went, or the last trip I took to Mexico, my cousin, she's my age and she has to ask for permission

> to go out. And I wanted to go out. I knew that I could go if I wanted to. I don't have to ask for permission. I would just tell my mother, well I'm going out. And she would be like, "ok." My cousin had to ask for permission and she wasn't allowed to go out. So, I had to stay with her. So I felt VERY... I felt mad, cause they didn't let her go. And I felt like I wanted to tell her, "Fight for your rights! Be more independent!"

Amelia also moved between the cultural borders of liberal womanhood back home in California where she struggled to negotiate "conflicting messages that encouraged both independence and subservience to her families' needs" (Cammarota, 2004, p.63). Amelia was required to balance homework with cooking and cleaning, while her brother was free to play during his after-school time. Amelia's father, Humberto, expected her to be an excellent student, one who studied earnestly and earned only As on her report cards. However, while Humberto held Amelia to high academic standards, he fervently rejected his wife's attempts to attend English classes and train for a job at the U.S. Census Bureau. Amelia's future goals included graduating from college and pursuing either a business or law career. While Julia supported this ambition and strongly urged Amelia to stay in school, both Humberto and Julia made it extremely difficult to do when they divorced and expected Amelia to co-parent her four younger siblings.

It is very challenging for young people from countries outside of the United States to navigate the myriad social venues and messages they receive about how they should act and who they should try to be. Amelia, for example, was proud to be Mexican, however she also lived in a particular U.S. context where messages about womanhood challenged her understanding of the norms and expectations for Mexican women. Amelia's movement across the geographical border between Mexico and the United States spurred this clash she often felt at the intersection of her salient identity as "liberal" and the sociocultural practices of her parents and extended family in Mexico.

She struggled to maintain a peaceful role as a dutiful daughter and good sister while simultaneously confronting and pushing the boundaries of what it meant for her to be a woman.

Secondary School Mathematics as Multidimensional

Amelia focused on the varied practices available for learning mathematics when she described her secondary school mathematics experiences at Railside. The following section depicts Amelia's portrayal of these experiences. In particular, Amelia recalled school mathematics as multidimensional, offering opportunities for both hands-on and minds-on engagement.

Invoking Complex Instruction: Hands-on and Minds-on Mathematics

Amelia described how she engaged with and learned secondary school mathematics very broadly and discussed a diverse range of available learning practices. These included a variety of things to do, projects in which to engage, mathematical tools to use, and people with whom to work. In Amelia's mathematics stories, there existed "space" for her to choose how to participate. Below, Amelia recalled her mathematics classes at Railside High.

> In math class [at Railside] you're going to have to work with your team members. Students have to work with their team members. They have to talk. They have to work together. In math I remember having the lab gear and you would have different things to play with, but you were also learning. That was fun. And the calculators that you had to borrow, like graphing calculators. Yeah, in math class you interact with other students and you also learn visually. It's very visual and that's what I liked. And you touch stuff. It's not just taking notes. You're playing with toys or you're playing with blocks, lab gear, and you're playing with the geoboards, with the rubberbands. That was fun. Or I remember the art competition with math and you had to find the area or do shapes with the cubes and find the area. Or you could also use your imagination, your creativity to do something. I remember I did a flower and I had to find the area of the flower and the petals and everything. So, that was fun. That's very enjoyable. That's very memorable too. I remember that as being a fun part of math. College is

> more...the teacher teaches the math, even if it's just beginning algebra, and you're just taking notes. It's not like high school where you're actually learning through drawings or the POWs [Problems of the Week] and you go outside and measure that big [flag] pole or you find the angle and the height. It's not like that at all. That makes it a lot more interesting and students are more engaged.

This portrayal of her mathematics classes is representative of all of Amelia's descriptions of her secondary school math courses, which differ greatly from a version of learning that often typifies "school" mathematics where "desks are in rows, the children silent, the teacher is at the front, chalk in hand, dispensing knowledge" (Ball, 1993, p. 209). There was nothing passive about the ways in which Amelia described learning mathematics at Railside. For Amelia, learning mathematics meant engaging with mathematical activities, using manipulatives and technology, and often working with other students. Her narratives were filled with action words: talking, working together, drawing, finding, playing, and imagining. Amelia characterized mathematical learning in a way that required doing something rather than sitting passively and listening to the teacher present knowledge or guide students through procedures. In addition to the many hands-on activities to which Amelia had access, she described mathematics classes at Railside that invited her to be "minds-on." Amelia explained that her mathematics teachers often expected her to be intellectually involved by explaining her ideas to others, justifying her processes and conclusions, and constructing personal meaning of different mathematical ideas. In the following conversation, Amelia explained the type of "minds-on" participation required by someone who is "smart" in mathematics.

> Lisa: What can a smart person in math do or what do they know?
>
> Amelia: I think they know how to help others. They understand what they're doing.
>
> Lisa: They understand what THEY are doing or what the TEACHER is doing?

Amelia: Well, both.

Lisa: Does a smart person have to do math the teacher's way?

Amelia: No, not necessarily. No, of course not. They have to understand what the teacher is doing and what the person [whom they are helping] is doing. They have to understand the concepts behind the math. I remember we had to explain, why. WHY do we have to write that equation? WHY does it work? HOW would you use it? WHERE does it come from? In Calculus, I remember learning that, like WHERE do those hard equations come from. How do you GET to that equation? WHY do you even have to do it? Why is it important? A smart person understands that, and a smart person knows how to explain things to other students. A smart person gets good grades, of course, but not so much. For me, to be good in math you have to understand how those basics relate to or build up to more complicated stuff and how to solve for things and how to think...What's that word? How to think logically and how to find the logic in things, in equations and word problems. I think a lot has to do with that. That's a major part to it. You can learn how to DO an equation. You can learn how to SOLVE for x. You can learn how to solve for things, but if you don't really know WHY you're doing it, you're just doing it just because that's the way you're taught and you don't know why.

This insightful quote from Amelia demonstrated her rich understanding of the "multidimensionality" (Boaler, 2004, p. 7) of mathematics as a discipline, and more specifically, "school" mathematics at Railside. Boaler (2004) suggests that many mathematics classrooms value one practice over all others – "that of executing procedures (quickly and correctly)" (p. 7), which restricts students' access to the broad array of important mathematical concepts and skills that should be available to them. The teachers at Railside, however, created "multidimensional classes by valuing many dimensions of mathematical work" (p. 7). According to Boaler, these practices included requiring multiple methods and solution paths, asking good questions, explaining well, being logical, justifying work, considering answers and rephrasing problems. Similarly, Amelia's description of what a successful mathematics student at Railside should know and be able to do included understanding concepts as well as procedures, explaining and

justifying ideas, making connections, and working and learning with other people. *Doing* math, or solving problems correctly, was only one part of what it meant for Amelia to practice mathematics. Understanding and explaining how, why, and when to use mathematical concepts and skills added significant depth and breadth to her learning experiences.

"We can be ourselves in math:" Compatibility Between "Liberal" Identity and Mathematical Pedagogy

Much research demonstrates that U.S. public schools are not comfortable or safe places for many immigrant students (Noguera, 2003; Olsen, 1997; Valenzuela, 1999; Waters, 1999). In addition to escalating violence, a lack of resources, and powerful pressure from peers to assimilate, mathematics curriculum and teaching practices often contribute to the tensions students feel in school. Interestingly, when Amelia discussed her experiences as a student at Railside in general or in her mathematics classes in particular, she did not articulate the same sorts of identity conflicts that she felt in Mexico or with her family. In fact, during a conversation the women had at a focus group meeting, Amelia adamantly agreed with Mariana who claimed, "we could be everything we want to be in our math classes." Amelia added, "Basically, we can be ourselves in math. We CAN be ourselves."

The compatibility between Amelia's salient "liberal" identity and the multidimensional aspects of mathematics at Railside was likely one reason for Amelia's strong claim that she could be herself in mathematics. Boaler and Greeno (2000) argue that the agreement between secondary students' imagined identities and the pedagogical norms of the mathematics classrooms in which they participate can impact how students feel about mathematics and then chose to engage with it. More specifically, Boaler and

Greeno determined that the students in their study who were positioned with significant agency to think, question, and negotiate the mathematical procedures they encountered enjoyed mathematics more because the ways of learning available to them were compatible with the people they imagined themselves to be. For example, many of the students from this study described themselves as thoughtful and creative beings and enjoyed the opportunities to actively engage with, discuss, and construct mathematical understanding. Alternately, students who participated in didactic-based courses rejected mathematics more often because they felt positioned as "passive learners," young people for whom learning mathematics was described as receiving "predetermined knowledge that appeared unavailable for discussion or negotiation" (p.179). These students felt that learning mathematics required them to "give up the agency they enjoyed in other aspects of their lives" (p.187) and the agency they imagined themselves having as young adults in the future.

A closer examination of Amelia's descriptions of secondary mathematics and her salient identity as "liberal" shows a strong compatibility between the two. In Table 1 below, I listed the words or phrases Amelia used throughout her interviews when she talked about each. The words or phrases in bold are common in both categories.

Table 1: Characteristics of "Liberal" and Mathematics Learner

Being "liberal" means:	**Being a mathematics learner means:**
To be independent of your family	Working with your team
To be independent of your parents	Interacting with others
Don't have to ask for permission to go out	Learning from others
Have a voice	Helping others
Express opinions	Teaching other people
Talk back	Participating
Saying what you think	**Asking questions**
Speak out	**Responding to questions**
To be who I want to be	**Talking**

Choose what I want to do **Choose** my own friends Having boyfriends **Being yourself** **Choose** my schedule	**Having a voice** Going to the board to **explain ideas** Learning WHERE something comes from Showing your work Trying different things **Using your imagination and creativity** Being yourself Having decision making power over the solution process

Table 1 continued: Characteristics of "Liberal" and Mathematics Learner

This list suggests that there is a strong compatibility between the norms for learning mathematics at Railside, as Amelia described them, and the meanings she assigned to her salient "liberal" identity. Specifically, I assert that there is compatibility in two categories, voice and authority. First, Amelia thought about herself as a person with opinions that she wanted to express. She had thoughts about the world and ideas. Similarly in mathematics, she recalled opportunities to talk, explain mathematical ideas, teach other people, and "have a voice." The second category where there exists compatibility between her salient identity and mathematics practices in the classroom is in the authority she assumes to make decisions for herself, engage in ways that make sense to her, and determine direction for life and learning.

In addition to the compatibility that exists in Amelia's descriptions about how she could be as a person in life and in mathematics, the norms for mathematical learning at Railside provided ample opportunities for agentive behavior in the classroom. This is one way to understand Amelia's comfort with mathematics and the reasons for her claim that there were "spaces" where she "can be herself." This understanding suggests that the alignment between Amelia's ways of being "liberal" and the ways for learning mathematics available to her at Railside supported her decision to enroll in all of the upper-level mathematics courses that were available and engage in ways that afforded her

learning and achievement. Amelia could avoid any potential tensions had her salient identity not been aligned with the mathematics teachers' pedagogies.

This argument is similar to those which suggest that to ease the "cultural conflicts" (Bishop, 1991) for students in mathematics, teachers should link curriculum to students' cultures and use pedagogies that match students' "ethnic learning styles" (Gay, 2000, p. 149). While this approach seems quite reasonable, especially for teachers who are searching for ways to improve learning for diverse student groups, I have several concerns about it. First, in an attempt to connect curriculum with identity, students' identities are assumed static and consistent across ethnic and gender groups. For example, research in gender studies has led some to believe that all girls learn more when cooperative learning is the main pedagogical strategy. Research in this area is often done with White, middle class, English-speaking girls and is then used to generalize across all females and socio-cultural contexts, including girls of color, girls from other countries, and girls who grew up in rural, urban, and suburban areas of the United States. Another concern of mine is that meanings are often assigned incorrectly to students' identities based on external characteristics, such as skin color or language, and broad generalizations are then made about how students live their lives. Both of these approaches fail to consider the many sociocultural contexts of the out-of-school communities in which students participate and create identities as well as the dynamic nature of the identities which they are creating.

Finally, attempting to align curriculum and pedagogy with students' identities places the locus of responsibility and authority to label and assign meaning to students' identities with teachers. The approach ignores the fact that students are constantly

interpreting and re-interpreting their surrounding contexts based on their lived experiences and making decisions about whether to engage with mathematics and how. For example, in Amelia's case, it is enticing to infer that the compatibility between her salient identity and the multidimensional nature of mathematics means that all girls, all immigrants, and all Latinos will be academically successful if they get this multidimensional "version" of mathematics. This may be true. However, it is erroneous to assume that the Railside mathematics teachers deliberately constructed this compatibility. They did not go into their classrooms with an understanding of Amelia's salient identity as "liberal" or of her experiences in Mexico. It is likely that they did not know much more than most teachers would about where Amelia came from, the language she spoke, or her prior schooling experiences. In any case, the teachers' attempts to create this alignment would likely lead to the homogenization of students because of necessity, "a kind of tracking in which instruction is adjusted on the basis of a group categorization" (Gutierrez & Rogoff, 2003, p. 20).

I argue that while there was compatibility between Amelia's salient identity and the multidimensional nature of mathematics at Railside, it is Amelia's translation of her secondary mathematics experiences that is important to understand. Throughout her stories, it became clear that Amelia was making sense of the "space" available to her through the lens of her salient identity and she justified her reasons for her participation in secondary mathematics based on this interpretation. In this way, Amelia made the cultural connection between the mathematical learning practices available to her and her identity in ways that were not available to outsiders.

In the following section I demonstrate how Amelia translated the multidimensional nature of secondary school mathematics as "liberal" mathematics, and I explore some of the potential resources from which she drew, including her lived experiences as a Mexican American woman and her salient "liberal" identity. Amelia's understanding of "liberal" mathematics can be understood in a cultural and historical context, how she has organized her life and participated in various out-of-school communities.

Becoming a "Liberal" Mathematician

Amelia's claim that she could "be herself" in mathematics classes meant that there were "spaces" available while learning mathematics in which she choose to insert her "liberal" self. Amelia decided to be "liberal" and to act liberally within the context of secondary mathematics. In addition, Amelia used her salient "liberal" identity as a lens through which she made sense of the mathematical practices in which she was invited to participate. She understood particular ways of acting as a mathematics student as "liberal," which meant she could use this identity as an intellectual resource. Amelia brought her identity as a "liberal" into her secondary mathematics classrooms, where it intersected with the identities available to her in unique ways. In this way, Amelia become a "liberal" mathematician during her high school career.

Specifically, being "liberal," both in life and as a mathematics learner, had two main components for Amelia: (1) voice, verbally expressing her thoughts and opinions, and (2) authority, the ability to determine how to live life and the "freedom" to mobilize voice and action in service of this discernment. Below, Amelia defined what it meant to be a "liberal" mathematics student using these two components.

Lisa: Could you be a liberal math student? Could you be liberal in your math classes?

Amelia: Yeah. Why not? I think so.

Lisa: What does that mean?

Amelia: Liberal as in you're free to do what you want. You're free to talk. You're free to participate. You're free to give your opinions. Saying what you think, saying if you agree or don't agree, saying what the solution is. You're being yourself because you're saying what's in your mind and you're not hiding it.

In this piece of narrative, Amelia clearly made a connection between her meanings of "liberal" as a young Mexican American woman and how she understood what it meant to be a "liberal" mathematics student at Railside. Again, voice and authority were the two critical components of these identities. Amelia felt "free to talk," to express herself and her mathematical ideas, to agree or disagree using mathematics just as she articulated her opinions as a daughter who stood up to her parents. Amelia also named authority as an important component of this "liberal" identity. In mathematics, Amelia was "free" to make decisions about whether to participate and how just as she made decisions about how to engage in her life. In the following section, I further demonstrate how Amelia used her salient "liberal" identity to interpret her secondary mathematics experiences and specifically how she described the elements of voice and authority in the context of learning mathematics.

"Talking Back" in School Mathematics

Voice was an on-going theme throughout Amelia's conversations about being a "liberal" mathematics learner at Railside. She consistently spoke about the use of her voice in mathematics with the same appreciation for self-expression she had when she discussed her desire to be heard as a young Mexican American woman. Amelia wanted

her mathematics teachers to "accept" her verbal participation and encourage her to share her ideas. She wanted to "give her opinions" and participate with her voice by explaining what she knew and how she made sense of her understanding.

Amelia interpreted particular dimensions of her multidimensional mathematics experiences as ways of being "liberal" by asserting "a voice." She explained that it was never enough to just show your mathematical ideas on paper. She said, "you have to talk in math. You have to ask questions. You have to show people what you are thinking." This verbal component of mathematical learning, as described by Amelia, was very similar to how she expressed herself as "liberal" in other aspects of her life. Just as Amelia "argued" with her father and expressed her opinions about the social construction of women in Mexico as silent and subservient, Amelia "talked back" in school mathematics. She *reasoned* her way through a problem when she went to the board to explain her ideas to her classmates. She *justified* her solution strategy while working with a small group. She *communicated* her mathematical thinking to her teachers and peers.

In the following story, Amelia described how she acted liberally by "talking back" to a particular student in class who did not believe her to be very knowledgeable. This story strongly paralleled Amelia's many other stories in which she described "talking back" to her father or her aunts by standing up for something for which she felt strongly and how she used her thoughts, ideas, and opinions to justify her points of view.

> I remember this very, very well. I went to another class the day before, and I learned what I had to learn. I had some questions, and I learned them through that class. I figured it out, and then I went back to my math class and I raised my hand. I wanted to participate for one of the first times, and I wanted to show my work on the board, on the overhead. I remember this guy, he was in my group, and he was always playing around. He was like the class clown. And he was like, "No. Sit down. You don't know." And he was just playing around. I took it as a joke. I didn't take it personally, but it was kind of like, well, I DO know. I showed him.

Amelia took charge of this situation in ways that clearly resonated with other "liberal" actions she took in out-of-school contexts. Rather than being silenced by the "class clown," Amelia created a way to learn what she needed to then express her mathematical ideas. Amelia used her voice as a "liberal" mathematician to prove her intellectual competence, just as she proved to her father and relatives many times over that she would not be compliant in the roles they had constructed for her as a women.

Amelia also discussed how voice was necessary if one wanted to be a successful mathematics student at Railside. Amelia described a "smart" mathematics person as someone who could explain ideas to other students and justify why their ideas made sense.

> I remember we had to explain, why. WHY do we have to write that equation? WHY does it work? HOW would you use it? WHERE does it come from? In Calculus, I remember learning that, like WHERE do those hard equations come from. How do you GET to that equation? WHY do you even have to do it? Why is it important? A smart person understands that, and a smart person knows how to explain these things to other students.

Amelia's "liberal" interpretation of the use of voice as a means for participation and demonstration of success was quite different from how engagement and achievement are often constructed in school mathematics. Too often participation in school mathematics means writing notes, following step-by-step procedures from the chalk board, or completing a worksheet, leaving little room for the articulation of ideas. Competence is asserted through the written word, solving several problems on a page or *doing* a homework problem on the board, which denies students opportunities for expression and fails to consider how and why they think the way they do. Verbal expression in Amelia's mathematics classes required a certain kind of intellectual independence as did her

"liberal" ways of being in the world. Engaging verbally meant that Amelia expressed mathematical ideas independent from a textbook or the teachers' ways for doing things, much like she expressed her opinions about living life apart from the rules that governed women's ways of being in Mexico, or from her father's opinions about how she should behave.

A "good" mathematics teacher supported this "liberal" way of being a mathematician in ways similar to how Amelia wanted her parents to be good parents, with an expectation and acceptance that she would express her thoughts and opinions. A "good" teacher "encouraged participation" for everyone and not only a select few. A good parent wanted their children to express their thoughts and feelings. A "good" teacher "picks on students to talk" rather than "telling them what to do all the time." "Good" parents want both their sons and daughters, nieces and nephews, girls and boys, to say what is on their minds and to be honest with their ideas. Students and teachers do not have to agree, but "[good] teachers encourage participation," because they ask questions, and "they accepted your comments and they commented back." "Good" teachers created environments where students had space to articulate their mathematical voices.

> You can be liberal in your math classes in the ways I just mentioned. You can participate and all that and it depends on the teacher and the way they are. If THEY'RE more conservative and THEY don't encourage you to be, for you to voice your opinions, then you act more conservative also just to please them and to get that good grade, so they can like you. I think it depends on the teacher. If the teacher is liberal then they create a liberal environment, and if they're conservative, then they create that environment in their classroom. Like Mr. Rupert. He was kind of more conservative. So, he, they make that, they create that environment where if a student doesn't agree with them they don't like that student or they'll give lower grades, so you have to act like them or agree with them for them to like you. And in a liberal environment, you're more free to agree

> or disagree. More conservative people, if you don't agree with them, they don't like you, or they look down on you. More liberal people don't do that.

Amelia demonstrated an acute awareness of how important teachers were for creating "liberal" spaces such that students could both author and insert their ways of thinking into their learning practices. If teachers were "conservative," Amelia felt less able to articulate her voice. If teachers were "liberal," then they created opportunities for Amelia to formulate opinions and share them with others. "Liberal" teachers did not determine what students should do or say. They were not interested in creating mini-versions of themselves such that students could mimic their answers and procedures. "Liberal" teachers created "liberal" environments that supported students to act liberally, and when these kinds of environments were available, Amelia chose to engage.

Doing Mathematics "Your Own Way"

Another significant piece of being "liberal" and acting liberally meant that Amelia authored decisions for herself and determined her life's directions. She assumed that she, and not others, could determine what was best for her and how to get what she needed. Amelia began crafting this stance early when, as a young child, she felt "free" to move around her house and Mexican neighborhood without any perceived fear of danger. She could "go ANYWHERE" by herself, walk around the barrios with her cousins, hang out in the city center, or go to the store on her own. In small-town Mexico, as opposed to the crime-ridden ghettos of urban California, Amelia was "free" to decide how to "interact" with and to "play" in the world.

> There's MORE freedom [in Mexico] in the sense that you can, you don't have to worry about something bad happens to you if you go outside your door. You can go to the next town without worrying that something bad is going to happen. You can go across the street. You can go to the store. That's the kind of freedom. You're not worried all the time. You're not scared.

The economic and social contexts of the Mexican community in which Amelia and her family lived also contributed to Amelia's independence, requiring her to act and make important decisions at a very young age. Amelia was responsible for finding her way to the market, purchasing beer for her father and tortillas for her family. She learned early in life how to bargain for good prices on fruit and vegetables and how to take care of her mother's store. By the age of four Amelia was positioned as an active participant in the daily maintenance of her family's social and financial well-being.

Similar to the independence offered her by the social conditions of her Mexican neighborhood, Amelia interpreted the multidimensional nature of mathematics as spaces in which she had freedom to actively move and physical engagement as a learner. She could "touch stuff" rather than "just taking notes" and had opportunities to "play" with drawings, work with manipulatives, and use technology. The nature of the mathematical activities varied, and Amelia had space to first figure out what she knew and then use her skills and knowledge to engage, learn, and demonstrate this knowledge. Amelia interpreted her role as a mathematics learner much like she did her life as a child in Mexico, as someone who was "free" to move about and engage in her world in many ways.

> In math you were more engaged. You do different activities. You play with little blocks. You have the POWs [Problems of the Week], the group projects, you have homework. You're more engaged. You participate more in math class than like in a history class where you just listen and turn in homework or take tests. You just mostly listen. And math class, I think it encouraged me more to participate. I participated more in math classes than I did in other classes.

With this "freedom" both as a child and as a mathematics learner, Amelia was faced with the responsibility to figure out how to engage with the tools and activities available to

her. She made decisions about which tools to take up and how to use them to solve problems. Amelia interpreted what was necessary to learn mathematics in much the same way that she had managed her responsibilities as a child, as a young person who used her "imagination" and "creativity" to solve problems to get what was needed. How might she find the best-priced fruit and negotiate for it? What would she do when the customers entered her mother's store? What would she say? How would she begin that mathematics problem? Which methods would she use to find the area of the design she created?

> You could also use your imagination, your creativity to do something. I remember I did a flower and I had to find the area of the flower and the petals and everything. So, that was fun. That's very enjoyable. That's very memorable too. I remember that as being a fun part of math. College is more...the teacher teaches the math, even if it's just beginning algebra, and you're just taking notes.

According to Amelia, learning mathematics was creative and required imagination. It was her job to assign meaning to an idea or determine the direction to a solution. She had to make decisions about which paths to take, which tools to use, which formulas to apply, just as she desired to do so for her own life. This sort of learning and living required reasoning and interpretation. There were many different ways to solve problems. There were multiple interpretations of an idea and many ways to use them. The authority for managing the learning process, for "doing it your own way," was located with Amelia.

> Lisa: In high school, did you have to learn math the teacher's way?
>
> Amelia: No. I think in high school there were different ways or even they teach you different ways or the students teach you different ways, but not in college. In college you have to learn the teacher's way or do it the teacher's way and show your work the teacher's way. That made it hard for me since in high school it was taught differently and then in college you're learning a new different way and I didn't really understand that way.
>
> Lisa: How do you feel about being able to do math your own way in high school?

> Amelia: That is better. That's more free, more liberal, doing it your own way. You still get the same answer. You still get the same thing. But...but yeah, it's better. It's better. It's a LOT better. And you learn more by trying different things, trying different ways of doing things. Not in college. In college, you just have to learn it. Either you do or you don't.

Again, Amelia's "liberal" interpretation of secondary school mathematics was unlike many school mathematics courses where the authority for how to think about and do mathematics is vested in the teacher or textbook. Students are often expected to receive and absorb information rather than actively construct knowledge and understanding (Boaler & Greeno, 2000). Amelia understood school mathematics "as an open and creative subject not restricted to a rule-bound set of procedures"(Angier & Povey, 1999) where she could make decisions about how to engage with a problem, how to get from start to finish, and how to reason and justify her solution. There existed multiple sources of authority, just as Amelia assumed there to be multiple ways to live a life.

Being "liberal" meant that Amelia was not "forced" to learn mathematics in the "teacher's way," or to live life the way her parents expected. There was "space" for Amelia to construct meaning, assign meaning, and insert her personal form of agency into her learning practices. She was engaged both physically and intellectually in ways that built from her prior experiences and knowledge from living in the world, "to define or redefine as well as build on or go beyond the specificities of the math situation on which she had been invited to work (Powell, 2004). Amelia could "put something of oneself into the practice" (Nasir & Hand, in press, p. 25).

Conclusion

Amelia constructed a salient "liberal" identity as she participated in local communities in Mexico and moved across both geographical and emotional borders

throughout her life. Amelia used this identity as a lens through which she interpreted her secondary mathematics as "liberal." More specifically, the "multidimensional" (Boaler, 2004) nature of school mathematics clearly resonated for Amelia. She focused primarily on opportunities for verbal expression and the "space" to exert her personal authority to construct meaning and determine when and how to participate. Voice and authority, with an emphasis on discernment, were the primary features of Amelia's version of "liberal" mathematics.

The many dimensions of school mathematics at Railside were quite compatible with the meanings Amelia assigned to her "liberal" identity, and the agentive aspect of these dimensions likely contributed to Amelia's claim that she could be herself in her mathematics classrooms. However, the Railside mathematics teachers did not construct this "cultural connection." They did not understand Amelia's salient identity or recognize the multiple communities in which she shaped this identity so that they might ease any dissonance she might feel as a woman of color. Amelia's stories demonstrate the interpretive work that *she* did to make this cultural connection and to build from her skills as "liberal" to support her mathematical engagement and learning. While Amelia's mathematics teachers provided "space" in the form of multidimensional mathematics, it was Amelia who translated these spaces in particular ways through her identity lens.

Amelia's case complexifies what it means to be an agentive mathematics learner and contributes to an understanding of how identity supports mathematical engagement. I assert that it is necessary to recognize how students play an active role in interpreting the social norms for learning mathematics available to them, and how they use the identities they have constructed from on-going lived experiences in multiple communities to do so.

It is therefore critical to provide "space" within the context of learning mathematics for this interpretation to happen. While Railside's version of school mathematics included a variety of components such as communication, reasoning, justification, making connections, and working with others, they did not determine how students should do so. According to Amelia, multidimensional mathematics made room for her self-expression and interpretation for how to engage, providing her with ample opportunities to build knowledge from previous experiences that she deemed relevant rather than assuming authority from the teacher or textbook. Amelia's salient identity acted as both a lens and resource for learning. She brought this liberal identity into the classroom, used it as she engaged in mathematics, and became a "liberal" mathematics learner in the process.

CHAPTER FOUR

Christian Funds of Knowledge

In a time when there is more ethnic and linguistic diversity than ever in the United States, public schools are wrestling with how to support students to know each other as cultural beings, respect and appreciate people who are different from themselves, and build communities that support positive learning environments for all students. In response, some have called for schools and classrooms to be places where students learn and develop respect and appreciation for each other. Many schools have implemented large-scale programs as part of developing more positive and respectful school environments. However, too often this work in schools is considered mutually exclusive from subject matter, and especially secondary mathematics, where interaction between people is relatively infrequent, and building relationships is often considered irrelevant to learning. Emily's interpretation of the social norms for learning mathematics at Railside demonstrated how she understood "family" to be constructed within these spaces, a family not connected by blood but by learning. Emily's salient identity, her ways of being and knowing as a Christian, became funds of knowledge from which she drew to support her engagement with this family. Emily's case demonstrates how identities created outside of school intersect in mathematical spaces, and how students use these identities as resources for learning mathematics. In addition, Emily's stories illuminate the potential for mathematics classrooms to become spaces for both moral development *and* mathematical achievement.

Cultivating Relationships and Respect within Secondary Mathematics Classrooms

Immigration has increased throughout the world, and in the United States, sixty percent of the annual population growth can be attributed to the arrival of new residents and through childbearing of immigrant women (Bean & Stevens, 2003). In addition, those migrating to the U.S. have arrived mostly from Asian countries and countries in Central and South America. This differs greatly from the first wave of immigration in the early 1900s which included mostly people from European countries.

This large influx of immigrants from a wide range of diverse backgrounds, along with the impact of globalization, which has made it more efficient and less expensive for people to travel between countries, means that more immigrant students are attending U.S. public schools than ever before (Suárez-Orozco & Suárez-Orozco, 2001). This shift in student population is transforming the culture of educational institutions and has teachers and administrators rightfully concerned about how best to create safe and supportive environments that cultivate respect for diversity, caring relations between students and staff, and a sense of belonging for all.

Literature in multicultural education is aimed at reforming schools and classrooms in an effort to meet such needs. Several researchers offer frameworks for how multicultural education should look such that students learn about each other, come to value their differences, and work together to create educational spaces that cultivate respect, care, and a sense of belonging (Banks, 2002; Nieto, 1996; Sleeter & Grant, 1994). However, multicultural education is most often implemented separate from teaching and learning mathematics, with the exception of add-on activities such as lessons about different number systems or research about female mathematicians.

Questions remain about how to create mathematical communities in which diverse groups of students feel appreciated, cared for, and have the space to build authentic relationships with their teachers and peers through mathematical teaching and learning practices.

Emily's case expands on current literature aimed at building respectful and caring learning environments by illustrating how she translated the use of small groups and norms for learning mathematics through the lens of her salient Christian identity. This chapter shows how Emily understood certain ways of practicing mathematics as Christian ways of being. This case suggests that it is very reasonable and absolutely necessary to implement normative structures that support the development of respectful and caring communities as an integral part of teaching and learning secondary school mathematics.

I begin this chapter with a brief introduction to Emily and share pieces of her stories about life in El Salvador and her immigration experience, especially those related to family and school. Then, I discuss Emily's salient identity as an Evangelical Christian, the meanings she assigned to this identity, and how she used her Christian identity to interpret her secondary mathematics experiences at Railside. I conclude by suggesting that Emily's Christian identity was an intellectual resource for learning mathematics, and engaging with mathematics supported her further development of a Christian identity.

Who is Emily?

Introducing Emily

Emily grew up in rural El Salvador, where she lived with her mother and three older brothers until she was five years old. She was then raised by her grandmother until the age of ten. Emily's mother, Gloria, left for the United States to find a job and a safe

place to live before sending for her children. Gloria's husband had left her, and she wanted to leave El Salvador and her life "where there was a lot of poverty, very torn-out shoes and very little clothing." Emily described these five years with much sadness and explained that although her "grandma was really, really, nice to me" and "loved me so much," she felt more "like a maid or something like that" than a member of her family.

> When I was there, I suffered so much. Even though my family says that they love me or whatever, they always take advantage of you as a little girl. I remember I used to go to school, and when I came back from school I had to run to the store like a block or two blocks away and get the tortillas, 'cause they sell tortillas. And when I didn't do that my auntie used to get REALLY mad at me. I remember there was times when I wanted to eat something, but I was just afraid of asking even though I was a little girl. Or when they give me something, I had to do something for that to pay them back, like wash the dishes or clean the house or whatever.

Emily found solace from her suffering in religion. She found refuge in prayer and in God. Emily mentioned several times throughout our conversations that "God is my faithful friend." She turned to God when she was "down and stuff" as a means for strength and comfort. She relied on God to help her cope with life's challenges.

> Since I was little, my mom taught me something beautiful about believing in God. Since then, to this day, I still go to a Christian church. I have always found a lot of peace in my heart from going to church. I found a lot of hope and prosperity by going to church and believing in God. That got me through the life I have had.

Emily attended school a few blocks from her home. Her grandmother never attended school, and her mother studied up to the 8th grade, but both understood how important it was for Emily to be educated. Emily did not enjoy school much when she was in El Salvador. She told stories about sneaking out of windows to skip class with her cousin and being sent home because the teacher did not think she was clean enough. Emily described her schooling experiences as very rigid and her teacher as extremely strict, which made the experience even more unpleasant for her.

> School over there is really different. You gotta follow whatever the teacher says to us. If it's green it's green. If it's red, it's red. You just deal with it. It's not like here [the U.S.] where sometimes the kids argue with you and they talk back, you know? Not over there [El Salvador]. If you do that, they used to HIT you. You had to put your hands close together and with a ruler, and oh my God! It hurt so MUCH!

Gloria returned to El Salvador five years after she initially left. She had established herself in Northern California and wanted Emily to live with her. She hired a coyote to help her and Emily as far as Mexico where they lived for a month before attempting to cross the border again. Emily did not share much about her immigration experience. The brief story she chose to tell did not sound pleasant, and nor did she describe it with much emotion. She included very few details, but spoke about walking between Mexico and the United States, getting stuck in quicksand, and not eating for days. When she and her mom finally arrived in Los Angeles, they were picked up by family and driven north where they have remained every since.

Evangelical Christianity as Salient Identity

Evangelical Christianity was the foundation of Emily's life since she was a little girl. It permeated her daily agenda, her conversations with family and friends, and her choices about where and how to spend her time. It was common for Emily to remind me to "look to God" for support or end our conversations with, "God bless you." During this focus group meeting in which the conversation below took place, Emily told us that religion was "the most important thing" for her, the one identity she was not willing to give up, even when someone tried to take it away as part of the "game."

Emily: For me it's the most important thing, religion.

Lisa: Was it the last thing you were left holding?

Emily: Yeah.

Mariana: Really? No one took it away?

Emily: Well, actually they did, but I wouldn't give it away. I think that's the last thing I would give away.

Lisa: So how did it feel to have it taken away?

Emily: I don't know. It hurt in a way 'cause it's just so important for me. I was raised with it and it got me to a different level, knowing what God is in my life and the changes and everything that he has created. I just have this strong belief in what God is in my life. I wouldn't change it for anything else in the world. When she took it away, I felt like I woudn't have my faith. I wouldn't have my belief. I wouldn't have GOD close to me.

As a child living on the outskirts of San Salvador, El Salvador, church was Emily's second home. It was the center of her world. Each day and night Emily walked with her grandmother to their local church, which was just five blocks from their house. They spent hours there praying for their family and for the world's poor.

Lisa: I didn't realize that church was as important to you in El Salvador as it is here [in the United States].

Emily: Yeah, it was, 'cause I'm from a Christian Evangelical family. Almost every afternoon after I took a nap, we're going to church and praying for about two hours. I remember my grandma used to sit...she was like, "Right here. Get on your knees." She used to have me there for like two hours praying, praying to God, praying for my family, for everything. And then we used to go back home and eat. We used to eat or do homework or something and then go back to church. It started at like seven and we had to walk because we didn't have a car...I was the only company, me and my grandma, 'cause my brother didn't want to go to church. So I had to take her to church. Me and her used to walk, and it was just so dark that we used to walk with lamps. Church was very...it IS very important.

In addition to Emily's personal relationship with God, Christianity played a central role in her life in two significant ways. First, identifying as a Christian provided Emily with a means of connecting with her family, which was very important to her. Emily's family attended church together three times each week. They prayed together, cleaned the

temple, and often studied the Bible at home. Her mother and sister-in-law coordinated monthly church services, one of Emily's brothers was a church deacon, and the family often visited church who were ill and could not attend services.

Additionally, religion afforded Emily an opportunity to connect with her family's cultural roots and traditions. Through her participation in the church, Emily became part of her family's long history with Christianity. She stayed connected to her home language and family traditions while both maintaining a relationship with life in El Salvador and co-constructing a current version of the family living in the United States. Christianity was what this family did. It was an integral part of who they were. Emily confirmed that she belonged to her family and her family's culture by claiming a Christian identity.

While her engagement with Christianity supported Emily to connect *with* her family, she also considered this religious community to *be* her family. Her church was more than a place where she did important things with the people she loved. Emily felt that she belonged in this space and with many of the people who participated in her church. Church activities provided a safe place where Emily could "be herself." In addition to sharing a strong commitment to God, she found unconditional acceptance as a young Salvadoran woman. Here, Emily did not have to pretend to be someone she was not. She did not have to compartmentalize the different parts of herself for fear of rejection. She did not have to hide the fact that she was an immigrant or could not speak English fluently. She shared her family's extreme hardships without fear of judgement and joined in prayer to ask God for support and guidance. Emily participated in her Christian community as many participate in their families, as a whole person. She could

"be herself" in this space and simultaneously she learned how to become more of who she wanted to be.

> Lisa: I think that's a really strong statement to make about religion and your family. If you lost your religion do you feel like you would be losing your family?
>
> Emily: Yeah. It's because I believe a lot in God, you know? And it's something that nobody can change from me. I feel that my religion represents what I think, where I belong.
>
> Lisa: Do you feel like the church is your family or that you use church...
>
> Emily: It's like a big family, but to be honest, I don't see that everyone there is my family. They're not truthful. Not everybody's truthful in the church. But the closer people, the friends that I have closer to my family and to us I DO consider them like my family. And most of them are from church. Most of them come from different backgrounds, different countries, but the church I belong to right now I feel like the closer people are like my family. I trust them.

Living as a Christian and Following God's "Amendments"

Emily was not a missionary. She did not talk about Christianity much at school, except with close friends. She did not recruit people to join her church, although each woman in the focus group admitted to having visited Emily's church at one time or another. Overall, Emily projected a great deal of healthy confidence in her Christian beliefs, maintained a strong devotion to God and her church, and allowed those around her to make their own religious choices without applying guilt or pressure. What was most important to Emily was that she tried to be a "real Christian" by maintaining "a relationship with God." This meant dedicating time to God and praying every day, "being a follower of Jesus and doing things like he did," praying for people, helping others, and talking about "the power of God" in her life. To be a real Christian also meant following "God's rules," which Emily interpreted as part of her Christian duty.

> What matters is that you do what God tells you to do. You know, follow the amendments, not stay mad, like the requirements, being a good person, yeah. And some people believe that because they are helping people they are going to

> heaven, but it's not just about that. The Bible, if you read the Bible, the Bible says exactly all the requirements and the things that God asks us.

Emily's focus on personal betterment as the primary way of being Christian echoes the stories of Salvadoran Evangelical Christians in Menjivar's (2003) research. Menjivar explained that Evangelical Christians in the United States tend to concentrate more on the individual and the ways in which prayer and conversion can create better people instead of emphasizing collective efforts for social change as Catholics often do. Evangelicals "seek God and let Him take care of things" (p.39) while the Catholic Church encourages community action.

Emily also worked with an assumption that she had a responsibility to "give back to my community" and presented an attitude of care and respect towards herself and others as a way of helping everyone have a better life. She was infused with a sense of justice and was emphatic that all the world's people have clean water, enough food to eat, clothing, shelter, and access to education. In addition to the time she and her family spent praying and doing kind things for others, Emily dreamt of spending her life helping the world's poor. However, Emily's inclination towards good will was not an effort to solve the world's social problems. Instead, Emily yearned to do good deeds as a way of serving God and helping others find their way to Him. In the conversation below, Emily explained her strong desire to help people but quickly corrected my assumption that this work was an effort to "save the world." Bringing comfort to others or providing quality resources to those in need was the work of good Christians, but saving the world was God's job.

Lisa: If you could do anything in your life, what would it be?

Emily: I would love to be uh...if I could do something in this world, I would love to travel to different places and help poor people.

Lisa: How would you help them?

Emily: Sometimes I wish I would just have the money and just GIVE it to them. When I pray to God, I tell Him why do we have so many rich people? Why they don't like to share what they have? They always think about themselves. But then I say, would I do the same thing if I were to be rich? Is it because of my experience that I think the way I do? Maybe that's what it is, 'cause that's what I would like to do. I would like to travel around different countries and just help them. I would like to build places where they can live, and feed them, and provide them with the basic needs. And then at the same time I would like to do religion. It's very important, and education.

Lisa: So, you're going to save the world?

Emily: Not me. Only God saves the world.

Emily's strong commitment to maintaining her Christian identity was evident in the way she spoke and acted in addition to how and where she chose to spend her time. Religion was not only an institution for Emily but also a space where she could be herself and connect with her family and her family's long history with Christianity. She applied Christian ways of being to many contexts in her life, allowing her to serve God in a multiple ways.

Interpreting Norms for Learning Mathematics as Christian Ways of Being

Emily was very aware of some of the Complex Instruction structures used by Railside mathematics teachers to support students' engagement and learning. However, Emily understood their purposes very differently than her teachers thought about them. In the following section, I demonstrate how Emily translated the norms for learning mathematics through her salient identity as an Evangelical Christian. Specifically, I explain how Emily constructed her mathematics classes as "family" who cared for each

other and worked together to support everyone's learning. Additionally, I show how Emily interpreted the norms employed in her classrooms as rules that facilitated the kind of care and learning that she expected as a young Christian. Finally, Emily explained that through her participation in mathematics, she learned how to become a better person, a better mathematics student, and a better Christian. Her Christian identity became a resource for learning mathematics and through her participation in mathematics, Emily became a better Christian.

"Math class was like a family."

Emily interpreted high school mathematics through her salient identity as an Evangelical Christian. One of the most poignant features of her interpretation was an emphasis on the relational components of her classrooms. Emily thought of the mathematics classrooms at Railside as places where people cared for and trusted each other, where students worked hard and worked together for the purpose of improving their own lives and the lives of others. Emily understood that in secondary mathematics students and teachers came together as "family" to help each other achieve a common goal, learning mathematics.

> Helping each other. I think that was the key in math class. Helping each other, working hard, you know and being supportive to everybody. It's like a family. Math class was like a family.

In her stories, Emily focused mostly on the use of small collaborative groups as a means of creating these mathematical families. Emily explained that the small groups helped her feel "very close to everybody" and "not afraid to ask people, "Will you help me with this?" She thought "the best way to learn math is by working in a group," and was curious about why her college professors or teachers in other schools where she tutored

did not use this arrangement. When I asked Emily to describe mathematics classes at Railside, she immediately focused on how students were seated in small groups, the roles they played, and how they were expected to work together.

> Lisa: If I walked into a math class at Railside, what would I see?
>
> Emily: Everything is organized. You have a Facilitator. I don't remember all the names. They had like four people, and everyone was in charge of something, the roles. We're sitting in groups. We're working in groups of four. We're listening to the teacher, and after she's done she always gives you something to do, and you work with your group or by yourself, but most of the time in the group. You get the toolkit and if you have a question you ask somebody. You have your neighbor and you have the teacher and you have homework.

Although it is quite common for high school mathematics classes to be organized with students seated in separate desks, which are organized in rows, such that they can learn as individuals, Emily repeatedly expressed her concerns about such arrangements. When she described the use of small groups in mathematics, she always compared this collaborative structure with the organization of her other high school courses. Emily told me, "We didn't work the same way in other classes. The teacher did not encourage us to work in groups. We were always working by ourself most of the time."

It is common to focus on classroom arrangements in secondary schools relative to how they support students' learning, but Emily explained that cooperative groups in mathematics also made her feel cared for, and the lack of cooperative groups in other classes often left her feeling lonely and isolated. Emily was all too familiar with such feelings. As a child growing up without her mother in El Salvador and as a newcomer to the United States, Emily longed for family and friends who took an interest in her life. She yearned for family who kept her clean and fed her meals. She wanted friends with whom she could speak Spanish and share her thoughts and experiences.

The feeling that "no one cares" is very common among Latina immigrants in U.S. schools where they are often physically isolated from the larger student body through separate English-Language classrooms or tracking structures (Olsen, 1997). They often feel emotionally isolated because they find few teachers who are willing to forge "authentic" relationships with them based on respect for them as "whole people" rather than as stereotypes of themselves (Valenzuela, 1999, p.61). Research particularly focused on Latinas argues that these young women are often positioned by teachers as "submissive underachievers," inevitable dropouts (Cammarota, 2002), or "*como si tuvieramos una enfermedad*"(like if we had a disease) because they lack English skills (Valenzuela, 1999, p.135). These sorts of experiences often contribute to Latinas' decisions to disengage from classroom activities or to leave school all together (Antrop-González, 2006; Flores-González, 2002; Katz, 1999; Valenzuela, 1999). While the concept of caring is rarely taken up in the mathematics education in the literature, Emily's stories suggest that it should, for it had a profound impact on her willingness to engage with mathematics.

As a student at Railside, Emily felt cared for by her mathematics families. Emily's version of care did not require teachers to act as her best friend. She did not want them to inquire about her family problems or ask her about her summer vacation. This was not the kind of care that had teachers wondering what she had for lunch or whether or not she was sick. While this kind of caring might be welcomed by some, Emily described caring in ways similar to the literature on "critical care" or "hard caring" (Antrop-González & De Jesús, 2006), which is represented by high academic

expectations and supportive relationships between teachers and students. Below, Emily shared how her mathematics teachers acted in ways that showed they cared.

> Lisa: Were there things that your math teachers did that were helpful?
>
> Emily: The fact that you CARE for us, you know? You guys always ask questions, "Can I help you? Did you finish your homework?" And we're like, "No." And you're like, "Why not?" You were doing something else but you were like, "Oh, why not?" And I was like, "Oh, because I was watching t.v.," or whatever and you're like, "Well, you need to focus on your education." You gave us like a preacher (laughs) like almost the same thing, every day the same thing. Yeah, that's what I remember.

Emily's defined care to include teachers' emphasis on her learning, and the use of cooperative groups in mathematics class helped to facilitate this. More specifically, when Emily spoke about small groups, she clarified how students acted when they were in them, what they said, and the role of the teacher. Emily described the use of groups in mathematics much like she discussed the meaning of caring and emphasized their academic components. She did not focus on the social aspect or mention that it was more fun to sit with her friends. When Emily discussed cooperative groups, she focused on how working with others helped her to learn mathematics.

> It helps when you do math in the group. It helps. You learn from the other people. I think it works better in working in groups than working by yourself. I work in a school now and they sit them in a row. They open their book and they don't really give them worksheets, just a book. And you have to do it yourself there. You could ask somebody but sometimes they are working on another problem. When you are working in a group, like you're helping each other, you know, "Let's do number one. Ok, everybody is working on number one. Oh, how do you do this? What are you talking about? How are you doing this?" And they explain it to you. Sometimes you sit with people who spoke Spanish, so if you don't understand then they can help like you translate or something. I think that works really good. I think that makes it very worth the way to learn. Groupwork. Participation.

Emily interpreted the purposes for working in small groups in mathematics class as she understood her goals as a Christian and those of her Christian family; people coming

together for a common purpose. As Christians, Emily and her family prayed together. They studied the Bible together, and they cleaned their church. As a community, people worked together to paint the church, send remittances to El Salvador, and collect food for the poor. This Christian family was "one of the most important forms of association (and of community-level sources of assistance) in the [her] Salvadoran community" (Menjivar, 2000, p. 109). It was impossible to accomplish these goals alone. It was impossible for Emily to bring people to God on her own. Doing them with others was a way for her to connect and develop relationships. Within the small groups in mathematics, Emily certainly connected with other people, and it is likely that she made new friends and had some fun. More importantly, Emily understood this structure to support her to accomplish her academic goals. In mathematics classes students come together to help each other, they formed relationships and had fun just as church was the way for Emily connect with her family. These connections were in service of something larger, helping people find God. Emily believed that in mathematics class, the collaborative groups were also in service of a larger goal, helping each person to learn mathematics.

Norms as Classroom "Amendments"

As with her biological and Christian families, there were rules to support Emily's mathematics family to function as a caring community. Emily interpreted the norms for doing mathematics just as she did God's "amendments" for being a Christian, as guidance for students to exist in a collective space such that they could all reach their common learning goals. Teachers were "preachers" responsible for implementing and reinforcing the norms that supported students' intellectual well-being, and the students

were responsible for enacting them. Like the "amendments" from the Bible, Emily considered the norms in her mathematics classes so powerful that they could literally influence how other students behaved.

> I don't remember none of my classes being selfish or things like that. It was weird if a person was selfish and we used to like criticize that person, like, "DAMN! They're HELLA shady! What are you doin'?" And they used to CHANGE! They used to CHANGE, you know? It's like, "I don't have to be like this." That changed their mind. I don't know what happened. So, we were like, in my group I remember my group always worked together. "Okay you guys, we have to work together. Are you done? You don't understand? Okay, let me help you." That's what I remember in my math class.

Railside mathematics teachers implemented several norms throughout their courses. Although Emily did not recite a list of norms, as students might do a set of rules about bathroom passes or gum-chewing, she consistently referred to norms throughout her mathematics descriptions and translated their purposes as ways to maintain a collaborative environment focused on working and learning together. For example, in the quote below, Emily explained how students helped each other in mathematics. In her explanation, she invoked two specific norms used at Railside. These were: (1) You have the right to ask for help, and you have the responsibility to offer it, and (2) ...Yet! Emily did not recite these norms verbatim but offered her own translation.

> In math we had the groups, the responsibility in the groups that everybody had to learn it and try to help the person next to you, in front of you, to the side, whatever, you know?

When Emily stated, "Everybody had to learn it," she was referencing a stance towards learning taken by the mathematics teachers at Railside, which stated that each student in the classroom was capable of learning mathematics. Students were not expected to learn everything immediately or at the same pace, but over time everyone was expected to be successful. The teachers' phrase for this norm was, "Yet!" When someone in a class

expressed frustration such as, "I can't do this." Students would respond with, "Yet!" Someone might say, "I'm not very good at math, " and another person would say, "Yet!" This norm was used to counteract the often-made assumptions that only some students are capable of understanding mathematics.

Another norm that Emily alluded to in this same sentence was, "You have the right to ask for help, and you have the responsibility to offer it." When Emily translated it, the norm sounded like this, "Try to help the person next to you, in front of you, to the side, whatever." Emily recognized that it was reasonable for someone to have questions, and that each person was responsible for helping others when needed. It did not matter who this person was or whether she was "next to you, in front of you, or to the side." Everyone was expected to support each other's mathematical understanding. In this way, each person was also assumed to be an intellectual resource in the mathematics classroom. This included, but was certainly not limited to, the teacher. While "helping" was required, learning from your peers meant valuing the help that was offered, and recognizing that each person had something intellectually worthy to share.

Of course Emily did not understand all of the educational reasons behind the use of these norms, and the Railside mathematics teachers did not create these norms with the purpose of aligning their pedagogy with students' identities as young Christians. As all students do, Emily interpreted these invitations to participate in mathematics classes in a particular way through the lens of her salient identity. She understood the rules for mathematical engagement through her Evangelical Christian lens. When the teachers said, "You have the right to ask for help, and you have the responsibility to offer it,"

Emily translated this message as an Evangelical Christian to mean "I am cared for," and "everyone cares about each other's learning."

One final norm that was important to Emily because it supported students to support each other was: "No one person in the group is done until everyone is done." Below, Emily translated this norm into her own words.

> It was different [in math class] because the teachers wanted to make sure that EVERYONE understood the subject and no one was staying behind. In my other classrooms, they were like, "Okay, next subject. You don't understand? Too bad. Learn it yourself." That's the point. Like in my English class we were learning about Scene 13, number whatever. "This is what we're doing and you're going to write a paper about this. If you don't know what we're talking about, well if you don't ask, too bad, you stay there."

First, when Emily said, "the teachers wanted to make sure that EVERYONE understood" she was referring to the public stance held and articulated by the mathematics teachers at Railside that all students could be mathematically successful. These teachers rejected the assumption that some students were smarter than others or that mathematical intelligence was innate. In addition, the teachers worked with an acute political awareness about the many institutional and social factors that might contribute to students' lack of mathematical achievement. This belief that everyone was capable of learning mathematics was coupled with social norms and other pedagogical practices chosen to support this position.

The other social norm of which Emily was aware was, "No one person in the group is done until everyone is done." The purpose of this norm was not to hold students back or penalize them for understanding something quickly. The teachers' goals were to ensure that small groups worked together and did more than solve a problem on paper. Railside mathematics teachers believed that by working and talking together, asking

questions and justifying ideas, students would construct a more meaningful understanding of an idea or concept than if they worked alone. If one student appeared to finish a problem before her group members, it was likely that there were more ideas to be discussed, different ways to solve the problem, or further justifications to be made. Only when each person in the group could explain how the problem was solved and why could the group move on.

During one of our focus group conversations, the young women discussed this norm in more depth and how it facilitated Emily's version of caring within their mathematics classrooms. Again, they invoked the idea that it was necessary to wait for others when they were working on a task, ensure that everyone understood the problem and agreed on the solution, and checked-in with group members so that no one was left behind.

> Amelia: And if you're behind [in college mathematics classes], nobody cares.
>
> Sandra: It's like on your own, you have to study on your OWN.
>
> Amelia: You're on your own, yeah.
>
> Sandra: But in high school, it was groups. It was helpful.
>
> Emily: I think college should do that too.
>
> Amelia: For example, group tests. Everybody has to have the same answer. They would NEVER do that in college. Whoever doesn't know it don't KNOW it. Who cares?
>
> Emily: Yeah.
>
> Amelia: In high school, we all had to have the same answer on our group test and only ONE test was going to be graded.
>
> Sandra: We have to WAIT for each other.

> Amelia: We had to have our group together, and we had to wait for each other, and we had to WORK together.
>
> Emily: Yeah, because we wanted to learn and get a good grade. So, we were like, "Did you get this? Are you sure?" We were communicating.

There were several statements made by the young women in which they interpreted the classroom norm, no one is done until everyone is done. These included "We have to wait for each other," "We had to have our group together," and "We had to WORK together." It is interesting to note that the women did not discuss these norms as restrictive or limiting. While many students might consider waiting for their group members or working towards the same answer to prevent them from learning, these women appreciated the norms and suggested that they afforded the kind of caring that supported their achievements.

Reciprocity: Assuming Responsibility for Others' Learning

In addition to supporting her individual learning, Emily explained that the norms for learning mathematics at Railside also facilitated an expectation that she was responsible for helping others learn. While Emily felt cared for and safe because she knew that *she* would not be left behind, she also constructed her role as someone who was responsible for her peers' learning as well. As part of her experiences in high school mathematics, Emily learned to take responsibility for her peers' learning and to value that "responsibility as an important part of life" (Boaler, in press, p. 13).

> In high school we had the groups, the responsibility we had in the groups that everybody had to learn it and try to help the person next to you, in front of you, to the side, whatever, you know? But in college, it's different. Like I said, you just tend to care more about yourself and not about what other people learn. If they learn it, oh well. If they don't, oh well. It's up to you.

This responsibility for learning that Emily felt and demonstrated towards her peers was much like how she interpreted her role as a young Christian. Part of following the rules of God required her to do good deeds as a way of serving Him. She lived her life with a moral obligation to assist others, to do good for people in the world, to work "through deeds that glorify God" (Menjivar, 2003, p. 36). Emily balanced her personal goals for personal betterment and salvation through actions that served God while simultaneously working to benefit others. Similarly, part of being a mathematics learner meant that individual achievement was not enough. Emily understood her student-role to require her to take interest in others' learning. She worked hard to achieve certain things such as good grades and a chance for a college education, yet, Emily also wanted other people to succeed as well.

> I learned to be responsible. I learned to always to be a better person meaning in my education. I learned to care for others, like when we did a project or something. We had to work together.

This "reciprocal" (Boaler & Staples, in press, p.18) response Emily had to working in cooperative groups is highly uncommon among students. According to Boaler (1997), students who have groupwork experiences in mathematics generally report advantages to working with others, but these advantages are usually related to their own learning. At Railside, however, Boaler's (in press) results were similar to Emily's responses. The mathematics students at Railside communicated a particular "social orientation" (p.16) towards learning mathematics that was both individual and collective. While students knew they would be held accountable for their individual knowing, they also felt responsible for understanding the content, not so they could be better than others but to "help others in their group" (p.16). Again, Emily's construction of this norm is strikingly

similar to how she constructed her role as a Christian, as someone with responsibility for helping others. God is powerful, and teachers are important. And while only God can save the world, each person has a responsibility to help others find their way to God.

"I learned to be a better person in math class:" Becoming a Christian Mathematician

In their work exploring moral identities within social and cultural contexts, Nasir and Kirshner (2003) call for future research that identifies where and how different contexts foster the development of moral selves and help shape youth's moral values and identities. In their study, Nasir and Kirshner define moral as "dedicating themselves to improving the lives of others" (p.139). Emily's story offers some insight into the teaching and learning practices that supported her moral development. Emily's case demonstrates that particular classroom norms may support both mathematical learning and opportunities to become a better person.

> Lisa: What did you learn from your math classes in high school?
>
> Emily: I learned so much. I learned to be responsible. I learned to always to be a better person, meaning in my education. I learned to care for others, like when we did a project or something. I learned to always finish my work on time (laughs). I learned not to copy. That's not good, to cheat in classrooms. I learned to pay attention to the teacher. I learned that if I work hard, I will always get there. I learned it's okay to be wrong, because I will always learn from my mistakes. I don't know. I just learned to be a better person in my math classes. And you're going to ask me how, huh?
>
> Lisa: Yep.
>
> Emily: Just caring for others. Not just thinking always about myself. A lot of people don't realize how math impacts people. That's what I think.

It is truly incredible to imagine that what goes on inside secondary mathematics classrooms has the potential to impact young people in such positive ways. Imagine mathematics classes where students learn how to be responsible, care for others, manage

their time, listen to ideas, set aside their individual needs to support their peers, work hard, experience success after not giving up, ask good questions and recognize the value in making mistakes. In addition to learning mathematics (remember that Emily successfully passed Advanced Placement Calculus during her senior year of high school), Emily also learned all of these other things. In her own words, Emily "learned how to be a better person."

Emily's stories of her high school mathematics experiences resonate with Povey's (2003) suggestions for how to help students become educated citizens through mathematical learning and instruction. Povey recommends that to achieve a more active and inclusive learning experience for students, classroom practices must take social justice issues seriously and "promote a willingness to share ideas; making space for the ideas of others, supportive listening; and less valorizing of the individual and of individual success" (p.57). Students must have opportunities to appreciate their own and others' talents and contributions, value shared learning, have opportunities to reflect, provide feedback, and make decisions to learn the skills necessary to successfully participate in a global society. Emily's stories indicate that what some might consider lofty goals for public school mathematics are not only possible to attain, but there are pockets of excellence that currently exist from which to learn how to achieve them.

> Lisa: Were there other things you learned from your math classes at Railside that were useful in your life?
>
> Emily: I learned how to work with different people. I worked with Asians at Railside, Mexicans, Salvadorans, people with different backgrounds. Even with Black people, you know? I think it helped me grow and not to be so shy about things. I learned to have a positive attitude towards people. When you work with people you HAVE to have a positive attitude. Being in those groups that you guys put us in high school helped me. Also, in math class I learned how to approach teachers. I was always a very shy type of person because I felt inferior when I was

younger because of my language. I didn't know how to speak English very well and I think that helped me a lot too. Everybody, well most of the students there were in the same spot I was and we had to communicate with the teacher. That was very helpful. I learned how to be myself. You want to know how? (laughs)

Lisa: Yes, please.

Emily: I learned how to be a good friend too.

Lisa: In math?

Emily: Yeah. I got closer to my friends and I got closer to people I didn't know. I learned about them. I learned about their culture. I learned how to respect even though they were different than I was. Their religion. They were Catholic, I was Christian. But that didn't matter, you know? I learned how to share. How to share the answers and how to help, how to help them and support them.

Finally, it seems that Emily's participation in mathematics at Railside High School was truly a transformative experience. Some may argue that transforming students into better citizens or helping them to become moral individuals is not the role of mathematics teachers. In addition to the myriad responsibilities a teacher takes on each day, most would be satisfied and overjoyed if students just passed their classes. However, a lack of deliberate attention to help students learn how to share ideas with different people, face their fears and take risks, care for others and become better friends is a choice to maintain the status quo, and currently, the status quo is failing too many students. It is likely that Emily is not the only young person whose life was affected in such positive ways by the Railside mathematics teachers, their intentions, and instructional practices. These teachers and their classroom environments played an important role in both helping students learn mathematics and "in offering both conceptions of self and ideas about how one should participate in the world" (Nasir & Kirshner, 2003, p. 144).

Belonging to a Mathematical Family

Emily's descriptions of her high school mathematics classrooms exist in stark contrast to the ways many students have described their urban schools, classrooms, and particularly mathematics classes. Rather than the sterile, unfriendly, and isolating places where students are often expected to sit quietly and listen to a teacher's lecture, Emily spoke about mathematics classrooms as places where people were friendly and helpful. Relationships were created amongst students that facilitated comfort, conversations, and a shared sense of responsibility for learning.

Emily felt that she belonged in these mathematical spaces, as she belonged to her church and its community. She had the sense that she and her peers were important participants in all aspects of the learning process. The concept of *belongingness*, as described by Ames (1992) and further by Allexsaht-Snider and Hart (2001) has a strong moral dimension that parallels Emily's Christian interpretation of the world where each person has value and is considered equal in eyes of God. To Emily, belonging to the Evangelical Christian community meant that people worked together to support each other to achieve personal greatness through a stronger relationship with God. There existed a belief that all people were worthy of salvation and therefore worth the investment of time and care. In Railside mathematics classes, belonging meant that students cared about each other's learning and acted unselfishly to support everyone's academic achievement. This may have meant working collaboratively, sharing ideas, asking questions, or checking in with each other. In Emily's Christian world, all people should have enough food to eat, clothes to wear, a good job and place to live. This belief also extended to learning, and in this case, the learning of mathematics.

Conclusion

Emily's salient identity as an Evangelical Christian supported her interpretation of the norms for learning in her secondary school mathematics courses at Railside. Emily understood her mathematics classes as "family" who cared for each other and worked toward a common goal, the goal of learning mathematics. Small, cooperative groups supported these families, but Emily also emphasized the norms, or "amendments," as facilitating Christian ways of being in these spaces. From the Railside teachers' points of view, these norms guided students' participation. They encouraged students to stay together on a problem, use each other as intellectual resources, ask questions and offer help. Emily translated these norms into "amendments," which she took to mean that people cared for her and her learning, and that she had the responsibility to help her peers learn as well.

Emily interpreted opportunities to work together, to help others, and to take responsibility for herself and other's learning as ways of being a better person, a better mathematics learner, a better Christian. In this way the use of norms afforded Emily "space" to build from a set of strengths she had honed in her Christian community, and provided her with further opportunities to grow into the kind of person she imagined becoming. Emily's Christian identity was a fund of knowledge in this particular context, "the accumulated and culturally developed knowledge and skills" (Vélez-Ibáñez, 1988; Moll, Amanti, Neff, & Gonzalez, 1992, p. 133) she had as a young Christian woman were critical to her mathematical success. The practices, skills, behaviors, and beliefs that Emily had developed and fostered as an Evangelical Christian were called upon by the classroom norms and required for her to engage and be a successful mathematics learner.

It is easy to imagine mathematics classrooms where these sorts of strengths would not be necessary or valued, where students were expected to sit silently or even ignore their classmates as the expense of individual and competitive learning. In such a case, Emily's Christian funds of knowledge would likely be discounted, set aside, or never even considered. She might actually be prevented from acting from these great resources she brings from her out-of-school communities. Additionally, Emily's stories and interpretations illustrate a content-specific setting in which she learned about others, how to care for others, and in Emily's words, how to "become a better person." Again, many may consider supporting students to develop responsibility, positive attitudes towards learning, or respect for other people irrelevant to mathematical learning or outside the realm of a mathematics teachers' responsibilities. However, I argue that it is not acceptable to ignore the many Latina immigrants who are currently choosing to opt out of secondary mathematics, or the power with which Emily spoke about her experiences as catalysts for her mathematical engagement. The potential exists to create different kinds of learning spaces, spaces in which students feel honored, cared for, and encouraged to build authentic relationships, not separate from, not in addition to, not outside of, but as an integral part of teaching and learning mathematics.

CHAPTER FIVE

"Girls are just Garbage."

Immigrant students in U.S. public schools who are learning the English language are often positioned as less intelligent and less able to learn mathematics than their English-speaking peers. English language learners are often tracked into low-level courses, exposed to less-than-grade-level curriculum, and provided with fewer academic resources, including qualified mathematics teachers. In these ways, language ability is used to justify assumptions about students' intellectual abilities. Lack of English proficiency is often constructed as a deficit in students. Resources are more informally "subtracted" from students when English-only rules are implemented in classrooms, leaving students feeling rejected, isolated, and incapable of academic success. Mariana's stories support the fact that trying to learn mathematics in a second language can be intimidating, frightening, and overwhelming. However, from Mariana we learn about the power inherent in language and how she used language, and Spanish in particular, as a means for empowering herself as a mathematics learner. More specifically, Mariana understood her use of Spanish as a tool for engaging with and learning mathematics, developing a mathematical voice, and further developing her salient identity as a "feminist."

Language and Mathematics Learning

Many studies have shown how often schools track immigrant students, and particularly Latino and Black immigrants, who are non-English speaking into courses with fewer resources, different curriculum, and less well-prepared teachers (Conchas, 2006; Garcia, 2001; Oakes, 1990; Olsen, 1997; Valenzuela, 1999; Waters, 1999). In

mathematics in particular, non-native English speakers are often placed in remedial courses based on language ability rather than mathematical understanding (Moschkovich, 1999). Such structures are forms of racism and inequality that prevent students from accessing the same academic opportunities as their English-speaking peers.

Additionally, Valenzuela (1999) argued that schools "subtract resources from youth" (p.20) in several ways. In particular, "English Only" rules divest students of their home languages and erode their social capital. This isolates students from their families and larger communities, leaving them without the many resources they need from which to build new understandings and learn new content. Insensitivity on the part of schools and teachers to students' linguistic competencies narrows their educational opportunities, implies a lack of intellectual ability, and reduces the possibility for caring relations between teachers and students that are necessary for student achievement.

In general, language is an important tool for learning mathematics. Opportunities to "talk mathematics" (Fullerton, 1995) support students' construction and negotiation of mathematical meanings (Lave, 1988), foster vocabulary development (Dale & Cuevas, 1987), and apprentice them into several socio-mathematical norms such as justifying, explaining ideas, and asking relevant questions (Cobb, Wood, & Yackel, 1993). For non-native English speakers, the use of home languages in mathematics classrooms has been touted as a way of supporting academic achievement for non-native English speakers by honoring students' diverse range of experiences and connecting to their "funds of knowledge" developed in out-of-school practices (Moll et al., 1992). More specifically, it has been claimed that when "new meanings are being developed, the language that the

child comprehends best should be the one used" (Khisty, 1995, p. 282). Mariana's case complexifies the discussion about whether or not students should use their primary languages while learning mathematics. Her stories illuminate the power inherent in language and illustrate how this power can be assumed by students to support their learning and the creation of a mathematical voice.

Who is Mariana?

In introducing Mariana I provide some background information and context for understanding Mariana's life in Guatemala prior to immigrating to the United States. This information about Mariana from outside of school and outside of the U.S. emphasizes the complexity of students lives and the broad diversity among students, even those who are often assumed to have the same cultural and ethnic backgrounds. I then demonstrate how Mariana constructed a salient identity as a "feminist" through her lived experiences and specifically in opposition to the social constructions of women made by her family and "culture." As Mariana's case unfolds, we become aware of the strong social and historical forces in which Mariana worked to negotiate a sense of self, which she then brought into her secondary mathematics classrooms and used as a tool for both interpretation and learning.

Introducing Mariana

Mariana was raised by her maternal grandmother on a farm in the mountains of rural Guatemala until she was nine years old. Mariana's father was killed in the country's civil war, and her mother had migrated to the United States to find a home and a job before sending for her two children. Mariana's older brother, Enrique, was sent to a military boarding school during this time, and Mariana was left to live with her cousins in

her grandmother's home. Mariana explained that she and her extended family lived in very poor conditions. They occupied a house with only one room and spent much time tending their livestock and managing the fields that made up the family farm.

> Living in Guatemala was basically poverty. We were living in a mountain with my grandma and my six cousins. I was the only girl and um...my...it was just really poor being there.

Mariana greatly disliked living with her grandmother. She described feeling more like a servant than a grandchild. Mariana was expected to shop, cook and clean for her family as a way to pay her dues for the care she received. Mariana made a point to tell me that she detested the way she was treated by the men in her family or in her community. She felt positioned as a sexual object even at a very young age.

> Guys are just guys over there [in Guatemala]. They hit on every girl, EVERY girl. It doesn't matter I guess what age they are unless like they're babies. Then they won't hit on them. But they hit on every girl. I don't know. Now that I think about it, it's weird and sick.

Mariana had an innate love for learning, and she was excited by new knowledge. She had access to very few resources, including books and qualified teachers, in the one-room schoolhouse she attended. Mariana recalled that learning how to write in cursive was one of her only highlights as a young student. She claimed that education was not considered very important to her family. Her grandmother had never attended school and was completely illiterate. Very few other family or community members moved beyond the third grade due to their social and economic conditions. Most people could not afford to pay for school fees or buy the tools their children needed to "do school." Mariana explained that a lot of people she knew were needed for labor on their farms and in the fields "so they can get food for their families."

Mariana was sent to school at the insistence of her mother, although her grandmother was set against it. Mariana's grandmother saw no need for girls to get an education. Their role was to "be in the house" cooking and cleaning and taking care of the men. School only got in the way of these necessary duties.

> Education didn't really mean a lot to my family until now. I went to school over there [Guatemala] until third grade. My grandma didn't want me to go to school. I remember that. She said basically that girls were supposed to be at the house, but my mom WANTED me to go to school, so she sent me all the supplies for school. Over there you have to get your own supplies.

Mariana emigrated from Guatemala to California with one of her aunts. A coyote was hired to help them cross borders. Mariana described her immigration experience at length and with a lot of emotion. This was an experience still very fresh in her mind. Mariana shed many tears as she recalled a treacherous journey that included walking through mountains, swimming across rivers, and climbing over walls. She carried everything she had on her back, and arrived in California only to feel "like a stranger" in her own family.

> And I just remember that when we got off, my aunt told me, "There they are." And I'm like, "Where?" I saw these people. They were just right in front of me. I'm like, "I don't see them! I don't see them!" I remember I saw a picture of my mom but I didn't remember her and when she stood up in front of me I was like, "You're my mom?" I didn't remember her. And then my brother had long hair and I'm like, "You're my brother?" I don't remember you. My brother was driving this red car. He just kept staring at me, staring and smiling at me. But I was just really, really serious. So I just kept looking out the window. I was like, I went through all that just to see this? And I'm like, why am I not feeling good? Why am I feeling weird? Next thing I know, I'm stepping out of the car and my step dad was in the apartment. And my mom was like, he's my husband. And I just looked and thought, "God, I just came from one bad place to come to another bad place."

Becoming a "Feminist"

Being a woman, and a particular kind of woman, was an identity that held a lot of salience for Mariana. She consistently discussed gender roles and women's social

positions throughout our interviews and rallied against a social construction of women as inferior and subordinate to males. Mariana created a salient identity as a "feminist" in reaction to the many messages she had received and the experiences she had had both in Guatemala and with her family in the United States. This identity occupied much of Mariana's time and thoughts and was often used to guide her decisions and actions.

Give a Boy a Chicken

The following is an excerpt from a focus group conversation in which the women were debriefing the Diversity Toss activity. Here, Mariana explained why her female identity was so important and why she chose to hold on to it until the last round of the task. From this conversation, we learn from Mariana both about the messages she received and larger social context in which she existed that contributed to how she thought about herself and the role of women and men in the world.

> Mariana: Well, female is really important to me. I like being a female. And most, the thing that I like the most is that um...when I was little, I used to consider females like so low, you know, just because of my grandma and everything that she used to tell me. That women were garbage and this, this, and that, and they weren't considered that big, just to make babies and take care of everything over there, all the guys and the family. And then I remember that for baby boys in my country, they STILL do it, and this is what I hate. When I went to Guatemala, someone had a baby boy and they gave him a chicken. [Everyone laughs.]
>
> Emily: That's a big gift! That's not funny! It's true!
>
> Lisa: I understand that it's a big deal. I'm sorry. I was looking at Amelia and I couldn't help laughing. Give the baby a chicken.
>
> Mariana: It's a chicken... No, sometimes it's a ROOSTER! [Everyone laughs louder.]
>
> Emily: That's a really big gift. They're expensive too.
>
> Mariana: A rooster is the, Wow! the HIGHEST! You know?
>
> Emily: That's a rich boy! [laughter]

Mariana: I'm serious. Then, for the little girls, like when someone has a little girl, everyone's like, "Oh, Okay." [sad and monotone]

Amelia: That's true in our culture. They do value men more than women.

Mariana: That's why. That's why I would not change being a female for a guy. I like being a female. I really like it and I feel PROUD of it. I can make a difference. For me, it IS important. I guess because I, maybe because I grew up with six boys. No, I don't know. I lost the count. [everyone laughs] But, all my cousins were boys.

Lisa: That's a lot of chickens! [Everyone laughs]

Mariana: And roosters! [more laughter]

As a young child growing up in rural Guatemala, Mariana was constantly exposed to very specific practices that positioned boys as more valuable than girls. She recalled her grandmother's words that "girls are garbage" while baby boys were given chickens to commemorate their births. As Emily reminds us, a chicken in Guatemala "was a really big gift," and obviously a sign of much affection and great joy when compared to the reception baby girls received.

When I asked Mariana what she remembered about her life in Guatemala, she spoke mostly about the poor treatment she received from her grandmother, the extreme loneliness she felt after her mother and brother left, and her strong opinions about how badly women were treated by men.

As a girl in Guatemala, I just remember being really, really sad. It's just really sad to be a girl over there, because it's just bad that guys, men, just have the power to do anything and girls back then of course didn't.

I was the only girl out of six guys and when I went back there, my grandma, I don't know, she hates girls. She says that girls are garbage. That's what they believe over there. Mostly, they...the very, very old people, they believe that girls are worth nothing. So, she treated me really bad. She always hit me and always told me hurtful things.

Reacting against and resisting oppressive constructions of women as weak, stupid, or incompetent was central to the way Mariana lived her life. She was very much aware of her social contexts and how they impacted her thoughts. Mariana explained that her pro-woman stance was largely based on the familial and cultural messages she received as a child.

> I really hold onto that [identity as a woman] because of what I grew up in. I grew up with men being better than women, and I always thought, why? Why are they better than women? I mean women can do the same. They might not have the same strength as the men but they have the intelligence. Over there [Guatemala] I believed that because that's what you grow up around.

In addition to the little intelligence women were assumed to have, being "garbage" implied that women were not able to do the same kind of work as men, and the work they did was of less value. Women were expected to "be there for the men," to spend their days in service of their desires. Overall, being "garbage" meant that women were smelly, stupid, inferior, and had little value as human beings.

> Lisa: I want to go back to when you were talking about your grandma and how she used to tell you that girls were garbage. Can you tell me more about what that means?
>
> Mariana: Well, that means I guess for her that, since women are NOT the providers, they can't work over there, even though they DO work 'cause they used to go sell the tomatoes or anything that they would plant and get, but for MEN, they would be the WORKERS. They would bring the "bacon" to the house and women were just to have babies and to be there for men, for their husbands and anything that they needed. So, I guess for her that meant they were garbage. And she also mentioned this once that women stink just because when they have their period that they stink. So that was another thing that made them garbage. Men didn't have all that. Men were clean. That's what she said. Those are her words. "Men are clean. Women are not." So that makes them garbage.

What Does it Mean to be a Woman?

When Mariana was brought to the United States, her mother's messages about what it meant to be a young woman largely echoed those Mariana had heard from her

grandmother. However, this time, these messages were mixed with expectations for Mariana to get out of the house and prepare for "a good future." For example, Mariana's mother, Lupe, told me that education was *the* most important thing for all of her children and named graduating from college as the one thing that would support their opportunities for future life success. However, while earning a quality education was supposed to guarantee Mariana a good future, Lupe also expected her to complete her daily chores before starting any homework. Furthermore, Lupe believed it extremely important that Mariana learn how to sew, cook, and clean house in preparation for her role as a wife, while she simultaneously encouraged Mariana to apply for college and train as a professional. Mariana's recollection of living with her mother during adolescence captured the challenges of negotiating her female identity in the midst her mother's mixed messages.

> She [mom] always said that with an education, you're going to be better. You're going to have a better job, but then when it came to that part of me being a woman, like she always said, "You have to learn how to cook. You have to learn how to do all these things." I don't want to cook because I'm not the only one who should be learning, even though she might be teaching me for other reasons. I know I can do my own food for me. But I don't do it because I have all that inside of me, all that anger. No! I'm not going to do it just for what you want me to do. She always told me, "You have to learn how to cook because how are you going to have your husband? You're going to let him die?" I'm like, "No. I'm not going to let him die. He can do his own cooking (laughs). He can find something if he doesn't want to cook." She always said that education was the first thing that I should be concentrating on, but when it came to be being a woman or a girl it was totally different.

It is important to clarify that although the messages Mariana received from Lupe about the kind of woman she was supposed to be were mixed and difficult to understand, Lupe was not trying to jeopardize Mariana's opportunities to attend college and find a career. Like so many parents from countries in Central America, Lupe truly believed that

education was the key to Mariana's future success and spoke passionately about how proud she was of all three of her children for doing well in school (Suárez-Orozco, 1997). Villenas and Moreno (2001) explain that these mixed messages Latinas often receive from their mothers are representative of a dilemma the mothers know all too well, that of "fitting into a system of oppression" for purposes of daily survival while simultaneously resisting becoming "willing participants of their own subordination" (Collins, 2000, p. 123). An awareness of this tension often results in mothers trying to teach their daughters "how to be *una mujer de hogar* (a woman of the home) while at the same time learning how to *valerse por si misma* (be self-reliant)"(Villenas & Moreno, 2001, p. 673). Lupe did not expect Mariana to be a modern-day superwoman who raised children and took care of the housework and her husband while working full-time as a professional outside of the home. Rather, Lupe was mothering "across borders" (p. 672). She encouraged Mariana to explore an alternative life to what she had known as an immigrant woman in the United States and wanted to ensure that Mariana was equipped to handle the realities of wife and mother if the alternatives she hoped for were eventually unavailable.

Making sense of her identity as a woman was further complicated when Mariana began high school and was challenged to negotiate both the messages from her family with those she was hearing from her peers and teachers. According to Mariana, she was greatly influenced by many of her high school teachers and their thoughts about gender roles.

> My family, in general, they're basically following one thing. Okay, women work, yeah, women DID used to work before, but they still have to. You still have a job, you still have to take care of the kids and you still have to go home and cook for them. I was taught that. I needed to do that for them. I needed to LEARN how to

> cook so later on when I get married that was going to help me. That's what my mom told me all the time. "It's going to help you later on when you get married. So, you need to learn this." But my brother DIDN'T need to learn that because if he gets married, he's going to have the wife there to do the things. So, that's what I was taught. And here [in the U.S.] I came to a whole different thing. My teachers were saying, or men and women were saying, "No, women can do ANYTHING. It's about half and half." I remember you and Mr. Caruna saying this. Mr. Caruna said this once about his wife. When he washes the dishes, she puts them up. She dries them and puts them up. If he mops, she brooms. So, it was half and half. So, that made me think I don't want to be doing everything in the house just because I'm a WOMAN and that's my responsibility, supposedly, MY culture. I want it to be half and half. So, my thoughts DID change through school.

Mariana admitted that the potential to be a different kind of woman at school was appealing, and she began to resist the expectations of her mother in small ways. She stopped ironing her brother's clothes, started hanging out with friends without her mother's permission, and refused to serve dinner to her step-father. Mariana's resistance caused a lot of tension at home, which was palpable in her stories. Mariana cried several times as she spoke about the rejection she felt from her mother when she began experimenting with new ways of being a woman. In many ways, Mariana was again faced with crossing her own borders. While she had once crossed several geographical borders as a child migrating on foot between Guatemala and the United States, now Mariana was challenged with a new kind of border, one that existed within herself. In the story below, Mariana described the myriad ways she thought about this new kind of woman she wanted to be.

> Mariana: When I came here I started seeing all these things, women working and a lot of women being in politics and things like that, positions that men would be in and I started learning about women's history and about how they couldn't vote and I became interested in that. I'm like, "Why is that?" "Why can a guy be better than a girl? It doesn't make any difference. The only difference that I know that they have is strength, you know? Physical strength, but other than that everything's the same. Different sexes, of course, but everything's the same. Women are smart and they're smart. Everyone's smart, so they can have the same capabilities if they want to. It doesn't take anything away from or the other being

> smart just because one is a girl or one is a boy. So, that's why I hold onto those things. I really hold on to it because I grew up like that. I guess I'm a feminist now (laughs). Because now I know that I'm the kind of person that if I cook, my husband or my partner has to do the dishes or clean after, or if I sweep the floor, he has to mop or just something like that. I want it to be both, equal, not the woman belongs in the kitchen. When I went to Guatemala a lot of my guy cousins were like that, "Yeah, women belong in the kitchen," or "Go get me something," or do this, or cook, just telling them what to do. Like they were their boss. I don't like that. You don't marry someone for somebody to be your boss.
>
> Lisa: You said you were a feminist. What does that mean?
>
> Mariana: It means that I don't believe that women can't do anything that guys do. I feel that there's no difference, and I hate it when guys say something like that, and I start fighting back. Like saying that women belong in the kitchen, they don't have to work, this, this and that. They'll just take care of the children. So, it makes me so mad when they tell me things like that and I fight BACK. I tell them, NO, that's not TRUE! I'm like the only thing is physical strength.

To claim the term, "feminist," as a way of describing her most salient identity was a bold move for Mariana. Her laughter inserted after she used this word indicated her awareness of some of the negative connotations associated with calling oneself a feminist. Many women of color have challenged the seemingly hegemonic construction of feminism, claiming that Western White women have dominated the movement and have suppressed and excluded the multiple feminisms of women for whom race, class, and geography differ (Collins; 2000; hooks, 2000; Zinn & Dill, 1996). In an effort to complexify how females experience mathematics and honor the many versions of woman that exist, it is critical that I explore Mariana's version of feminism in more detail.

Mariana did not claim that she was anti-male. Although she constructed her "feminist" identity relative to many experiences in which men had degraded or oppressed her, Mariana did not adhere to a commonly held vision of feminists as male-haters. In fact, Mariana claimed that her brother was her best friend and her boyfriend one of her biggest fans. Additionally, Mariana's feminism was not about rejecting marriage or

children, wearing only pants instead of skirts, or working on a construction site rather than as a secretary. Mariana actively resisted a construction of women as weak, dumb, smelly, incompetent, and less valuable than men as human beings, and with the exception of biology and physical strength, asserted that there were absolutely no differences between women and men. Because of these things, women should make choices for themselves and determine their own life trajectories free from the rules of society rather than be relegated to the home or forced to live in servitude to men.

Language Usage in Secondary Mathematics

Unlike the other participants, Mariana did not discuss any particular components of Complex Instruction that were identifiable in her stories. Instead, the use of language in mathematics was prominent in her descriptions. In particular, Mariana felt that using Spanish in her mathematics courses supported her academic success. She translated her secondary mathematics experiences through the lens of her salient "feminist" identity and understood the use of Spanish to position her as an intelligent and equally competent mathematics learner, a young woman with power and voice, and a valuable human being.

" I AM smart! I'm like anybody else."

Spanish was Mariana's primary language, and when she entered high school she struggled to read, write and speak using English. She was painfully aware of her Spanish accent, and her placement in English language courses made her feel inadequate as a person and as a student. She desperately tried to stay away from teachers who had reputations for publicly embarrassing non-English speaking students or enabling her peers to make fun of English learners in class. Mariana explained that

in high school, language was the one thing that scared her the most, made her feel uncomfortable, and prevented her from fully participating in school.

> The language was the biggest thing because we were afraid of talking English in front of other people, and they would make fun of us. Since they have been in school here since they were little kids and we haven't, so we have this thing where we pronounce words differently. We have this accent, and they don't. They would make fun of our accent or something. We're just afraid of that.

Mariana claimed that her lack of English proficiency and fear of public embarrassment were never problems in mathematics. Her mathematics teachers did not poke fun at her accent or make a spectacle of her in front of others. Mariana explained that her peers were respectful and patient as she tried to reason and communicate in English when they were learning mathematics. Rather than discomfort, fear, or insecurity, Mariana described her secondary mathematics classes as places where she felt comfortable and competent.

> Lisa: How would you describe yourself as a math student?
>
> Mariana: In high school? GREAT! In high school I felt SMART in my classes and in my MATH classes. In college it's different, but in HIGH SCHOOL I felt GOOD! We would practice so much and we would spend so much time on something out of class. If we didn't understand it and we have to move on then it would have to be out of class. We would have to spend extra time with teachers or with tutors or anybody who could help us to move us, but I describe myself as GOOD. Yeah, GREAT, in high school.

There were several systems in place at Railside that likely supported Mariana's feelings of safety and competence in mathematics. With the exception of a Sheltered Algebra class in the 9th grade, students who were non-English speakers enrolled in "regular" mathematics courses at Railside and made up approximately 10-15% of upper-level classes. All students at Railside had access to the same curriculum, resources, and mathematics teachers. Students who received English–language

services were not tracked into low-level courses, isolated into separate parts of the school building, or taught mathematics by anyone other than a qualified instructor.

In addition to the systems that formally supported students' mathematical achievement, Mariana explained that the mathematics teachers also played an important role. They helped non-native speakers to negate the stereotypes they often internalized about their own academic abilities and supported them to construct a more positive and realistic version of what they could do. The Railside mathematics teachers explicitly acknowledged the challenges non-native speakers faced by "doing school" in a second language, and deliberately explained that this should not impede their mathematical progress.

> The teachers wouldn't make us FEEL stupid. You guys [math teachers] wouldn't make us feel stupid. You made us feel important. You would make us feel SMART! If we would say, "We don't understand this because we're stupid," you'd be like, "No! You're not stupid! If this was in your language you would understand it really good. But this is not in your language so that's why it's hard."

Mariana translated these messages from teachers through her salient identity as a "feminist" and understood her position as a mathematics learner similarly to how she thought about her role as a woman. While Mariana knew that she was different from men in terms of her biology, and she was different from her peers who were fluent with English, she demanded that neither of these characteristics should determine her intellectual ability. Mariana interpreted the encouragement and use of Spanish in the mathematics classroom to mean that she was intellectually competent. She was capable of learning. More importantly, Mariana explained that her mathematics teachers' efforts to ensure that English did not impede her learning implied that she was intellectually equal to her English-speaking peers.

In the following two quotes Mariana explained this relationship. She spoke about the ways in which language could be used to dismiss her as mathematics learner just as her biology had been used so often to dismiss her as a woman. In both statements Mariana offered her "feminist" critique by suggesting that neither her inability to speak English nor her female biology could determine her intellect or abilities.

> Teachers shouldn't make you feel like you're LESS than others. They should treat everybody as equals. If you're like me, from another country, instead of making fun of me just because I can't speak the correct English, HELP me or try to UNDERSTAND me in different ways.
>
> I believe that women can do anything that guys do. I feel that there's no difference, and I hate it when guys say something like that and I start fighting back. Like saying that women belong in the kitchen, they don't have to work, this, this, and that. They'll just take care of the children. So, it makes me so mad.

These statements clearly demonstrated how Mariana used her feminist lens to construct meaning of a situation in her secondary mathematics courses. As a "feminist," Mariana argued that her biology did not correlate with her capacity to take on any task, any job, any challenge that it was assumed men could do. Here, she demonstrated her stance against the "biology determines destiny" argument that she articulated throughout her conversations about men and women. Similarly, Mariana strongly believed that there was no correlation between her English-language ability and her potential for learning mathematics. Mariana said, "Don't make fun of me! Don't assume that I am less able! My language skills do not determine what I can learn in mathematics!"

In addition to Mariana's "feminist" critique of her position in mathematics class, she understood her opportunities to use Spanish while engaged in mathematical learning as a way to support her knowledge and understanding. With Spanish, Mariana could

access mathematical vocabulary, concepts, and ideas that might otherwise be out of reach. She could understand meanings and make connections to concepts she already knew. Using Spanish in the context of learning mathematics was interpreted by Mariana as more evidence that she really could be academically successful. While the teachers explained that language did not dictate her mathematical abilities, when Mariana used Spanish to learn something, to become more mathematically able, she actually had some proof. Not only was her lack of English *not* a deficit but Spanish became an intellectual resource.

> I had all these people I could talk to in Spanish. If I didn't understand something I would ask them in Spanish, "What does this mean? What are we doing?" They would tell me, and I could do the math.

Research regarding language and mathematics education asserts that discussion is an important vehicle for the construction of mathematical knowledge for all students (Forman, 1996; Lampert, 1992; Lampert & Cobb, 2000). Others advocate similar arguments about the use of language as a mathematical learning tool for young people who are English-language learners (Khisty, 1995; Moschkovitz, 1999, 2007). Through mathematical conversations students make connections to existing ideas, they develop meaning, and create language used to share and justify ideas. Mariana's translation of her mathematics experiences echoes the messages from these researchers. It was clear to Mariana that her use of Spanish in her mathematics classes helped her learn new things. When she was prevented or discouraged from using her primary language, or when she was surrounded by mostly native-English speakers in other courses, she described feeling "less [smart] because everybody had these really good skills when they were talking or writing or just figuring out stuff." The freedom to work in Spanish or to move between

Spanish and English in mathematics helped Mariana feel intelligent and act intelligently, for she had many more intellectual resources on which to rely. She could ask questions in Spanish, participate in mathematical conversations in Spanish, and construct meanings in Spanish. Spanish was not considered an intellectual crutch, and her lack of English proficiency was not viewed as a deficit. Spanish afforded Mariana access to mathematical ideas, information, and interactions that supported her understanding in ways she might not otherwise have had if she had been forced to work in English only.

Using Language to Develop Voice: Becoming a "Feminist" Mathematician

Allowing non-English speakers to use their primary languages is a common argument among those who advocate for students to build from their cultural competencies to support engagement and learning (Moll et al., 1992). Obviously Mariana understood it this way too. Spanish supported her participation with mathematics by providing her access to content and ideas. This is very important, since to learn mathematics, students need access to mathematical ideas and the means to express them (Khisty, 1995). However, Mariana understood her use of Spanish in mathematics as more than a means of connecting to prior experiences and knowledge. It was good for more than helping her understand a test question or the context of a homework problem. For Mariana, the use of her primary language was an opportunity to assume authority over her mathematical engagement, her ideas, expressions and interactions. In this way Mariana used the Spanish language to develop a mathematical *voice.*

Ironically, "although Latino youth have two languages, they often have no voice in matters related to their schooling" (Quiroz, 2001, p. 328). *Voice* implies

"having power over the presentation of reality and meaning, and the ability to construct, articulate and therefore shape one's experiences as it is presented to others" (p. 328). One cannot give voice to another. Teachers cannot give voice to their students. What teachers can do is create "conditions under which people can *empower themselves*, or not" (Ruiz, 1997, p. 323), and provide opportunities in which students might chose to move from "silence into speech" (hooks, 1989, p. 12). Additionally, voice can only be developed through students' primary language, because it is the only means through which they make sense of their own experiences in the world (Macedo, 1997).

Mariana had spent years rejecting a life that positioned her as a silent observer. Her reality had long been determined by social and familial structures over which she felt no control. Mariana's life had been predestined for marriage, children, and housekeeping. She lacked the authority to shape her own experiences and present them to the world. She was an object, "defined and interpreted by others" (hooks, 1989, p. 12). As a "feminist," Mariana would no longer allow this. She wanted more than a life of subservience. She wanted more than freedom from the oppressions she felt as a woman. Mariana wanted out from under the rules and norms that governed her female life. She wanted the authority to define herself and to speak her truth. She wanted to determine her life's direction. It was not enough for Mariana to be free from the power men assumed over her. Mariana wanted to become the subject of her own life.

Similar to the ways in which Mariana was silenced as a young woman, the systems and processes that privilege the English language in schools through curriculum and instruction and English-only rules also silence language learners. Insisting that

students use English only strips them of their power and prevents them from expressing their voices. However, at Railside, Mariana used Spanish to support her transformation from "garbage" into a "feminist" by using her primary language as "the tool through which her voice was expressed" (Quiroz, 2001, p. 329). In mathematics classes, Mariana asked questions. She expressed opinions and presented ideas. She engaged in mathematical conversations. Mariana participated in learning mathematics and with others vis-a-vis mathematics as a "feminist" who *voiced* her perceptions, her understandings, her sense making and interpretations. In this way, Mariana was no longer subservient to her brother or step-father, the teacher or her English-speaking peers. Mariana had moved from object to subject by using Spanish to develop her mathematical voice.

In the following quote, Mariana invoked the power of language to facilitate voice in the context of secondary mathematics. Through Spanish, Mariana explained, students could direct mathematical conversations while teachers remained on the periphery of the discussion. The power used to determine who spoke, who decided how to solve the problem, and who engaged with the task shifted from the mathematics teacher to the students.

> Everyone would just be speaking Spanish everywhere, you know, explaining things. Like for example, Sandra would be explaining stuff in Spanish, and they're [mathematics teachers] in the middle trying to listen but not understanding anything we were saying. But then if we didn't understand anything, you know, then they would be like, "This is how you can try it." It was just fun.

Notice that in Mariana's recollection, students' primary languages were not suppressed. Instead students used Spanish to express their mathematical voices, to resist silence and insert themselves as subjects who constructed meaning of the task at hand. In Spanish,

Mariana could "explain stuff" while teachers listened but did not necessarily understand what was being said. In Spanish, students were mathematical resources for each other, the holders of knowledge and dispensers of information. While the formal curriculum and language of instruction at Railside was English, Mariana described a space co-created by both teachers and students in which learners could use their languages to create a mathematical voice and to empower themselves.

Gorgorió and Planas (2002) argue that as students engage in mathematical talk, they also create and gain access to a community in which language, and a very particular language, is an important practice. As students speak the language of mathematics, they develop a culture in which this sort of talk is reinforced as a normative social practice and is valued as an appropriate form of engagement. Their engagement through mathematical conversation then supports their learning. To gain access to a community such as this, students must first be able to enter the conversations, and to maintain membership one must be able to talk the talk such that others can understand what is being said.

Mariana interpreted the opportunity to use her voice in her mathematics classes through her "feminist" lens and chose to insert herself into this particular community though the use of her primary language. In mathematics, Mariana claimed she was "doing things with others" "going up in front of everybody and talking about a math problem," "asking questions," "gathering practices of this mathematical community she developed as both a mathematics information," and "figuring stuff out." She even went so far as to describe herself as a class "leader" who could "explain and help others" in addition to helping herself. This is the "feminist" she knew herself to be. While Mariana's "feminist" identity supported her to develop a voice, Mariana used her mathematical voice to further

develop her salient identity. She used this identity as a mathematical resource and in turn used her mathematical voice to support her identity. As Mariana engaged in the learner and as a "feminist."

"We're NOT garbage! Everyone is equal!"

Recall that Mariana constructed her salient identity as a "feminist" in opposition to how she understood the role of women in Guatemala and in her family. As a female, and solely because of her female biology, Mariana was "garbage." She was assumed less intelligent, less able, less worthy and less valuable than men. Mariana was expected to live her life serving men, placing their wants and needs ahead of her own and willingly silencing any desires she may have for a different kind of life. Similarly, as a Spanish speaker living in California, Mariana had too often been assumed unintelligent and incapable, less important, easily dismissed, inferior and subordinate to those for whom English was a first language. Again, these assumptions were solely based on the ways in which she spoke.

As a "feminist," Mariana took a stand against a construction of women as subservient and unequal. She would not allow biology to determine her value as a person. She responded by saying, "NO! We are NOT garbage!" "It doesn't make any difference. Different sexes, of course, but everything's the same." Similarly, Mariana declared that her language abilities in no way determined her status as a person. Her lack of proficiency with English was not indicative of her human worth. Through this lens, Mariana interpreted the use of Spanish in her secondary mathematics classes as more than a symbolic gesture of encouragement. It was more than a pat on the back or a simple reminder that "you can do it too." Mariana interpreted the "freedom" to work in Spanish

to mean that that she, too, was a legitimate human being. Below, Mariana used her feminist lens to translate the value teachers' placed on her use of Spanish to mean that she was also valued as a young woman.

> When I came here [Railside High School], my math teachers started saying I was smart, that I could have a future, that I was brilliant. And I'm like, I AM smart. I'm like anybody else. I can be like my brother. I can be like anybody else. I can do ANYTHING! And when my grandma used to tell me that women are garbage, those were things that stuck in my head and completely made me change. I'm like, "NO! We're NOT garbage! We're PEOPLE! We're HUMAN BEINGS! Everybody's equal! Inside we don't have colors. I mean we have sex differences, but the organs are still the same. So, I'm like why does everything have to be like women are garbage? No!

In this quote, Mariana declared her potential as a student and woman and made a connection between her intelligence and her human worth. Mariana knew that she was smart and for her this meant that she was equal to "anybody else." She could be like her brother, who was positioned with power to make decisions for himself and do whatever he wanted with his life. Mariana understood her smartness as the key to her equality. It positioned her far from the dumb, dirty, incompetent "garbage" her grandmother declared her to be, and instead made her equal to men.

This relationship between language use and human value may sound like an exaggeration, an excuse for Mariana not to learn English, or a rejection of what some consider a sign of a "real American." Others might suggest that allowing Mariana to use Spanish in her mathematics classes is simply another way of making her feel good about herself or raising her self esteem without attending to her mathematical learning. However, in many ways, the Spanish language was as natural to Mariana as her female biology, and as integral to how she thought of herself as a person. Spanish was the vehicle through which Mariana expressed her personhood, her lived experiences, her

goals and dreams. Gloria Anzaldúa (1987) passionately expressed this centrality of language to feelings of legitimacy as a human being.

> If you want to really hurt me, talk badly about my language. Ethnic identity is twin skin to linguistic identity – I am my language. Until I can take pride in my language, I cannot take pride in myself. Until I can accept as legitimate Chicano Texas Spanish, Tex-Mex, and all the other languages I speak, I cannot accept the legitimacy of myself. Until I am free to write bilingually and to switch codes without having always to translate while I still have to speak English or Spanish when I would rather speak Spanglish, and as long as I have to accommodate the English speakers rather than having them accommodate me, my tongue will be illegitimate (p.81).

Furthermore, Spanish was Mariana's connection to her family and friends, her experiences as a child in Guatemala, her ethnicity, her religion. To dismiss Mariana's language in the context of learning mathematics was to dismiss her lived experiences (Macedo, 1997). To take away Marina's language was to cut off her supply of knowledge and understanding and to "subtract" her social and academic resources and deny her existence as a person. In the quote below, Mariana explained this deep connection between Spanish and her self. Additionally, Mariana described how it felt when she was once told that she could not use Spanish in school.

> It's part of me. It's part of ME as a person. That's my first language. The first language I knew, what they taught me. It's a part of me since I grew up with that language. It's part of my identity. Spanish is part of what I grew up with. It was part of what I was taught. It's a way of communicating. Of course, it's part of me. It's the first language I used to show communication, so that's why it's so special to me.
>
> That has happened to me before, and I was SO angry, because I thought they were taking something away from me. I got so defensive. I felt that they CAN'T take that away from me. If I want to say something in Spanish, I will. That's me. That's what made me as a person the way I am. It taught me what I know. My mom, my grandma, everyone taught me so I can communicate my feelings, what I'm thinking, right? That's what made me the person I am. It's my heritage. Trying to take away part of my being. I am so PROUD of my language. I didn't want them to take it away from me.

Mariana refused to give up her primary language just as she refused to let go of her female identity. Losing her language and losing her "feminism" meant losing parts of herself. Even with the idea that she might move back to Guatemala, Mariana explained that she would never relinquish her feminism. She would never "let a man own me or let him be my boss." Mariana's stories are evidence that language is more than a medium of communication. "Language is one of the most important social practices through which we come to experience ourselves" (Donald, as cited in Macedo, 1982, p. 44), and no student should be expected to sacrifice her self-understanding by being forced to function in silence on the periphery of a mathematics classroom or on the periphery of her own life.

Conclusion

As a child in Guatemala, "garbage" was the word used to describe Mariana. She developed a salient identity as a "feminist" in reaction to this construction of women as weak, stupid, and inferior to men. Mariana entered her secondary mathematics classrooms as a "feminist" and used this identity as a lens through which she translated particular learning practices. In particular, Mariana understood that her lack of English proficiency did not determine her mathematical abilities. She was intellectually competent and as equally capable of academic success as the students for whom English was a primary language. Mariana's use of Spanish in mathematics became an intellectual resource that she accessed to support her engagement and learning and helped her to develop a mathematical voice. Finally, Mariana expressed a critical connection between her "freedom" to use Spanish in her mathematics classes and her value as a human being. Mariana's stories suggest that denying students

opportunities to use their primary languages in school is one way of devaluing their lived experiences.

Mariana's case advances to two lines of research focused on language and mathematical learning. First, Mariana's stories contribute to an argument for the use of mathematical conversations to support all students' learning. Opportunities to communicate mathematically by explaining ideas, justifying reasons, negotiating meanings, using new vocabulary, and making connections between concepts through interactions with peers support the construction of new knowledge. If students are barred from these experiences then they cannot do the work necessary for learning mathematics. This holds true for students who are learning English and for native speakers as well. Without communication, students "are curtailed from participating in those activities that develop and enhance mathematical meanings and comprehension (Khisty, 1995, p. 283).

Second, Mariana's case adds to recent research regarding language learners and mathematics education that pushes beyond conversations focused on language barriers and explores the use of primary languages as an intellectual resource (Adler, 1998; Civil & Planas, 2004; Khisty, 1995; Moschkovich, 2007). Mariana used Spanish to ask mathematical questions, access prior knowledge and vocabulary, and participate in mathematical conversations. This participation helped her to make connections to prior knowledge and to appropriate new understandings. While Mariana certainly needed to learn more English, she could access her prior mathematical knowledge through the use of Spanish such that she could participate mathematically and simultaneously learn more mathematics and English. The Spanish language was an

intellectual tool for Mariana, allowing her to engage in her mathematics classes in ways that might not otherwise had been possible if English-only rules were enforced.

Furthermore, Mariana's case demonstrates how language is also more than an intellectual resource. Language is power. While Mariana used her primary language to practice mathematics, it was through these practices that she developed a mathematical voice and assumed power over her own learning. Mariana's use of Spanish likely motivated her participation in secondary mathematics and supported her success, but simultaneously it afforded her opportunities to further develop her identity as a "feminist."

For a young woman who had heard that she was dirty and dumb and should not expect much more from her life than to serve men, the messages of competence she understood from her mathematics teachers were exhilarating and affirming. They provided her with both a place to be herself and nurtured the kind of woman she was becoming. In secondary mathematics, this young Spanish-speaking, loud, funny, smart, demanding Guatemalan woman was not dismissed, nor was she required to morph herself to fit an image constructed by her teachers or peers. Here, Mariana's whole self had worth. She was valued, and she was equal. Her feminism was welcomed and necessary to be a successful mathematics student and her success in mathematics supported her salient identity. Through the use of Spanish, Mariana became a "feminist" mathematics learner.

CHAPTER SIX

"Everybody can be Somebody."

It is common for students who come from Spanish-speaking countries to enter U.S. schools with big ambitions and a strong drive to achieve in an effort to create lives that are better than what they experienced in their home countries. They very often assume that education is *the* key for their success. However, traditional school mathematics is often constructed very narrowly, privileges few ways to "do math," and valorizes speed and accuracy above other important mathematical skills and understandings. With so few ways to be mathematically successful, too few students choose to engage in learning and fail to achieve their larger life goals. When this happens, students' quests to become "somebody," to achieve greatness and a better life, is squashed and often left behind. Sandra's interpretation of particular pedagogical practices in her secondary mathematics classes through her salient identity as "somebody" contributes to a discussion aimed at supporting more students, and especially those who are traditionally marginalized, to engage in secondary mathematics. Sandra's stories illustrate how the expansion and valorization of "school" mathematics simultaneously supported her belief that she *was* intellectually capable of mathematical success and helped her to further develop her "somebody" identity.

Secondary Mathematics as a Means to a Better Life

It is common in the immigrant literature to hear of students who come to the United States from their home countries with dreams of "becoming somebody." Their life goal is to lift themselves and their families out of poverty and create lives filled with quality education, good jobs, new homes, and happy and healthy families. Research

shows that immigrants from Mexico or from countries in Central America strongly believe that education is the key to this better future (Cammarota, 2004; Suárez-Orozco, 1997; Weiler, 2000). It is *the* social capital assumed necessary to move up and out of poverty and often motivates young Latinas and Latinos to achieve academically at all costs, no matter the hardship. Situations such as these are often used to justify an argument that places sole responsibility for educational achievement on students, obscures the effects of structural factors, and assumes that anyone can be successful if she just works hard enough.

This argument continues in secondary schools where the subject of mathematics enjoys particularly high social status and is considered by many as a "powerful vehicle for social access and mobility" (Schoenfeld, 2004, p. 3). Students' lack of mathematical achievement is blamed on their laziness, poor work ethic or the lack of family involvement. However, what many fail to consider is that U.S. secondary school mathematics is often very narrowly defined through available curriculum and teaching and learning practices (Boaler & Staples, in press; Civil, 2002; Moschkovich, 2002). In addition, the versions of secondary school mathematics that are used most often purport a Eurocentric version of math as "true math," and fail to consider students' prior experiences and mathematical understandings as valuable resources from which to connect and build (Powell & Frankenstein, 1997). Many students are pushed to the periphery of their mathematical learning communities when both content and learning processes are restricted, significantly impacting how students think about their abilities to become "somebodies." If mathematics education is assumed primary for students'

success, but they are unable to access it, then students often come to believe that the lives they have imagined for themselves are unattainable.

Sandra's case demonstrates how she understood the construction of secondary mathematics and specific valorization practices used by her mathematics teachers as supportive of her "somebody" identity. In particular, Sandra focused on the use of multiple-ability, groupworthy mathematics tasks and the practice of assigning competence to support a broad range of mathematical practices. Sandra interpreted these practices to mean that she and her peers were not only equally capable of learning mathematics but also had equal potential to become "somebodies" in the future. In turn, as Sandra engaged with mathematics as "somebody," she drew from this identity as a resource and simultaneously developed as more of the "somebody" she wanted to be.

Who is Sandra?

Introducing Sandra

Sandra grew up in a small, poor barrio in Managua, the capital of Nicaragua and lived there until she was fourteen years old. She and her parents, her younger sister, Ellie, and grandmother shared a tiny house that had sheet metal for the roof, cubicle separators used to create bedrooms, and a kitchen outside on the back patio. In her barrio, Sandra was surrounded by family. Each of her father's sisters lived within blocks of her home, and she had upwards of a dozen cousins nearby. Sandra spent her days going to school, helping in her mother's store, and babysitting her sister and cousins.

> My life when I was over there [in Nicaragua]...we went through a lot of economic problems, because it is very poor over there. So, it was difficult, for my mom especially. We had like a store, so we have to wake up early, wake up early and help my mom, then go to school. Then, do homework, like at night. But overall it was good. I had my family support always.

Sandra's parents, Carla and Miguel, never legally married but had lived together since their early 20s, and their families were very intertwined. They met in high school, but neither graduated because they soon became pregnant with Sandra and chose to leave school to spend more time raising her. Carla, was the matriarch of their Managua barrio. Doña Marta was how everyone referred to her. Carla ran a small restaurant and business out of the family's home and sold a variety of products that included women's clothing, shoes, and imported liquor. People regularly sought out Carla for advice, financial loans, or care for their children. Sandra's father, Miguel, worked in a coffee factory. He was always present in Sandra's life but seemed to take a back seat to Carla's powerful presence.

Carla explained that even at a young age, Sandra's role as a daughter was critically important to the family's financial survival. When she was only nine years old, Sandra was responsible for going to the market each day before school to purchase food for the restaurant. Then, she helped her mother cook, went to school, and arrived home around six o'clock each night to serve food and manage the money. Sandra was also a budding entrepreneur. She borrowed money from Carla to purchase fingernail polish, perfume, and adornments for women's hair. Then, she sold these items for a profit in her mother's small store.

Even with such a meager income, Carla and Miguel managed to put enough money together each year to send Sandra to Catholic schools in Nicaragua. Carla's attitude regarding education was similar to Central American immigrants in other studies who considered education as the key to a better future and therefore the most important thing she could provide for her daughters (Cammarota, 2004; Suárez-Orozco, 1997;

Weiler, 2000). Carla explained, "*La educacion es importante porque eso vale en todas partes. Se siente uno mejor, como persona, mas respetado y economicamente tambien* (Education is important because it valuable everywhere. You feel better as a person, more respected and economically too). Sandra agreed, and she believed that there was no better way to support her family or to become the person she wanted to be. Education was *the* vehicle for her success.

> Education is REALLY important. For me knowledge is REALLY important. To be, to have knowledge is important for me, for my kids in the future. I want to give them a good life, a BETTER life, so that's why education is important. With education, I can be someone.
>
> I don't want to stay how I am right now. I want to SUCCEED! You know? So that's why education is important. I think you really NEED education in order to succeed. That's what I think.

Sandra spoke of her schooling experiences in Nicaragua with great fondness. She explained that the public schools in her home country "don't have nothing, no seats and no books." However, the Catholic school Sandra attended was "REALLY good." There, Sandra felt that she had received a quality educative experience.

> The education is REALLY good. They, you know, we do a lot of stuff. Like math is harder than here [U.S]. We have EXTRA homework, you know like 50 problems to do, and we HAVE to do them. It was very strict in that way. But the education was like, EXCELLENT. It's one of the best in Nicaragua.

Sandra spoke of her teachers in Nicaragua with the same sort of affection and appreciation, and she enjoyed a respectful and jovial relationship with them. Sandra explained that she felt comfortable with her teachers. She felt that her teachers recognized her academic potential and encouraged her to share her ideas and participate in class.

> Sandra: My history teacher was so.... I REALLY like him a lot. And my biology teacher too. She was really nice. Like we were really close. It was like a close relationship between the teachers 'cause they live like close to the school, so we

know where they lived, you know, so it was REALLY a close relationship. And also liked my English teacher. She was really, really, really nice. I really like her.

Lisa: Tell me what you liked about these teachers.

Sandra: What I like about them...they gave you a lot of...they make you feel comfortable. You're not shy to ask them something. You're not shy to go in front and do a problem, so that's a good thing. They make you feel that you can DO this, like come on, "I can help if you don't get something." So, that relationship, it was good for me. And also I liked the way they explained things. They make jokes, you know. They laugh with the students. So, I liked that about them.

After more than six months without work and many attempts to sustain her neighbors with personal loans, the pressure to survive financially became too much for Carla to handle. Her debt had piled so high that she was unable to see any options for herself and her family in Nicaragua. Carla decided to take Sandra and Ellie and move to California. Although it was very difficult to leave her husband and his family behind, Carla felt they had no choice. In addition, Carla explained that there were so few options for her and her daughters in Managua, and she wanted them to have better educational and career opportunities. Although she expected it to be a difficult transition, Carla felt that the benefits of the move made up for their challenges.

Si. Super. Digamos no podrian ir a la universidad porque es muy carisima. Los libros bien caros. Trabajos no hay. Al menos que han de...como lo que hacia la mama vendiendo comida o en una fabrica. Las oportunidades de trabajo y de estudio que tienen aqui no las van a tener alla. Yo creo fue una decision buena la que hice haber venido y lo hice por ella. Espero que sacarla adelante. Aunque eso haya significado separar la familia.

Yes. Super. Let's say they couldn't go to college because it is very expensive. The books are quite expensive. There's no work. At least they have...like her mother did, selling food or in a factory. The opportunities to work or study that you have here [U.S.], they won't have them there [Nicaragua]. I think I made a good decision to come here, and I did it for her. I hope it will move her forward, although this means separating the family.

"I want to be SOMEBODY!": Establishing a Salient Identity

At the end of the Diversity Toss activity, Sandra was left holding a card that read, "college student." She explained that she was "happy that female was taken away." She was willing to let go of her identities as woman, Hispanic, and Catholic to hold on to the one thing that was most important to her and represented her future. This was education. Sandra wanted more than anything to eventually "be SOMEBODY. I want to help my mom, to help my FAMILY, so they can have a better life in the future." Education was assumed to be the key to achieving this "somebody" identity that Sandra desired.

> Sandra: It's my dream, it's my goal to have an education, to be in college, to be SOMEONE one day. So, I don't want to give it away for anything.
>
> Lisa: You say this a lot. In your interviews with me I see a lot that you say, I want to be someone. I want to be someone. You say this often.
>
> Sandra: I want to be...um...I want to have a career. I want to have a good job and so I can HELP people in my society. I want to be someone who can contribute to the society and to help ME and my family as well.
>
> Lisa: So, that's what it means to be someone?
>
> Sandra: Yeah. It doesn't really matter what is my job. I can be a doctor, a social worker, but I want to have a career, a profession so I can HELP people in the future.

While Sandra is simultaneously a daughter, sister, female, Catholic Nicaraguan, her "somebody" identity resonated throughout our interviews and was a strong catalyst for her decisions and actions. It was clear to me from the ways in which Sandra spoke about herself and how her mother spoke about her that Sandra was already a "somebody" when she arrived in the United States. She had been trained by her mother, the neighborhood matriarch, how to be a "somebody" and had many opportunities to hone her skills. When I asked Sandra to describe herself as a girl in Nicaragua, her response indicated that she

was well on the road to somebody-ness. She characterized herself as active, responsible, fun, very active in school activities, hard working and very responsible.

> Lisa: When you think about yourself as a girl in Nicaragua, how would you describe yourself?
>
> Sandra: I would say ...I was really intelligent, smart, but also I was very...um...I don't know there was something about me. I was a very outgoing person. I was involved in clubs, helping other people, like teaching, but I had a lot of responsibilities too.
>
> Lisa: If I asked your cousins to describe you, what would they say about you?
>
> Sandra: Oh they would say, "Oh, she's fun, happy." They would say, I think, hard worker, responsible. I was VERY responsible for my age. I was...everybody was amazed how I was helping my mom and we were working together.

Carla's described Sandra similarly. She seemed genuinely amazed with her daughter and all she had accomplished in her short lifetime.

> *Si. Cuando estaba en el primer nivel...se sabia como veinte canciones de los pollitos, de no se que. Mucha que se sabia. Se aprendía los canciones de Thalia, Laura Leon, y Gloria Atreve y en las cosas de la escuela, cuando hacen los actos del dia de la madre, esas cosas, ella siempre sabia bailando ahi. Asi bien pequeñita. Que bailaba y todo asi. A parte de ella, ella estaba por ejemplo en el primer ano o segund ano y le ayudaba a persona que estaba en el tercer ano cuando no endendia. O cuando estaba en sexto ayudaba primas que estaban en primer ano o segund ano y tal vez si no sabían se ponía leer y les ayudaba. Ya no se le ha tocado esto ver que alumnos que están en high school...no saben leer bien. No saben hacer una operación bien, y ella le ayudaba a esa persona...ay tambien era presidenta de un grupo de la escuela y se reúnen en la casa y le daba clase y estaba ayudando como siempre. Salió como de creo siete u ocho anos salio reina del colegio. Hecho de todos.*
>
> Even when she was in the first grade, she knew something like twenty songs about chickens, about whatever. She knew so much. She learned the songs from Thalia, Laura Leon, and Gloria Atreve, and regarding things in school, when they did the play for Mother's Day, those things, she always knew how to dance in them. She was such a little one! But she could dance and everything. On her part, she was for example in the first or second grade and she helped someone who was in the third grade when they didn't understand something. Or when she was in the sixth grade, she helped cousins who were in the first or second grade, and maybe if they didn't know something, she would get down to reading and help them. She also took it upon herself to see that high school students...they

> don't read well. They don't know how to do a certain operation well, and she helped this person...oh, also she was president of a group in school and they met at home and she held classes and was helping others like always. She got to be seven or eight, she became queen of the school. Doing everything.

When Sandra's story in the U.S. continued, so did her determination to maintain her salient identity as "somebody." However, her version of "somebody" seemed to shift when she spoke of herself in the United States. Her stories indicated that she wanted to become a more altruistic "somebody," a person who achieved social status for the benefit of others. As a daughter, Sandra wanted to be "somebody" so she could take care of her mother. She wanted her mother to be proud of her accomplishments, but more importantly, Sandra wanted to financially provide for her as Carla had done for Sandra all her life. Becoming "somebody" would allow her to do this. As a sister, Sandra hoped her somebody-ness was a model for Ellie for whom she expected great things. Sandra was thrilled to be "an example" for her younger sister and wanted Ellie to "be BETTER than me," to speak better English, do better in school, and eventually get a better job. As part of her large family, Sandra yearned to be "somebody" so that she could help her family out of poverty and "bring everyone here to find jobs." Being "somebody" drove Sandra's outlook on life. It guided her decisions and actions. She used it to determine her life's direction. This identity had the most salience for Sandra both in the way she talked about herself and in the communities in which she chose to participate.

Sandra's dual frame of reference, her ability to compare her current opportunities in the United States with her past realities in Nicaragua, aided in her creation of this salient identity as "somebody." Sandra's lived experiences in Managua and her periodic trips back to her home country created a point of reference from which she judged the quality of her life and her future aspirations (Ogbu, 1991; Suárez-Orozco, 1991). Sandra

often referenced the "poverty" in which she had lived in Managua and the current social and economic conditions with which her father and extended family were still coping. Sandra's awareness of these issues were forefront in her mind when she spoke about one of her trips back home.

> It made me SO sad to go over there [Nicaragua] and see how POOR people are. Like here I have a lot of food here and over there they don't. And here even though I'm poor here, it's not even compared to over there. You know what I mean? Another thing, to see little kids working, selling tortillas, or selling things with no shoes, no clothes. It makes me so sad and I think, Why? It makes me really sad to see how poor we are. And I wonder why my country is so poor.

In addition, Sandra defined her goals and actions relative to the opportunities that she perceived as unavailable to her in Nicaragua. For example, Sandra explained that as a woman in Nicaragua it was unlikely she would ever attend college or earn enough money to support herself. She believed that the social conditions for women were so poor that "they have no choice but to stay with their husband." Sandra also believed that she would never acquire the same material amenities in Nicaragua as she could in the United States. Although Sandra's desires for such things seemed meager, such as her own bed, doors on the bedrooms so she could have some privacy, or a telephone in the house, these requests were always constructed relative to what she had known in Nicaragua.

> Here I have things that I think I will NEVER have in Nicaragua. Like driving, like a cell phone. Like we didn't even have a phone in the house! Now, they have, but when I was there we didn't have any. So, here I have a lot of opportunities, a lot! I will never get them if I was in Nicaragua. I KNOW I will never have them.

While Sandra's role as a daughter and older sister took precedence over all else in her life, her "somebody" identity foregrounded how she played these roles. Among many other things, Sandra was a financial provider, role model, translator, co-parent, and chauffeur. She took her sister to school each morning and helped her mom find jobs that

did not require much English. Sandra helped to pay the mortgage, sent money home to her family in Nicaragua, and attended college on a full-time basis. Becoming "somebody" was not purely for personal gain. Sandra did not yearn to be a public figure or movie star. She did not talk about owning a large house or jetting around the world in a private plane. Her goals might seem meager to some, but for Sandra, becoming "somebody" was the only way she knew to help her family achieve a better life than they had in Nicaragua.

> Lisa: If you could do anything in your life, what would it be?
>
> Sandra: Anything? I would go to Nicaragua and get all of my family here [to the U.S.]. Everybody here, so they can work. They can have a better life. I will help all of my family get here. I will get a job and I will help EVERYBODY to have a good job, my mom, my dad. If I could do ANYTHING?! I will...I don't know (laughs). [Sandra seems overwhelmed by the idea of thinking about her life without boundaries.]
>
> Lisa: It's an exciting idea, isn't it?
>
> Sandra: Yeah. Just to think about it. I think I would like to help people. When I help someone it's a feeling I cannot explain. I would like to go and to give food to them. I imagine myself traveling around the world helping people. It's something like, oh my God! It's a feeling that is hard to explain. I will...if I could do ANYTHING, I would get all the money in the world and help the poor people.

Becoming "Somebody" Through the Valorization of Diverse Mathematical Practices

In many ways, Sandra's academic and social success paralleled the typical immigrant story that many believe drives immigrant students to work so hard in school and sets them apart from their U.S. born peers. One might reasonably argue that Sandra's dual frame of reference and goals as "somebody" made "present sacrifices in the United States tolerable" (Valenzuela, 1999, p. 14) and acted as catalysts for her determination and hard work. While Sandra's situation may seem easy to explain using this argument, it has been shown that it often takes much more than hard work and tenacity for immigrant

students to achieve academically. Even with the best made plans, Herculean efforts, and supportive families, research shows how, more often than not, Latinas are often forced off their paths by structural and systemic barriers such as tracking (Olsen, 1997; Suárez-Orozco, 1997; Valenzuela, 1999), race and gender discrimination (Valenzuela, 1999; Weiler, 2000), and negligence and low expectations among school staff (Cammarota, 2004).

In the following section, I demonstrate how Sandra used her salient identity as "somebody" as a resource from which she drew to translate the valorization of multiple-ability, groupworthy tasks and the pedagogical practice of assigning competence. Through this translation, Sandra understood the ways in which she practiced mathematics to be of great value, and she interpreted the social status she earned as a mathematics learner to mean that she was also valuable as a person. Since there were so many ways to be mathematically smart at Railside, Sandra believed that she and her peers were equally smart, equally capable of learning, and all had equal potential for future success.

Doña Sandra in the Mathematics Neighborhood

Similar to Amelia, Sandra invoked "multidimensionality"(Boaler, 2004) when she described secondary mathematics at Railside. Amelia interpreted multidimensionality as "liberal," and chose to participate "liberally" as a student by using her mathematical voice and authoring her participation moves. Sandra, however, interpreted multidimensionality through her salient identity as "somebody," and therefore translated this version of mathematics to mean something quite different from Amelia.

Sandra explained that "doing" and learning mathematics required different ways of thinking and working with problems, finding multiple solution paths, reasoning,

justifying, and explaining ideas. According to Sandra, there was always more than one way to solve a problem, and she valued finding the "other ways." Sandra understood learning mathematics as something that required a lot of creative thinking.

> If you don't know how to get the answer, then you have to think of another way. For example, I have to solve a problem where you have to find the factors. If it's hard to do it that way [using factoring], I can maybe use the Quadratic Formula to find the answer and be creative. Find OTHER ways, NEW ways to find the answer. It's not only ONE way. In math there's like DIFFERENT ways to solve a problem. You can actually invent NEW ways to solve problems. So you have to be creative.

Sandra's descriptions of secondary mathematics included a variety of mathematical skills and knowledge that all students should have opportunities to learn. These included, but were not limited to, problem solving, reasoning, communicating mathematically, generalizing, and making connections between multiple representations. Again, it has been argued that traditional versions of "school" mathematics, and especially secondary school mathematics, are much too narrowly defined (Boaler & Staples, in press; Lave, 1988; Moschkovich, 2002). Yet, in response to this claim, many fear that in an effort to motivate and engage more students as mathematics learners, expanding "school" mathematics to include more diverse mathematical practices will cause "school" mathematics to lose the rigor it is assumed to have.

The version of mathematics Sandra described included an integration of both "everyday" and "academic" mathematics (Moschkovich, 2002, p. 2). It included skills and knowledge both central to the work of mathematicians and touted by NCTM as important process standards necessary for deep understanding of mathematical concepts (NCTM, 2000). In the quote below, Sandra explained that learning her version of "school" mathematics required her to do more than use given procedures to solve

problems. It was also necessary for Sandra to "try to make sense" of given information, reflect on her problem solving approaches, and construct her own understanding about *how* something worked, building from both personal knowledge and information she gained from class. The mathematical practices Sandra described included a balance of activities that included aspects of mathematics reflected in both the practices of mathematicians and those used in everyday life.

> I have to understand, how did the teacher get this? How can I get this for x? Things like that. Trying to make sense. How can I get this 3x? I don't get it. What happened? I have to know what's going on in the problem. I have to know where I got each number. WHY this 4x is negative. I need to know WHY and use it later.

The diverse practices Sandra described were privileged at Railside through the curriculum teachers made available to students. Sandra described the many activities that were part of her mathematics classes, which were both "challenging" and a "fun and interesting" part of class. These activities included projects, presentations, "big" posters, and Problems of the Week (POWs), and were deliberately created by Railside mathematics teachers as "groupworthy" tasks (Cohen, 1994; Horn, 2002; Lotan, 2003). Groupworthy tasks are designed to be "true group tasks" (Cohen, 1994, p. 22), such that students need each other as intellectual resources to solve the problem. Groupworthy tasks are "challenging, open-ended, and require many different intellectual abilities and resources" (p. 22). Cohen defined these tasks as activities "for which a shorthand, standard answer or solution is: it depends"(p. 107). Groupworthy tasks might have only one solution, but only after much discussion, clarifying, drawing, or modeling, can students proceed through finding a solution. *The* answer depends largely on how students have interpreted the problem, justified their assumptions, and correctly used mathematics.

To be successful with groupworthy tasks at Railside, it was necessary for students to work together, and Sandra understood groupworthy tasks to require a lot of interaction with her peers. If, when students were interacting, they were actually focused on learning mathematics, then the kind of interaction Sandra described necessitated a completely different skill-set than would learning in isolation. Explaining mathematical ideas, using mathematical vocabulary, understanding a process from multiple perspectives, drawing pictures, justifying ideas and solutions, or working with an idea in a new way, were all mathematical practices that Sandra and her peers were required to use when they worked together to solve a groupworthy problem. Furthermore, it is important to remember that Sandra was doing all of this in a second language.

In the following quote, Sandra explained that she enjoyed learning mathematics with her peers. She appreciated the interaction and the opportunities to talk with others, and she considered this opportunity to support her learning. While these collaborative practices were different from how Sandra had experienced school mathematics in Nicaragua, she believed that it was "really helpful" to work in cooperative groups, because they availed her of alternate resources, especially her peers and their ideas.

> Lisa: Were your math classes in Nicaragua different from your math classes at Railside?
>
> Sandra: I think I like it here better, the way that they do it, in groups with people. With people like you learn from your mistakes. You can learn from others. Like if I don't get something, other people explain it to you and I can understand it a little bit more. In Nicaragua the teachers explain, and we are all like in rows and if you get it you get it, and if you don't get it you can ask the teacher later or something. But, it's not like a group thing. I really like working with people. So, that's what I really like...In high school, yeah, I think groups are an excellent idea, excellent idea. Like for me it was helpful personally in high school. Being in groups was really helpful.
>
> Lisa: What was helpful about it?

> Sandra: I learned FROM other people. I learned from my friends. I learned from the teacher. And especially I learned that I could help others too. I felt good helping others and explaining to other people. That makes you feel good. Like when you help someone, you know, "How do you get this? Can you help me with this?" I want to study more so I can help more.

As I have explained before, working in small groups was an integral part of the Railside mathematics program, and the mathematics teachers organized their classrooms into collaborative groups on a daily basis. They had several reasons for doing this, of which sharing ideas and learning from others, as Sandra mentioned, were two. Opportunities to work together were invaluable for students, given the diverse mathematical practices required by their multidimensional curriculum. It becomes quite difficult, if not impossible or irrelevant, to explore problems from several different perspectives, justify multiple solution strategies, or be creative and "find NEW ways to find an answer" if students are working alone.

Sandra understood how working together facilitated a different kind of thinking and learning than was available had she been isolated from her classmates. This was evident in her statement above when she referred to learning "from others," learning "from your mistakes," and hearing different mathematical explanations as she tried to "understand it a little bit more." In addition, the last part of Sandra's quote suggested that she interpreted these opportunities to work on groupworthy tasks with her peers as a chance to be helpful. In my opinion, this is quite an unusual statement to make about secondary mathematics. "And especially I learned that I could help others too." This is what Sandra said, and given the particular meanings she assigned to her salient identity as "somebody," I believe she meant it.

Recall that Sandra had begun constructing her version of "somebody" when she lived in Managua, and a significant part of this identity included helping others. She helped her mother run the family store. She helped care for her younger sister. She helped her grandmother cook, her cousins study, and the older kids at school with their homework. Sandra also learned from her mother, the neighborhood matriarch, how to be "somebody." Her mother was Doña Carla, "someone important," and the woman who took care of her family and her neighbors to the point of losing everything. In the U.S. Sandra wanted to be "somebody" so she could help her family, send money back to Managua, ensure that her mother never had to work again, and use the status of her college education and her future job to take care of others. So, too, was Sandra, Doña Sandra in her mathematics classes. Sandra understood groupworthy tasks done with others in a small group as an opportunity to be the altruistic version of "somebody" that was salient to her. In these spaces, Sandra chose to insert herself into the available "space" afforded by the expanded, multi-dimensional version of mathematics in which she was invited to participate as the altruistic "somebody" she knew herself to be. In this way, the skills she had developed as "somebody," both in Managua and as a teenager living in the U.S., became resources for participating in secondary school mathematics.

Sandra also interpreted these spaces not only as opportunities to be helpful, but as occasions to learn more mathematics, so she could "help *more*." As Sandra asked questions or shared her ideas, she practiced being "somebody" and further developed this salient identity. Sandra's choice to participate in these ways supported her to become a better version of the person she wanted to be.

"We are all equal!"

As part of Sandra's "somebody" identity, she constructed all people as "equal" no matter their class, ethnicity, gender, language abilities, or religion, and she had a strong sense of what it meant to be treated "just like everybody else." Sandra's stance against inequality was directed at the forms of injustice she had experienced as a child in Managua and then as an immigrant in the United States, and she used this identity as a lens to interpret new situations she encountered. Sandra often referred back to her life in Managua to compare how little people had relative to what was available to her and her family in California. She was adamant that everyone should have enough food to eat and clothing to wear. She believed that children should not have to work in the streets, and opportunities to work and earn a reasonable financial living should be available to all. These passions for equality extended to school as well. Sandra insisted repeatedly that all students were "equal," and mathematics teachers should assume all of their students intelligent and capable of success.

> I want them to feel that we are all EQUAL, and that we are all capable of learning. I want them to see ALL the students as equal. Forget about religion. We are all equal and here for the same purpose, to learn, to learn the subject. But some people think that because they are Asian, they are really, really smart. Oh, they're Latino, they're not that smart. It's ok if they get an F. You know? Some people think like that and it's not right. It doesn't really matter how we look. It doesn't really matter. We are there for the same purpose, to learn math. The same thing, it doesn't matter if we have a ring in our nose or if we are ugly, pretty, it doesn't MATTER. Their JOB is to give the BEST of themselves and be equal with ALL of the students. Because we are ALL capable. We are ALL smart.

Sandra was aware of the many ways in which social inequities might be perpetuated in schools. In particular, she recognized how racism and sexism could look and feel and was very astute to how she might be positioned by her peers and teachers as unequal to her classmates in high school. Throughout our conversations, Sandra consistently spoke

about White and Asian students, boys, and native English speakers as the students who were expected to be smarter and more capable, and she recalled several classes where only the "White students" were expected to participate, or the "girls were picked on" by the teacher.

Sandra spoke differently, however, about her secondary mathematics classes at Railside. While she often referred to the racial diversity within these classrooms, she talked about it in a positive way rather than as a tool for pitting students against each other or discerning the smart from the dumb. She also spoke consistently about how she felt "equal" in her mathematics classes. Unlike many immigrant students who are assumed to be incapable of learning mathematics because they cannot speak English or are placed in remedial courses because the version of mathematics in their home-country was assumed less rigorous than school mathematics in the U.S., Sandra felt positioned "as equal" to her peers. She believed that she had as much potential for success as her White, Asian, male, and English-speaking peers.

> Like they [mathematics teachers] see you as equal, not only Latinos, but also you know, Indians or people from other parts of the world, not only Asian or White people. Nobody underestimated that I was not smart enough to be in that class. Like everybody looked at me like, "I can do this problem too. YOU can do it. EVERYBODY can do it."

Being "equal" had a particular meaning for Sandra. It did not mean that her teachers were *equally* friendly to all students, or that they spoke Spanish *and* Chinese. Sandra was not concerned that each student received the same grade. Being "seen" as equal meant that Sandra felt positioned as "somebody" in mathematics. She was assumed to be intellectually capable of learning, capable of achieving, capable of success. Maybe more importantly, she was assumed to be *as* capable as the students whom she thought had

high status in mathematics, particularly those who were White, Asian, male, or fluent English speakers.

In addition to the multi-ability, groupworthy tasks, the Railside mathematics teachers practiced assigning competence to explicitly value the many intellectual contributions students made while engaged with learning mathematics. Assigning competence is a form of public valorization of diverse mathematical practices. Its purpose is to both increase the intellectual status of all students (Cohen, 1994) and help students recognize the myriad valuable ways of thinking and doing mathematics. For example, imagine a student named Grecia who decides to organize a lot of information she has generated while trying to solve a problem. She creates a chart so that she can make better sense of her data. Making this chart was not part of the given mathematics problem. It was not a prescribed step in the process for finding a solution. Grecia generated this idea on her own as a way of working towards a solution. In this situation, Grecia's teacher might take an opportunity to assign competence to Grecia by saying, "Grecia, your chart is a great way to organize your information. It will probably be very helpful as you think through all of your options for solving this problem." A short statement to Grecia about her good idea validates Grecia's thinking such that both she and her peers understand that Grecia is intellectually competent in mathematics. It also sends the message to students that making and using a chart to organize data is an important mathematical skill and a tool that all students will want to learn how to use at some time.

Sandra interpreted the valorization of diverse mathematical practices through the use of multidimensional groupworthy tasks and the practice of assigning competence to

mean that her ways of doing mathematics had value. Sandra's "NEW ways to find the answer," the creativity she used to solve problems, the questions she asked and justifications she offered were important and beneficial in these particular mathematical spaces. Additionally, Sandra expressed an understanding of equality that went beyond herself and embraced her peers as well. In her secondary mathematics classrooms, it was not only the Latinos who were positioned as equal or as intelligent as other students. It was not only the students who could not speak English who were singled out and made to feel good about themselves. According to Sandra, "everybody" was considered smart and capable of learning. There were so many different and valuable ways to "do mathematics" at Railside that Sandra considered everyone equally smart and equally capable of success. She explained,

> I think everybody is smart in math. You just have to work hard... participate a lot and explain to other people, know how to solve things, be able to use your rules, your notes, how to think like, "How can I solve this?" That's smart.

This sense of equality that Sandra felt in her mathematics classrooms was so strong that she even suggested that her academic success might have depended on it.

> Maybe that's why I succeed I think. I went to all the math things because they saw me and all my Latino friends as equal. They saw that I was ABLE to succeed and I was doing good in everything. But other people in other schools give more importance to White and Asian than Latino, because maybe they are minority people. I don't understand why it is like that. I have no idea why.

Everybody can be "Somebody"

It is unusual to hear a young person describe secondary mathematics classes as spaces in which all students are considered intellectual equals. Sandra's stories are especially poignant at a time in history when school mathematics more often acts as a gatekeeper than a great equalizer. It is likely that the equality Sandra felt in her

mathematics classes stemmed largely from the mathematics teachers at Railside who "were deeply committed to equity" and made extraordinary efforts to support each student's mathematical success (Boaler & Staples, in press, p. 14). One might reasonably argue that any young person would benefit from a philosophy and work ethic that put equity at its center. A combination of hard work and a strong commitment from a teacher should lead to academic success. However, it has been shown to take more than a professed stance towards equity, a curriculum aligned with reformed efforts, or even a deliberate stance *against* inequity to support students' mathematical achievement (Boaler, 1997; Boaler, 2004; Lampert, 2001; Lubienski, 2000).

Current research done by de Abreu and Cline (2007) made a critical connection between the status assigned to "school" mathematics practices and the social identities students assume to be available in their futures. This research highlights Sandra's use of her salient "somebody" identity to interpret the pedagogies used at Railside to mean that she was intellectually equal to her peers and therefore potentially able to achieve "somebody" status in her future. De Abreu and Cline claim there is a relationship between students' social identities and the mathematical practices valued in schools. When certain mathematical practices are assigned more status than others, the identities students construct for themselves and others relative to these practices are affected. For example, in de Abreu and Cline's study, "school mathematics" was valued more highly than some "categories" (p. 124) of mathematical practices that students and their families used in their out-of-school contexts. The mathematics used to manage a family farm was assigned less value by teachers than the mathematics used in school. Students were not encouraged to use or build from their mathematical resources as farmers when engaged in

"school mathematics." As a result, students assumed that those who excelled in "school mathematics" as opposed to "peasant mathematics" (p.120) would eventually enjoy higher status in life.

Alternately, students made assumptions about the mathematical abilities of people based on the status of their jobs or the status of their assumed cultures. For example, students believed an office administrator to be more mathematically able than a farmer, because office administrators enjoyed more social status than farmers in the context in which these particular youth lived. Similarly, a young person from Pakistan was assumed to be less mathematically able, because Pakistan did not enjoy the same status as the country in which this school was located. In both cases, the link between mastering school mathematics and the social identities afforded by this mastery was the valorization of certain mathematical practices.

Similarly, Sandra understood that if she was good at school mathematics, then she could be "somebody" in life. She could achieve a college education, find a good job, and support her family. Sandra translated the status assigned to her as "equal" and as "smart" as a mathematics student to herself as a person. However, Sandra likely benefited from her construction of school mathematics more than her counterparts in the De Abreu and Cline study. For Sandra, school mathematics was defined very broadly. It was multi-dimensional. It included a variety of categorizations of mathematical practices, such that students could try "different ways" to solve problems and "be creative" with their processes. The multidimensional nature of school mathematics and the status it was assigned literally expanded the boundaries for what was considered school mathematics and who could be good at it. So, as Sandra used mathematical ideas and practices she had

learned as a student in Managua or as a young girl working her family's store, she felt valued as a competent mathematics learner, and in turn she believed that she had high status as a person. Sandra interpreted her valued position as a "somebody" vis-à-vis her engagement with multiple-ability, groupworthy tasks and its valorization through teachers' assignment of competence.

According to Sandra, everybody could be good at mathematics. Everybody was "equal." Everybody could be "somebody." She defined mathematical competence very broadly, much like she had defined school mathematics itself. Sandra explained that there were a variety of ways to be mathematically "smart." It was "more than doing things fast" or only getting a right answer. In fact, Sandra explained, even smart math people can do things wrong sometimes.

> It's more than doing things fast. You can be smart and do it wrong too. You don't have to be right all the time. It doesn't mean you aren't smart if you do it wrong. Because in math, sometimes you can be SO smart and you can get the wrong answer, especially in math. So, like everybody is smart in math I think.

The fact that there were many ways to be mathematically competent given the multidimensional nature of school mathematics at Railside and the public value assigned to the many ways students were mathematically competent, attributed to Sandra's understanding that she and everyone around her had status as people. It did not matter whether it was "peasant math" or "farm math" or "school math" that students were using. The range of mathematical practices necessary and valued through the use of multiple-ability, groupworthy tasks and the assignment of competence included all of these forms of mathematics and more. Whatever version of mathematics students brought to the task was important. As Boaler and Staples (in press) stated, "when there are many more ways

to be successful, many more students are successful"(p. 16). If everyone can be mathematically smart, then everyone is "equal," everyone can become "someone."

Conclusion

People develop identities as a result of participating in communities of practice (Nasir, 2002), but they also enter communities with salient identities through which they translate and assign meaning to new experiences. Sandra entered her secondary mathematics classes with a salient identity as "somebody," which she constructed through a dual frame of reference based on her lived experiences in Nicaragua and the U.S., and from the strong messages she received from her mother, Doña Carla, about the importance of helping people. Sandra used her salient identity as a lens through which she translated her experiences with a multidimensional mathematics curriculum and the valorization of diverse mathematical practices. She interpreted her experiences to mean that she and her peers were equally intelligent and equally capable of mathematical success and translated the status assigned to herself and her peers as mathematics learners into status as people.

Sandra understood the "spaces" created by the use of collaborative groups necessitated by the multidimensional curriculum as opportunities to develop her "somebody" identity. She chose to engage in these spaces such that she could be intellectually supportive of her peers' learning. In this way, not only did Sandra use her salient identity to interpret new experiences in secondary mathematics, but her experiences with mathematics supported her to continue developing this salient identity. Sandra was "somebody" when she entered her mathematics classrooms, and she was still

"somebody" when she left, but a different version, a stronger version, a more capable version, a version that was closer to the "somebody" she wanted to become.

Unfortunately, Sandra's experiences in secondary mathematics are not widely repeated across the United States. Too often students enter schools and classrooms with great intentions to become "somebodies" only to be met with a lack of appropriate resources or opportunities to support these quests. A narrow version of school mathematics contributes to this problem. When teachers do not value a wide range of mathematical practices, it can be especially difficult for immigrant students to be successful when they may have learned mathematics differently, or practiced mathematical thinking and learning in alternate ways in another country. As a result, these young people may choose to disengage from learning. What might appear to be stubbornness, laziness, or incompetence on the part of a student to do mathematics might actually be related to the lack of status assigned to students' mathematical practices. It might also be the result of an inability to make connections and build from the knowledge she constructed elsewhere and the mathematics she is trying to do now. A narrow construction of mathematics may in fact alienate the same students we are trying to better serve because the available practices for school mathematics may seem unusual or strange. Sandra's case demonstrates the power in valorizing a diverse range of mathematical practices, such that all students come to believe that they, too, and not only a certain few, are capable of success.

CHAPTER SEVEN

Discussion and Implications

The stories of Amelia, Emily, Mariana and Sandra described secondary mathematics experiences that felt supportive of their personal identities, provided opportunities for the creation of multiple identities as mathematics learners, and encouraged them to continue developing the identities most salient in their lives as they engaged with learning mathematics. These young women entered their mathematics classrooms as "liberal," "Christian," "feminist," and "somebody," and used these identities both as lenses through which they constructed personal meanings of the available teaching and learning practices and as intellectual resources for engaging with and learning mathematics. The stories that make up this study differ greatly from many told about Latina immigrants, which too often describe them as an ethnically homogenous group and one that is mostly not interested or possibly even incapable of learning rigorous mathematics. This study contributes to a growing body of literature concerned with better understanding how to support more students to engage with and successfully learn mathematics.

Four Different Stories, Four Different Lives: Lessons Learned about Identity

The narratives of these four young women contribute to a growing understanding that young people from Spanish-speaking countries are not an ethnically homogenous group (Anzaldúa, 1975; González, 1998). While at first glance, Amelia, Emily, Mariana, and Sandra likely appear to have emigrated from the same countries, their stories suggest that they entered Railside High and their secondary mathematics classrooms having lived through varied experiences that were uniquely intertwined with issues of immigration,

bilingualism, and religion. A dual frame of reference, comparing current situations with social contexts in their home-countries, affected the experiences to which they referred and used to construct beliefs about themselves and their positions in society. They learned to straddle several geographical, psychological, emotional, and spiritual borderlands as they became young adults learning to juggle different cultures (Anzaldúa, 1987).

Furthermore, this study shows that identities constructed relative to major social structures are not always the most salient to individuals. Emily's stories about the meaning and role of Evangelical Christianity in her life, and Amelia's identity as "liberal" are two specific examples of salient identities which might never have been considered had more traditional identity categories such as gender or ethnicity been applied to this research. It is important to examine traditional identity categories within educational research, but it is also necessary for research to expand beyond these categories and include identities to which students are most committed, as these salient identities profoundly impact the decisions and actions young people make.

Additionally, the stories told by Amelia, Emily, Mariana, and Sandra demonstrate the multiplicity of salient identities and the unique meanings assigned to each by the individual. While one might assume homogenous identities within gender, race, or ethnic groups, these young women illustrated the uniqueness of identity construction given the "braids" (González, 1998, p. 83) of experiences woven through their lives. Mariana, for example, demonstrated how her version of "woman" was shaped relative to the social and familial messages she received as a child and the conditions with which she lived in Guatemala. Her woman-identity was very different from how Sandra thought about

herself as "somebody" smart and special growing up Northern California such that she could ultimately return to Managua to care for her family. Similarly, being "liberal" for Amelia meant something different from what is often meant by being *a* liberal in the U.S. political scene. Amelia's construction of "liberal" included strands of what might be called familial and female identities, but the meanings Amelia assigned to this identity were unique given her experiences as a young girl growing up in Mexico and in urban California. Identities are not mutually exclusive. Rather they are multiple, overlapping, and complex understandings of self developed over time and across many contexts (Anzaldúa, 1987; Bernal et al., 2006; Collins, 2000; Flores-González, 2002; González, 1998).

Finally, these four cases together extend research that demonstrates the fluidity with which identities are constructed and used. Much research has focused on how particular identities, such as *ethnic* identities, *gender* identities, or *mathematics* identities, are shaped by or used within specific educational settings (Flores-González, 2002; Martin, 2000; Nasir, 2002; Weiler, 2000). While context and the available norms and practices contribute to how one thinks about herself and acts in the world, identity is a constant negotiation of personal history, values, and realities across contexts (González, 1998). Emily's case is an excellent example of this. While much of what I have called Emily's salient Christian identity was likely constructed within her church community, Emily did not stop being a Christian when she attended school. In fact, Emily explained that it was through her participation in Railside mathematics classes, and not necessarily through a designated Christian activity, that she became a better person, a better Christian. Had I failed to explore of Emily's Christian identity been limited to only

traditionally designated Christian spaces in which she participated or had I focused only on her mathematical identity given my emphasis on secondary mathematics classrooms, much would have been lost. The inclusion of Emily's Christian identity in a conversation about mathematics education provides a more complex and thorough portrait of Emily's mathematics success.

Identities as Interpretive Lenses and Intellectual Resources in Secondary Mathematics

This study shows that the identities students create outside of school intersect within the contexts of school mathematics. While students construct identities as mathematics learners within their classrooms (Martin, 2000; Nasir 2002), they also use their personal identities, their understandings of selves in their social worlds, as ways to read their mathematics classrooms. They are constantly translating teacher moves, curricular goals, and social norms for participation and learning through the lenses of their identities.

Because of the unique identities each young woman in this study brought into their mathematics classrooms, different features of Complex Instruction took on distinct meanings in their narratives. For both Amelia and Sandra, the "multidimensional" (Boaler & Staples, in press) nature of school mathematics was important for several reasons. Amelia interpreted the availability of multiple mathematics practices through her salient "liberal" identity as an opportunity to "do mathematics your own way." In addition to the broad array of mathematical practices available to her, Amelia described having significant agency as a mathematics learner at Railside. She claimed she could articulate her ideas and opinions and assume authority over her decisions and actions while learning mathematics.

Sandra also valued the multidimensional nature of secondary mathematics, but for different reasons. Through her salient identity as "somebody," Sandra understood the valorization of multiple mathematics practices, through the use of groupworthy tasks and the pedagogical practice of assigning competence, to mean that each student was equally intelligent and mathematically competent no matter her skin color or primary language. While learning mathematics, Sandra explained that there were many ways to be smart. There were several options for working through problems and finding solutions. The authority for determining the trajectory of mathematical thinking, reasoning, and justifying was located with students rather than the teacher or text. Most importantly, these different ways of doing mathematics were publicly valued. Sandra extended her interpretation of the valorization of the multidimensionality to herself and her peers. This meant that in addition to their personal ways of practicing mathematics she and her peers were also valuable as young people.

Emily was the one student in this study that I thought I knew the most about, but I discovered through this process that I knew her the least. Emily's interpretation of mathematics teachers as "preachers" who work to ease students' "suffering" and mathematics classrooms as spaces where she learned how to become a better person provided some important lessons about mathematics teaching and learning. First, Emily's stories illustrated the diversity of salient identities with which students bring to classrooms. Prior to this study, I knew Emily attended church regularly, but I was not aware of the critical centrality of Christianity in her life. Emily's use of her Christian identity as a lens through which she translated the social norms of her mathematics classrooms demonstrates the powerful potential for mathematics classrooms to become

spaces where students build relationships, develop community, and learn how to care about each other and for each other's learning.

Finally, Mariana's stories support the many heard about the challenges of learning mathematics while using a second language, however Mariana extends this conversation by insisting that her lack of fluency in English in no way determined her mathematical competence. Through the lens of her "feminist" identity, Mariana translated her use of Spanish in her mathematics classes to mean that she was smart, she had potential for academic success, and she was equal to men. Furthermore, Mariana used Spanish to develop her mathematical voice. Through her primary language, in the context of learning mathematics, Mariana learned how to verbalize her ideas, express opinions, and justify her thinking.

Overall, it was interesting to note how infrequently the woman spoke about mathematical content as part of their stories. Although the second wave of interviews was entirely about school mathematics, when I asked the women what they learned in their mathematics classes they spoke mostly about Process Standards, including making connections, explaining and justifying ideas, and using different representations to model and solve problems (NCTM, 2000). In addition to several other things, Amelia explained that she learned "how to relate ideas to each other and know why they are important." Sandra learned "why you do something to solve a problem," and Mariana explained that she "realized there were different possibilities for how to solve a problem."

When the women did mention content, they spoke about big mathematical ideas rather than isolated facts, procedures, or skills. For example, across their stories the women explained that they learned about "how to solve equations," "congruence,"

"slope," "surface area and volume," "quadratics," and "integration." These descriptions of content are very different from responses commonly heard by young people who often explain the mathematical procedures they have learned such as how to solve one-step linear equations, or the interesting facts they have memorized such as the derivative of $\sin(x) = \cos(x)$.

Each of the young women also mentioned several large, unit problems she was assigned over the course of several years, and again, framed these tasks as big ideas rather than a set of skills. For example, Amelia referred to a unit problem used in Algebra A called, "How Tall is the Flag Pole?" when she explained that she "learned how to find the height of the flag pole." This problem required students to use their knowledge about scale drawings, angle measures, triangles, and trigonometry to determine the height of a flag pole in front of the school building without actually measuring it. Mariana remembered "figuring out what was wrong with Barbie," referencing a problem in which students use measurement, ratios, proportions, and scale drawings to compare the size of different body parts on a Barbie doll with that of a human female. Emily enthusiastically recalled "that Godzilla problem we did," which required an understanding of similarity, congruence, and proportional reasoning. Each of these were large problems, with no prescribed processes, which students were expected to solve using a variety of mathematical content and strategies. To successfully complete them required a broad range of mathematical skills and understandings.

"We CAN be ourselves."

It is common and commonly accepted in U.S. society to admit to not enjoying mathematics, or to not being very good at it. People often express, "I was never good at

mathematics," or "I am not a math person." These statements partially suggest that the construction of school mathematics, its content, and norms for learning are not necessarily compatible with the kind of people some imagine themselves to be. Individuals may feel it is impossible to locate oneself within the practice of mathematics or that their intellectual strengths do not match the kinds of skills and knowledge required to learn mathematics. It has been shown that young people are often forced to give up certain ways of being such that they are divested of their strengths and resources (Olsen, 1997; Valenzuela, 1999). Pressures in U.S. schools to become more Americanized by giving up home languages and behaving in accordance with the dominant culture literally require students to leave important parts of themselves outside of schools and classrooms and likely contribute to feeling disconnected from or unable to participate in school mathematics.

The stories from the young women in this study were very different from what is commonly heard in schools or read about in educational research. Although the women referred to some classrooms at Railside where they did not feel comfortable and mentioned a few teachers who poked fun of their inability to speak English, their mathematics classrooms were not included in these descriptions. Strikingly, a common theme across all of their stories was about feelings of mathematical competence and positive messages from their mathematics teachers about how they were "equal" to their U.S.-born peers and valued as persons and learners.

As part of the second Focus Group conversation, I asked the women to describe themselves. Their responses were broad and included such things as funny, artistic, creative, open-minded, responsible, talkative, helpful, honest, funny, wrong, strong,

persistent, and loving. I then asked which of these characteristics they were allowed to bring into their secondary mathematics classrooms. Part of their response is below.

> Amelia: There were a lot of ways in which we can be in math class.
>
> Mariana: Yeah.
>
> Sandra: Yeah.
>
> Emily: We can be everything that we want to be in our math class.
>
> Amelia: Basically, we can be ourselves in math. We CAN be ourselves.
>
> Sandra: If we want to be.
>
> Mariana: Everything, basically, we can be in math.
>
> Amelia: We can be ourselves. Whatever characteristics describe you. We can be OURSELVES!

This conversation demonstrates that these young women felt they could act authentically while participating in their mathematics classes. They were not required to leave parts of themselves outside of their classrooms to accommodate their teachers or particular ways of being a mathematics student reinforced at this school. Their unique ways of thinking and being were not constructed as deficits, things to be disregarded or fixed. Instead, these women felt that their unique ways of thinking and participating were invited and encouraged in mathematics. Given this data, I claim that in addition to using their salient identities to read their mathematics classrooms, the women in this study had opportunities to use their identities as intellectual resources to encourage their mathematical participation and support their learning.

Again, the women's' stories indicate which features of Complex Instruction provided space to connect to prior knowledge, skills, and understandings, which they had developed as part of their salient identities. For example, the multidimensional nature of

Railside's mathematics program provided Amelia with the opportunity to justify how she solved a problem in a way that was different from her teacher. In this way, Amelia's "liberal" practice of mathematics was valued. When Mariana used Spanish to assert her understanding of a concept or process, she gained access to a mathematical conversation with her peers that supported her learning. Emily used her skills as a Christian to help her group members answer questions and reason through misunderstandings, necessary skills at Railside given the use of particular norms and roles of Complex Instruction. Finally, Sandra claimed that the use of small collaborative groups afforded her the chance to assert her "somebody" identity. In mathematics, Sandra's was a Doña, and her skills as supporter, questioner, helper were all necessary and valued while she and her peers practiced mathematics. These pedagogical and curricular features afforded each woman to make connections to and build from her salient identity as a resource for learning mathematics. Opportunities to do so over the long term were likely critical reasons for their mathematical success and supported their decisions to continue enrolling in upper-level mathematics classes long after they had met their graduation requirements. "When students feel connected between self and practice, they are more likely to engage (Nasir & Hand, in press, p.8).

Participation Supports Further Identity Development

It is important to recognize that the women in this study were not becoming just any kind of actors in their mathematics classrooms. Their stories did not suggest that they were "playing the game" or trying to please their teachers by behaving in particular ways. As the women participated in mathematics they were simultaneously creating unique versions of the people that they wanted to become.

Identities support mathematical learning and mathematics practices they engaged with supported their further identity development. Amelia described how she became more "liberal" by authoring her voice and authority over her own learning. Emily became a better "Christian," better able to help others and serve God as she shared her ideas and helped others to learn mathematics. Mariana became more of a "feminist," a young woman who continued to develop her emotional strength and intellectual competence while she asked questions and expressed her mathematical opinions, proving to the world that she was not "garbage." Sandra understood the valorization of multiple mathematics practices to support her goals of becoming "somebody" who would eventually earn a college degree, find a well-paying job, and use her social status to help her family and poor people in the world. Each woman entered her mathematics classrooms with a unique salient identity and then acted from that identity as she engaged in learning. Certain features of these classes then supported their continued engagement such that their salient identities intersected with the versions of mathematics learners they were creating. Their identities as "liberal", "feminist," "Christian," and "somebody" co-developed in a process that was connected to the social contexts of their mathematics classrooms and to their learning of mathematics (Holland et al., 1998). These young people left high school as better versions of the women they wanted to become, with more tools, more skills, and more confidence to live in the world as the people they wanted to be.

Implications for Research

This study specifically suggests the need for mathematics education research to continue moving beyond classroom and school contexts to include the varied out-of-school communities, including home-countries, in which students participate. To better

understand issues of participation and achievement, it is necessary to understand the broader socio-historical contexts in which schools, classrooms, teachers, and students are situated. In addition, similar studies that contain out-of-school contexts as part of the research design must include students who embrace different ethnic and gender groups. The move to support students' cultures within classrooms has often led to stereotyping without consideration for how individuals experience and understand their cultured lives. As research strives to understand the cultural disconnect often felt by students in school mathematics, it is critical to include young people from a variety of social positions.

Mathematics education research must expand its repertoire of methods to include data from a range of sources and perspectives. These should include narrative inquiry, ethnography, and case studies. Adding these techniques will expand the available information about students and mathematics learning by changing the subject of study and afford opportunities for students to explain how they understand themselves, their social worlds, and the residue of previous lived experiences from their personal perspectives. This move does two things that I believe will contribute to the growing knowledge base about identity and mathematics learning. First, it takes seriously the student as a source of knowledge and honors students' lived experiences and their personal constructions of these experiences. A focus on students also provides for an expanded understanding of identity by starting with the students' own sense of identity rather than assuming the standard categories of race, ethnicity, gender to be salient for all (Cobb & Hodge, 2002).

The use of identity as a research frame in mathematics education is fairly new, but the studies that have used it have uncovered important new issues relevant to the field

(Boaler & Greeno, 2000; Martin, 2000; Nasir, 2002; Sfard & Prusak, 2005). It is necessary to continue to explore both the benefits and limitations of identity as a research construct. I imagine more large-scale studies that include both participant observation and intensive narrative inquiry such that students' stories are available to parallel the stories being told from teacher and classroom perspectives. In particular, I suggest the following sorts of questions be considered alongside students' identity stories as part of the same research design: Which identities are taken up in the moment by a teacher and how does this happen? What are the teacher moves that limit or support a student's identity in the context of learning mathematics? What is the knowledge required by teachers to utilize students' identities as resources for learning mathematics?

Finally, results from this study suggest a continued focus on students who have achieved mathematical success. Changing the focus from failure to success highlights the important strengths of both students and mathematics programs that are working and exposes what is going well and offers descriptions for how students understand their own achievement. If I had only talked with students who had failed mathematics, I could have described several problems with the mathematics curriculum and instructional practices at Railside, certain things students felt were wrong or unfair. However, this side of the story is incomplete and only reveals one part of a complex portrait of mathematics teaching and learning. It is necessary for research to continue searching for and highlighting the pockets of success that exist to further understand what is possible.

Implications for Practice

> You have to believe we are capable. If you don't believe in us, there is nothing left to believe (Sandra, September 2006).

The stories of these four women serve as counter-narratives to the dominant story told about Latina immigrants. This dominant story often constructs these young people as deficits, and is then used to justify the low academic expectations often held for them in secondary schools and the lack of resources provided to support their learning. Amelia, Emily, Mariana, and Sandra shared important messages that remind those working in schools that young women from Spanish-speaking countries have strong desires for learning and the tenacity to stay engaged with upper-level mathematics. They enter high schools with goals that challenge common stereotypes that portray Latinas as stupid and lazy, and they want their teachers to recognize and value their diverse intellectual and cultural competencies by providing them with opportunities to learn important mathematics.

Because teachers are trying to understand who students are and how they make sense of mathematics, they must respect the diverse identities students bring into classrooms and share the responsibility for negotiating meanings. Teachers have access to only small parts of students' lives. It is necessary to accept the personal limitations relative to how well anyone can truly know another person while simultaneously maintaining a respectful curiosity about their lives. It is also important to avoid overly neat identity categories of race, gender, ethnicity and the temptation to implement a given curriculum or instructional strategies because they are thought to be generalisable to an ethnic group (Bartolome, 1994; Cobb & Hodge, 2002).

Educational researchers and practitioners continue to search for strategies to encourage students who are traditionally marginalized by school mathematics to engage more fully. Special curricula, interesting technology and games, and culturally relevant tasks are just some of the more recent developments aimed at this goal. However, the women in this study suggest that it will take more than quick fix, "technical" solution (Bartolome, 1994), or a one-size-fits-all teaching approach to support students' engagement with secondary mathematics. Their stories indicate that teachers must embrace multiple methods that deliberately address and interfere with issues of status that are oppressive and discriminatory and work to "create conditions that enable subordinated students to move from their usual passive position to one of active and critical engagement" (p. 177).

Part of this work requires teachers to provide spaces in classrooms for students to construct meanings of their mathematics experiences through the lenses of their salient identities. This interpretive work is critical, because it supports students to make connections to prior experiences and knowledge in ways that make sense to them but may not be available to an outsider. These spaces are not separate from the practices of teaching and learning mathematics. They are not something one does prior to a lesson or as part of building a safe and enjoyable classroom environment before students engage with mathematics. The stories shared by the young women in this study demonstrate that interpretive spaces can be created within the context of learning.

Acknowledging that students can do this interpretive work and recognizing that they require space for it requires a shift in thinking and practice for teachers. It is necessary to understand that cultural relevance is not entirely located within the context

of a problem or in a student's learning style. Additionally, teachers cannot be solely responsible for understanding the "culture" of each student and then creating a match between this culture and mathematics curriculum and pedagogy. Instead, this study suggests that the role of a teacher might be less about interpreting and responding to students' assumed cultures and more about interpreting and responding to students' mathematical sense-making, which they have constructed through a cultural lens. Teachers must provide spaces for students to access their cultural knowledge and then react appropriately to a student's mathematical ideas in such a way that builds from her understanding and moves her forward intellectually rather than shutting her down or redirecting her to a "better way." This work requires foregrounding students' ideas, reasoning, and justifications, and providing opportunities for mathematical conversations. Teachers must probe and explore students' thinking such that they are able to unearth and then build from the connections students are making. All of the women's stories push toward the use of a more expansive version of teaching and learning secondary school mathematics than what is traditionally offered in schools. The scope of mathematical content, the learning practices afforded and valorized in secondary school must be broadened. Teachers do not necessarily need more cultural knowledge to do this work. However, they do require a different stance towards school mathematics, what it is, and what it means for someone to know and understand it well.

APPENDIX A

Map of Mexico and Central America

APPENDIX B

Focus Group Conversation about Ethnic Terminology and Geographical Knowledge

Lisa: So, I think this is really interesting. You didn't write, Nicaraguan, Mexican, Salvadoran...

Amelia: I did! I wrote, Mexican.

Lisa: ...or Guatemalan.

Emily: As you guys know I come from a Latino family. I don't consider myself Hispanic. I consider myself Latino. Would I be gringa if I gave up being Latina? I wouldn't mind being gringa, a little white girl.

Lisa: I'm white, but that's the color of my skin. I also have an ethnic heritage. I'm Polish, Irish, and German. I think this is so interesting that you [Amelia] wrote, Mexican, but none of the rest of you wrote the country you came from.

Mariana: I was going to write mine, but then I thought I'm just going to write, Hispanic. I like being Hispanic. I'm so proud of being Hispanic.

Amelia: ...that's why I didn't give it up in the first two cards. You know? But, being Mexican for me is who I AM. That is SO important to me and I wouldn't give it up for ANYTHING. But it was easier than the other two to give up.

Lisa: How does it feel for others to know that you are Mexican?

Amelia: GOOD!

Lisa: Do you want other people to know you are Mexican or Hispanic?

Amelia: Mexican OR Hispanic, either one.

Lisa: It doesn't matter?

Amelia: I would rather let them know I'm Mexican because I'm proud of where I'm from but I don't... I'm not ashamed of it. I'm not going to deny I'm Mexican.

Lisa: So, back to this question. If I write in my dissertation that you are all Hispanic, I will get in trouble.

Amelia: Really?

Mariana: Really?

Emily: You're not allowed to do that.

Lisa: People will probably call me insensitive and racist.

Sandra: But we are ALL Hispanic!

Emily: Ms. Jilk, I took a civics class and the teacher told us that. "You're not allowed to say, Hispanic, in this class, because that's racism. You're not allowed to say, nigger, in this class, because that's racism."

Amelia: I understand now how you're saying it's racist. Now I understand.

Lisa: Why?

Amelia: Because we're not just Hispanic. Yes, we're Hispanic but we're a specific type of Hispanic. We're Mexican, Nicaraguan, Guatemalan, you know?

Emily: We're not the same.

Amelia: We're not all Mexican. That's like saying to a Guatemalan person....

Mariana: We might have the same traditions or the same beliefs but not....

Amelia: ...saying Hispanic generalizes us.

Emily: So, you will get in trouble for real?

Lisa: For real. When I write about you, I will talk about the countries you are from. I have to do exactly what Amelia said and show that I understand that you come from different places with different cultures and different...

Sandra: values

Mariana: I kind of like that, knowing people from other countries. Yeah, I really like having that diversity.

Emily: I just think that we're all the same, just the thing that separates us are the countries...

Amelia: ...where we were born.

Emily: ...where we were born. And in a way, our traditions are a little bit different. We try to understand each other and accommodate it [the differences]. I like it.

Lisa: But why didn't you write, Salvadoran, on your card?

Amelia: That's a good question.

Lisa: And why didn't you write, Guatemalan or Nicaraguan?

Mariana: I didn't....

Amelia: Because I'm really PROUD of being Mexican. I wrote Mexican because I'm PROUD of it.

Emily: Because I feel like I belong to the whole thing. When it comes to Latino, it doesn't matter where I come from, where other people come from, just that we're Latino and I want to be part of that, you know?

Sandra: What was your question when you asked us to write this?

Lisa: I said race or ethnicity.

Sandra: Your ethnic group is Latino.

Lisa: Isn't your ethnic group, Nicaraguan?

Sandra: I understood in general, but not where I was born.

Mariana: Yeah.

Emily: You have to be more specific with us! [joking] What country are you from?

[everyone laughs]

Sandra: Yeah, if you ask, "What country are you from?" I will write, Nicaraguan.

Amelia: But she wanted to know how you identify yourself.

Lisa: Exactly. I wanted to know what you would write.

Emily: Very smart

Lisa: That's why I'm going to be a doctor [joking].

[Everyone laughs]

Mariana: I say I'm Hispanic, but then it'll be, from where? I'm like, Guatemala. I know people ask where I'm from.

Lisa: People ask you if you're Hispanic?

Mariana: No. No. If somebody asks, like...

Sandra: Where are you from?

Mariana: Sometimes people can't tell that I'm Hispanic. I don't know why, but, you know they ask me and I'm like, no, I'm Hispanic. So they're like, from where? What part? And I'm like, "Oh, I'm from Guatemala."

Sandra: If people say, "What are you?" I say, Nicaraguan.

Emily: I say, Central America.

Sandra: I say Nicaraguan first.

Emily: I feel like if I say, El Salvador, some people don't know what it is.

Sandra: I say, Nicaraguan. Then I say Central America if they don't know.

Mariana: Most people don't know where Guatemala is.

Lisa: People don't know where your countries are?

Mariana: A lot of people are like, "Where's that at?" I'm like, between Mexico and South America. "Oh that little thing right there?" [laughs]

Sandra: That little thing. [laughs]

Emily: People think I'm from India or Asia.

Mariana: When people say, "That little thing right there?" I'm like, "Oh God, how ignorant."

Emily: Have mercy.

REFERENCES

Adler, J. (1998). A language of teaching dilemmas: Unlocking the complex multilingual secondary mathematics classroom. *For the Learning of Mathematics, 18*(1), 24-33.

Allexsaht-Snider, M., & Hart, L. E. (2001). Mathematics for all: How do we get there? *Theory into Practice, 40*(2), 93-101.

Angier, C., & Povey, H. (1999). One teacher and a class of school students: Their perception of the culture of their mathematics classroom and its construction. *Educational Review, 51*(2), 147-161.

Antrop-González, R. (2006). Toward the School as Sanctuary concept in multicultural urban education: Implications for small high school reform. *Curriculum Inquiry, 36*(3), 273-300.

Antrop-González, R., & De Jesús, A. (2006). Toward a theory of critical care in urban small school reform: Examining structures and pedagogies of caring in two Latino community-based schools. *International Journal of Qualitative Studies in Education, 19*(4), 409-433.

Anzaldúa, G. (1987). *Borderlands/LaFrontera: The new mestiza*. SanFrancisco: Spinsters/Aunt Lute.

Ball, D. L. (1993). With an eye on the mathematical horizon: Dilemmas of teaching elementary school mathematics. *The Elementary School Journal, 93*(4), 373-397.

Banks, J. A. (2002). *An introduction to multicultural education* (Third ed.). Boston: Allyn and Bacon.

Barrington, B. L., & Hendricks, B. (1989). Differentiating characteristics of high school graduates, dropouts, and nongraduates. *The Journal of Educational Research, 82*(6), 309-319.

Bartolome, L. I. (1994). Beyond the methods fetish: Toward a humanizing pedagogy. *Harvard Educational Review, 64*(2), 173-194.

Bean, F. D., & Stevens, G. (2003). *America's newcomers and the dynamics of diversity*. New York: Russell Sage Foundation.

Beck, L., & Muia, J. A. (1980). A portrait of tragedy: Research findings on the dropout. *The High School Journal, 64*(2), 65-72.

Bernal, D. D. (1998). Using a Chicana feminist epistemology in educational research. *Harvard Educational Review, 68*(4), 555-582.

Bernal, D. D., Elenes, C. A., Godinez, F. E., & Villenas, S. (Eds.). (2006). *Chicana/Latina education in everyday life: Feminista perspectives on pedagogy and epistemology*. Albany: State University of New York Press.

Bettie, J. (2003). *Women without class: Girls, race and identity*. Berkeley: University of California Press.

Bishop, A. (1988). *Mathematical enculturation: A cultural perspective on mathematics education*. Dordrecht: Kluwer.

Bishop, A. (1991). Cultural conflicts in mathematics education: Developing a research agenda. *For the Learning of Mathematics, 14*(2), 15-18.

Bishop, A. (1994). Cultural conflicts in mathematics education: Developing a research agenda. *For the Learning of Mathematics, 14*(2), 15-18.

Bishop, A. (2000). *Critical challenges in researching cultural issues in mathematics learning*. Paper presented at the Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics.

Boaler, J. (1997). *Experiencing school mathematics: Teaching styles, sex and setting*. Philadelphia: Open University Press.

Boaler, J. (2002). The development of disciplinary relationships: knowledge, practice, and identity in mathematics classrooms. *For the Learning of Mathematics, 22*(1), 42-47.

Boaler, J. (2004). *Promoting equity in mathematics classrooms - Important teaching practices and their impact on students learning*. Paper presented at the International Conference for Mathematics Education, Copenhagen.

Boaler, J. (in press). Promoting relational equity: The mixed ability mathematics approach that taught students high levels of responsibility, respect, and thought. *British Educational Research Journal*.

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

Boaler, J., & Staples, M. (in press). Transforming students' lives through an equitable mathematics approach: The case of Railside School. *Teachers College Record*.

Bogdan, R. C., & Biklen, S. K. (2003). *Qualitative research for education: An introduction to theories and methods* (Fourth ed.). Boston: Pearson Education Group.

Bruner, J. (1996). *The culture of education*. Cambridge: Harvard University Press.

Budgeon, S. (2003). *Choosing a self: Young women and the individualization of identity*. Westport, CT: Praeger.

Campbell, P. B. (1995). Redefining the "girl problem in mathematics". In W. G. Secada, E. Fennema & L. B. Adajian (Eds.), *New directions for equity in mathematics education* (pp. 225-241). Cambridge: Cambridge University Press.

Cammarota, J. (2004). The gendered and racialized pathways of Latina and Latino youth: Different struggles, different resistances in the urban context. *Anthropology & Education Quarterly, 35*(1), 53-74.

Chazen, D. (2000). *Beyond formulas in mathematics and teaching: Dynamics of a high school algebra classroom*. New York: Teachers College Press.

Civil, M. (2002). Everyday mathematics, mathematician's mathematics, and school mathematics: Can we bring them together? *Journal for Research in Mathematics Education*(Monograph Series: Everyday and academic mathematics in the classroom), 40-62.

Civil, M., & Planas, N. (2004). Participation in the mathematics classroom: Does every student have a voice? *For the Learning of Mathematics, 24*(1), 7-12.

Clandinin, D. J., & Connelly, F. M. (1994). Personal experience methods. In N. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 413-427). Thousand Oaks, CA.

Cobb, P., & Hodge, L. (2007). Culture, identity, and equity in the mathematics classroom. In N. S. Nasir & P. Cobb (Eds.), *Improving access to mathematics: Diversity and equity in the classroom* (pp. 159-172). New York: Teachers College Press.

Cobb, P., & Hodge, L. (2002). A relational perspective on issues of cultural diversity and equity as they play out in the mathematics classroom. *Mathematical Thinking and Learning, 4*(2&3), 249-284.

Cobb, P., Wood, T., & Yackel, E. (1993). Discourse, mathematical thinking, and classroom practice. In E. A. Forman, N. Minick & C. A. Stone (Eds.), *Contexts for learning: Sociocultural dynamics in children's development* (pp. 91-119). New York: Oxford University Press.

Cohen, E. G. (1994). *Designing groupwork: Strategies for the heterogeneous classroom.* New York: Teachers College Press.

Cohen, E. G. (1997). Understanding status problems: Sources and consequences. In E. G. Cohen & R. A. Lotan (Eds.), *Working for equity in heterogeneous classrooms: Sociological theory in practice* (pp. 61-76). New York: Teachers College Press.

Cohen, E. G., & Lotan, R. A. (1997). Raising expectations for competence: The effectiveness of status interventions. In E. G. Cohen & R. A. Lotan (Eds.), *Working for equity in heterogeneous classrooms: Sociological theory in practice* (pp. 77-91). New York: Teachers College Press.

Cohen, E. G., Lotan, R. A., Scarloss, B. A., & Arellano, A. R. (1999). Complex instruction: Equity in cooperative learning classrooms. *Theory into Practice, 38*(2), 80-86.

Collins, P. H. (2000). *Black feminist thought* (Second ed.). New York: Routledge.

Conchas, G. Q. (2001). Structuring failure and success: Understanding the variability in Latino school engagement. *Harvard Educational Review, 71*(3), 475-504.

Connell, R. W. (2002). *Gender.* Cambridge, UK: Polity Press.

Cossey, R. (1997). *Mathematics communication: Issues of access and equity.* Unpublished Ph.D. Dissertation, Stanford University.

Dale, T., & Cuevas, G. (1987). Integrating language and mathematics learning. In J. Crandall (Ed.), *ESL through content area instruction: Mathematics, science, and social studies* (pp. 9-54). Englewood Cliffs, NJ: Prentice Hall.

de Abreu, G. (1995). Understanding how children experience the relationship between home and school mathematics. *Mind, Culture, and Activity, 2*, 119-142.

de Abreu, G., & Cline, T. (2003). Schooled mathematics and cultural knowledge. *Pedagogy, Culture and Society, 11*(1), 11-30.

de Abreu, G., & Cline, T. (2007). Social valorization of mathematics practices: The implications for learners in multicultural schools. In N. S. Nasir & P. Cobb (Eds.), *Improving access to mathematics: Diversity and equity in the classroom.* New York: Teachers College Press.

Dyson, A. H., & Genishi, C. (2005). *On the case: Approaches to language and literacy research.* New York: Teachers College Press.

Ed-Data, Education Data Partnership (2007). Retrieved from http://www.Ed-Data.k12.ca.us.

Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: W.W. Norton & Company, Inc.

Erickson, F. (1986). Qualitative methods in research on teaching. In M. C. Wittrock (Ed.), *Handbook of Research on Teaching* (pp. 119-160). New York: Macmillan.

Fennema, E., & Leder, G. C. (Eds.). (1990). *Mathematics and gender*. New York: Teachers College Press.

Fine, M. (1992). *Disruptive voices: The possibilities of feminist research*. Ann Arbor: University of Michigan Press.

Flores-González, N. (2002). *Identity development in Latino students*. New York: Teachers College Press.

Forman, E. A. (1996). Learning mathematics as participation in classroom practice: Implications of sociocultural theory for educational reform. In L. Steffe, P. Nesher, P. Cobb, G. Goldin & B. Greer (Eds.), *Theories of mathematical learning* (pp. 115-130). Mahwah, NJ: Lawrence Erlbaum Associates.

Forman, E. A. (2003). A sociocultural approach to mathematics reform: Speaking, inscribing, and doing mathematics within communities of practice. In J. Kilpatrick, W. G. Martin & D. Schifter (Eds.), *A Research companion to Principles and Standards for school mathematics*. Reston, VA: National Council of Teachers of Mathematics.

Fullerton, O. (1995). Who wants to feel stupid *all* of the time? In P. Rogers & G. Kaiser (Eds.), *Equity in mathematics education* (pp. 37-48). Bristol, PA: The Falmer Press.

Garcia, E. E. (2001). *Hispanic education in the United States: Raices y alas*. New York: Rowman & Littlefield.

Gay, G. (2000). *Culturally responsive teaching: Theory, research & practice*. New York: Teachers College Press.

Godinez, F. E. (2006). Haciendo que hacer: Braiding cultural knowledge into educational practices and policies. In D. D. Bernal, C. A. Elenes, F. E. Godinez & S. Villenas (Eds.), *Chicana/Latina education in everyday life: Feminista perspectives on pedagogy and epistemology* (pp. 25-38).

González, F. E. (1998). Formations of Mexicananess: Trenzas de identidades multiples. *Qualitative Studies in Education, 11*(1), 81-102.

Gorgorió, N., & Planas, N. (2002). Teaching mathematics in multilingual classrooms. *Educational Studies in Mathematics, 47*, 7-33.

Greeno, J. G. (2003). *A situative perspective on cognition and learning in interaction.* Paper presented at the Theorizing Learning Practice workshop, University of Illinois.

Gutierrez, K. D., Baquedano-Lopez, P., & Tejeda, C. (1999). Rethinking diversity: Hybridity and hybrid language practices in the third space. *Mind, Culture, and Activity, 6*(286-303).

Gutierrez, K. D., & Rogoff, B. (2003). Cultural ways of learning: Individual traits of repertoires of practice. *Educational Researcher, 32*(5), 19-25.

Gutstein, E., Lipman, P., Hernandez, P., & Reyes, R. (1997). Culturally relevant mathematics teaching in a Mexican American context. *Journal for Research in Mathematics Education, 28*(6), 709-737.

Hand, V. (2003). Reframing participation: Meaningful mathematical activity in diverse classrooms. Unpublished Ph.D. Dissertation, Stanford University, Stanford, CA.

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

hooks, b. (1989). *Talking back: Thinking feminist, thinking black*. Cambridge: South End Press.

hooks, b. (2000). *Feminism is for everybody: Passionate politics*. Cambridge: South End Press.

Horn, I. (2002). *Learning on the job: Mathematics teachers' professional development in the context of high school reform.* Unpublished Ph.D. Dissertation, University of California, Berkeley.

Horn, I. S. (2006). Lessons learned from detracked mathematics departments. *Theory into Practice, 45*(1), 72-81.

Katz, S. R. (1999). 'Teaching in tensions': Latino immigrant youth, their teachers, and the structures of schooling. *Teachers College Record, 100*(4), 809-840.

Khisty, L. L. (1995). Making inequality: Issues of language and meanings in mathematics teaching with Hispanic students. In W. G. Secada, E. Fennema & L. B. Adajian (Eds.), *New directions for equity in mathematics education* (pp. 279-297). New York: Cambridge University Press.

LeCompete, M. D. (1995). Some notes on power, agenda, and voice: A researcher's personal evolution toward critical collaborative research. In P. McLaren & J. Giarelli (Eds.), *Critical theory and educational research*. New York: SUNY.

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal, 32*(3), 465-491.

Ladson-Billings, G., & Tate, W. F. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal, 32*(3), 465-491.

Lampert, M. (1992). Practices and problems in teaching authentic mathematics in school. In F. Oser, A. Dick & J.-L. Patry (Eds.), *Effective and responsible teaching: The new synthesis* (pp. 295-314). New York: Jossey-Bass.

Lampert, M. (2001). *Teaching problems and the problems with teaching*. New Haven: Yale University Press.

Lampert, M., & Cobb, P. (2000). Communications and language. In J. Kilpatrick, W. G. Martin & D. Schifter (Eds.), *A research companion to NCTM's standards* (pp. 237-249). Reston, VA: National Council of Teachers of Mathematics.

Lave, J. (1988). *Cognition in practice: Mind, mathematics, and culture in everyday life*. Cambridge: Cambridge University Press.

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

Lester, J. (1982). The black writer. *New England Journal of Black Studies, 2*, 82-85.

Lieberman, J. C. (1997). *Enabling professionalism in high school mathematics departments: The role of generative community*. Unpublished Ph.D. Dissertation. Stanford University.

Lieblich, A., Tuval-Mashiach, R., & Zilber, T. (1998). *Narrative research: Reading, analysis, and interpretation* (Vol. 47). Thousand Oaks, CA: SAGE Publications, Inc.

Losey, K. M. (1995). "Mexican American students and classroom interaction: An overview and critique. *Review of Educational Research, 65*(3), 283-318.

Lotan, R. A. (2003). Designing groupworthy tasks. *Educational Leadership*, 72-75.

Lorde, A. (1984). The master's tools will never dismantle the master's house. In *Sister outsider*. Freedom, CA: The Crossing Press.

Lubienski, S. T. (2000). Problem solving as a means towards mathematics for all: An exploratory look through the class lens. *Journal for Research in Mathematics Education, 31* (4), 454-482.

Lutrell, W. (1997). *Schoolsmart and motherwise: Working-class women's identity and schooling.* New York: Routledge.

McAdams, D. P. (1993). *The stories we live by: Personal myths and the making of self.* New York: William Morrow.

Macedo, D. (1997). English only: The tongue-tying of America. In A. Darder, R. D. Torres & H. Guttierrez (Eds.), *Latinos and education: A critical reader* (pp. 269-278). New York: Routledge.

Martin, D. (2000). *Mathematics success and failure among African American youth.* Mahwah, NJ: Lawrence Erlbaum Associates.

Meador, E. (2005). The making of marginality: Schooling for Mexican immigrant girls in the rural Southwest. *Anthropology & Education Quarterly, 36*(2), 149-164.

Menjívar, C. (2003). Religion and immigration in comparative perspective: Catholic and Evangelical Salvadorans in San Francisco, Washington, D.C., and Phoenix. *Sociology of Religion, 64*(1), 21-45.

Menjívar, C. (2000). *Fragmented ties: Salvadoran immigrant networks in America.* Berkeley: University of California Press.

Mishler, E. G. (1992). Work, identity, and narrative: An artist-craftsman's story. In G.C. Rosenwald & R.L. Ochberg (Eds.), *Storied lives: The cultural politics of self-understanding* (pp. 21-40). New Haven: Yale University Press.

Moll, L.C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory into Practice, XXXI*(2), 132-141.

Moschkovich, J. N. (2007). Bilingual mathematics learners: How views of language, bilingual learners, and mathematical communication affect instruction. In N. S. Nasir & P. Cobb (Eds.), *Improving access to mathematics: Diversity and equity in the classroom* (pp. 89-104). New York: Teachers College Press.

Moschkovich, J. N. (2002). An introduction to examining everyday and academic mathematical practices. In M. E. Brenner & J. N. Moschkovich (Eds.), *Everyday and academic mathematics in the classroom* (pp. 1-11). Reston, VA: National Council of Teachers of Mathematics.

Moschkovich, J. N. (1999). Understanding the needs of Latino students in reform-oriented mathematics classrooms. In W. G. Secada, L. Ortiz-Franco, N. G. Hernandez & Y. De La Cruz (Eds.), *Changing the faces of mathematics: Perspectives on Latinos* (pp. 5-12). Reston, VA: National Council of Teachers of Mathematics.

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

Nasir, N. S. & Hand, V. (in press). From the court to the classroom: Opportunities for engagement, learning, and identity in basketball and classroom mathematics.

Nasir, N. S., & Kirshner, B. (2003). The cultural construction of moral and civic identities. *Applied developmental science, 7*(3), 138-147.

National Center for Educational Statistics (2005). *Immigration, participation in U.S. schools, and high school dropout rates* from U.S. Department of Education (retrieved November 2006, from http://nces.ed.gov/pubs/dp95/97473-4.asp).

National Center for Educational Statistics (2005). (retrieved November 2006, from http://nces.ed.gov/globallocator/).

National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics.* Reston, VA. 2000.

Nieto, S. (1996). *Affirming diversity: The sociopolitical context of multicultural education* (second ed.). White Plains, NY: Longman Publishers.

Nieto, S. (2004). Affirming diversity: The sociopolitical context of multicultural education (fourth ed.). White Plains, NY: Longman Publishers.

Noguera, P. (2003). *City schools and the American dream.* New York: Teachers College Press.

O'Donnell, M. (May 2006). Thousands turn out, but support is mixed for New York's immigrants. *New York Times.*

Oakes, J. (1990). *Multiplying inequalities: The effects of race, social class, and tracking opportunities to learn mathematics and science.* Santa Monica: Rand Corporation.

Ogbu, J. (1991). Immigrant and involuntary minorities in comparative perspective. In M. A. Gibson & J. U. Ogbu (Eds.), *Minority status and schooling: A comparative study of immigrant and involuntary minorities.* New York: Garland Publishing.

Olsen, L. (1997). *Made in America: Immigrant students in our public schools.* New York: The New Press.

Portes, A., & Rumbaut, R. G. (2001). *Legacies: The story of the immigrant second generation*. Berkeley, CA: University of California Press.

Povey, H. (2003). Teaching and learning mathematics: Can the concept of citizenship be reclaimed for social justice? In L. Burton (Ed.), *Which way social justice in mathematics education?* (pp. 51-64). Westport, CT: Praeger Publishers.

Powell, A. B. (2004). The diversity backlash and the mathematical agency of students of color. *Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education, I*, 37-54.

Powell, A. B., & Frankenstein, M. (1997). *Challenging Eurocentrism in mathematics education*. New York: State University of New York Press.

Quiroz, P. A. (2001). The silencing of Latino student "voice": Puerto Rican and Mexican narratives in eighth grade and high school. *Anthropology & Education Quarterly, 32*(3), 326-349.

Raissiguir, C. (1995). The construction of marginal identities: Working-class girls of Algerian descent in a French school. In M. H. Marchand & J. L. Parpart (Eds.), *Feminism, postmodernism, development* (pp. 79-93). New York: Routledge.

Reyes, L. H., & Stanic, G. M. A. (1988). Race, sex, socioeconomic status and mathematics. *Journal for Research in Mathematics Education, 19*(1), 26-43.

Rolón-Dow, R. (2004). Seduced by images: Identity and schooling in the lives of Puerto Rican girls. *Anthropology & Education Quarterly, 35*(1), 8-29.

Romo, H. D., & Falbo, T. (1996). *Latino high school graduation: Defying the odds*. Austin: University of Texas Press.

Rosenwald, G. C., & Ochberg, R. L. (Eds.). (1992). *Storied lives: The cultural politics of self-understanding*. New Haven: Yale University Press.

Ruiz, R. (1997). The empowerment of language-minority students. In *Latinos and education* (pp. 319-328). New York: Routledge.

Sapon-Shevin, M. (2004). Introduction. In E. G. Cohen, C. M. Brody & M. Sapon-Shevin (Eds.), *Teaching cooperative learning: The challenges for teacher education* (pp. 1-12). Albany: SUNY.

Schoenfeld, A. H. (2004). The Math Wars. *Educational Policy, 18*(1), 253-286.

Sfard, A. (1998). On two metaphors for learning and the dangers of each. *Educational Researcher, 27*(2), 4-13.

Sfard, A., & Prusak, A. (2005). Telling identities: In search of an analytical tool for investigating learning as a culturally shaped activity. *Educational Researcher, 34*(4), 14-22.

Sleeter, C. E., & Grant, C. A. (1994). *Making choices for multicultural education* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc.

Suárez-Orozco, M. M. (1991). Immigrant adaptation to schooling: A Hispanic Case. In M. A. Gibson & J. U. Ogbu (Eds.), *Minority status and schooling: A comparative study of immigrant and involuntary minorities* (pp. 37-62). New York: Garland Publishing.

Suárez-Orozco, M. M. (1997). "Becoming Somebody": Central American immigrants in U.S. inner city schools. In M. Seller & L. Weis (Eds.), *Beyond black and white: New faces and voices in U.S. schools* (pp. 115-129). Albany: State University of New York.

Suárez-Orozco, C., & Suárez-Orozco, M. M. (2001). *Children of immigration.* Cambridge: Harvard University Press.

Valenzuela, A. (1999). *Subtractive schooling: U.S.-Mexican youth and the politics of caring*. Albany, NY: State University of New York Press.

Vélez-Ibáñez, C. G. (1988). Networks of exchange among Mexicans in the U.S. and Mexico: Local level mediating responses to national and international transformations. *Urban Anthropology, 17*(1), 27-51.

Villenas, S., & Moreno, M. (2001). To *valerse por si misma* between race, capitalism and patriarchy: Latina mother-daughter pedagogies in North Carolina. *Qualitative Studies in Education, 14*(5), 671-687.

Waters, M. (1999). *Black identities: West Indian immigrant dreams and American realities*. Cambridge, MA: Harvard University Press.

Weiler, J. D. (2000). *Codes and contradictions: Race, gender, identity and schooling.* Albany: State University of New York Press.

Weis, L., & Fine, M. (Eds.). (2000). *Construction sites: Excavating race, class, and gender among urban youth*. New York: Teachers College Press.

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. New York: Cambridge University Press.

Zinn, M. B., & Dill, B. T. (1996). Theorizing difference from multiracial feminism. *Feminist Studies, 22*(2), 321-331.