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To Iron or to do Science: A Storied Life of a Latina from Scientist to Science Teacher

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ACCEPTANCE

This dissertation, TO IRON OR TO DO SCIENCE: A STORIED LIFE OF A LATINA FROM SCIENTIST TO SCIENCE TEACHER, by SARIDA PEGUERO HOY, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chair, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education concurs.

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ABSTRACT

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by
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Reform initiatives such as *Science for All Americans* (AAA, 1989) and *National Science Education Standards* (NRC, 1996) argue for making science accessible to all children regardless of age, sex, cultural and/or ethic background, and disabilities. One of the most popular and prevailing phrases highlighting science education reform in the last decade has been *science for all*. In terms of making science accessible to all, science educators argue that one role of science teachers ought to be to embrace students' experiences outside of the science classroom by becoming aware and inclusive of the cultural resources that student's households contain. Moll, González and Amanti (1992) termed these cultural resources as *funds of knowledge* which refer to culturally developed bodies of knowledge and skills essential for household well being.

This study examined the career transition of a former Latina scientist from a research scientist to a high school science teacher. Her lived experiences that influenced her career transition were examined using interpretive biography through a feminist theory lens. The following question guided the study: How have the lived experiences of the participant as engaged through cultural, historical, and social interactions influenced a transition in career from a research scientist to a classroom teacher?

A former Latina scientist and her family participated in this study to facilitate the documentation, narration, and interpretation of her career transition. The researcher immersed herself in the field for five months and data collection included in-depth interviews with the participant and her family. In addition, the researcher kept a reflexive journal. Data were analyzed using socio-cultural thematic approach to identify snapshots and to develop emergent themes. Data analysis revealed that the participant's cultural socialization conflicted with the Eurocentric/Androcentric culture of science found in both the university and research laboratories. Consequently the participant's strong need to have a family was a powerful contributor to her selection of teaching as a second career. The participant's lived experiences emphasized a need to explore the impact and interaction of ethnicity and gender in the myopic science culture that has left women and people of other cultures at the doorsteps of the scientific enterprise.

TO IRON OR TO DO SCIENCE: A STORIED LIFE OF A LATINA FROM SCIENTIST TO SCIENCE TEACHER

by

Sarida P. Hoy

A Dissertation

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[1] Little girls.
[2] Teaching me how to put both my worlds together
[3] A saying to sooth a child who is hurt
[4] Put both worlds together

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CHAPTER 1

INTRODUCTION

I am excited to finally make it to my nena's[5] school for an open house night. Balancing the baby on one hip, we rush to the cafeteria for the beginning of what turns out to be a business meeting with parents and teachers. I can only catch a few snippets here and there as I walk the baby up and down to keep her quiet. Finally, it's time to visit the classrooms and meet the teachers. By the time we get to the classroom, the teacher has already started introducing herself. I start looking around when something catches my eye on a bulletin board. I get closer and there is my little nena smiling with a book in her hand. I read the caption:

> My name is Sadie, and I LOVE to write. I have a little sister and a mom and dad.
>
> I have another sister and brother. I like school and I love my teacher.
>
> I want to be a scientist when I grow up.

Científica?[6] She wants to be a scientist when she grows up? I can hear my Mami's voice "She has to know how to cocinar arroz-con-abichuelas[7] and care for a house. You

[5] Little girl
[6] Scientist
[7] Cook rice and beans

know that it will take several years to become una Científica. I don't want una jamona vistiendo santos as a nieta.[8] Elga Wasserman (2000) noted that the less a woman's chosen career is consonant with a "feminine" role, the more directly her career may be viewed as in conflict with the role as wife and mother. My Mami's concerns are an echo of an androcentric society where women are expected to fit careers around childbearing and husbands' career needs, viewing the husband's job as essential to the economic well-being and survival of future families (Coser & Rokoff, 1971; Machung, 1989; Wasserman).

Statement of the Problem

Reform initiatives, *Science For All Americans* (AAA,1989) and *National Science Education Standards* (NRC,1996), hold as central the belief that all children can learn science regardless of age, sex, cultural, or ethic background, disabilities, aspirations, or interest and motivation in science. One of the most popular and prevailing phrases connected to science education reform in the last decade has been "science for all." The phrase *science for all* extends to all groups who are marginalized. If we were to dissect this educational slogan, we would find a very disturbing reality. To whom is this slogan referring? The literature is extensive in outlining the marginalization of girls in science education. *Science for all* is not inclusive. Girls are not getting equal portions of the cake (Burke, 2007; Kahle & Meece, 1994; Sadker & Sadker, 1994; Etzkowitz, Kemelgor & Uzzi, 2000; Eisenhart & Finkel, 1998).

The past four decades have been instrumental for the advancement of women in professional science careers. While scientific training is an arduous process for all, research suggests that women who aspire to scientific careers face barriers that do not equally exist

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[8] A girl that has waited too long to be married and will stay home dressing dolls.

for men and that equal success results only from truly heroic efforts (Abir-Am & Outram, 1987; Etzkowitz et al, 2000). Etzkowitz and colleagues called these visible and invisible barriers to women pursuing a scientific career "a 'glass ceiling' that places limits at all stages and phases of the scientific career line" (p. 15).

The masculine stereotyping of science in Western culture is a major barrier for girls (Fox-Keller, 1985; Kelly, 1985). This stereotype has bled into gender role expectations reinforced by parents (Hoffman, 1977; Pomerleau, Bolduc, Malcuit, & Cossette, 1990), by teachers (Etzkowitz et al., 2000; Sadker & Sadker, 1994), and by the media (Etzkowitz et al.; Smith, 2002). These stereotypes have also created conflicts for women scientists who are balancing family and career (Dean & Fleckenstein, 2007; Xie & Shauman, 2003).

The research on women in science has been saturated with studies that explicate the barriers that contribute to the underrepresentation of women in science careers. One of the barriers studied in the literature is parental influences. Parents play an important role in their children's success in science. Research suggests that the socialization experiences girls receive in the home are not likely to encourage success in science. A source of difference in socialization patterns comes from the kinds of toys given to children. The toys for girls are playthings of the mother--dolls, dishes, miniature household appliances--while boys are given toys that represent the world of work--trucks, tools, and building equipment (Hoffman, 1977).

A secondary barrier found in the literature is teacher influence. A few examples of classroom treatment biased against girls are described by Sadker and Sadker (1994). They report on girls who were told by teachers "that a girl had no need for physics" (p. 120). In a physical science class the teacher talked mainly to boys, when a girl asked for information

on how to use a graduated cylinder the teacher became impatient and threw the water in the graduated cylinder at the girl, the teacher's comment after class was that "girls weren't suited to 'do' science" (p. 124). When girls are not dealing with these types of biased treatments their participation in science classrooms are passive. Boys typically dominate nearly every type of teacher interaction from disciplinary to direct questions. These interactions steer teachers into asking boys more academically-related questions than they do girls (Lee, Marks & Bird, 1994; Greenfield, 1996; Brickhouse, Lowery, & Shultz, 2000).

A tertiary barrier can be found in television and other media. At an early age, girls are being socialized into distinct gender roles that society has defined for females. Popular culture transmits messages about the values, behaviors, and communication styles of men and women, generally in stereotyped and often derogatory forms (DeMarrais & LeCompte, 1999). These stereotypes in the media are so prevalent that they have become the norm. Women are attractive, caring, emotional, and are seen in romantic and family context while males are usually powerful heroes (Signorielli, 2001).

A fourth barrier explicated in the literature is balancing career and family. In spite of the increased entry of women in science, opposition to their full participation continues. Cultural norms still reinforce the traditional division of labor; cultural forces have a strong and enduring influence on career aspirations and career choices (Regan & Roland, 1985; Etzkowitz et al. 2000; Evetts 1996). A study conducted by Stickel and Bonett (1991) found that women may fail to pursue nontraditional female careers not only because they doubt their ability to perform the requirements of these careers but also because they doubt their ability to combine such requirements with home/family responsibilities.

Purpose, Guiding Question, Significance

While research on women in science has been saturated with studies that describe the barriers and obstacles that contribute to the underrepresentation of women in science careers, there is an absence in the literature documenting the dilemma faced by Latina female research scientists when negotiating conflicts involving the pursuit of a career and simultaneously desirous of motherhood and marriage.

Literature thus far has viewed family values as obstacles for women who wish to pursue a career in science. A case in point is Bianchini and Helms's (2000) study of high school science teachers which described marriage and motherhood as obstacles that prevented these teachers from pursuing careers as scientists and instead encouraged and steered them toward careers as science teachers.

My study helps to inform how lived experiences encouraged a Latina woman to change careers from a research scientist to a high school science teacher. One of the lived experiences that my participant storied was her experience while being pregnant and working in a research lab. My participant did not see motherhood as an obstacle but rather viewed her career as an obstacle to motherhood. This study has given voice to a Latina female scientist who does not share the view of motherhood and marriage as obstacles. She incorporates these values as meaningful to her character development. The following is an excerpt from her narrative:

> My Principal Investigator and I had a very nice professional relationship. I know he had a very good opinion of me from an intellectual point of view. Everything changed when I got pregnant. And I got this feeling that I had made a mistake, my son was like a mistake . . . and it wasn't like that in my personal life. But that's the way they made me feel. My pregnancy was very, very stressful and then when I finished and had my baby I decided I just couldn't handle my son's childhood going through that same kind of thing. I remember being driven by, O.K. I need to find a job where I am still doing

> science but my children are not a mistake. Being a mom has to be something positive not something bad that I have to hide from people. I couldn't put the same amount of hours in the lab anymore but I still wanted to be a scientist and decided to teach science. You know, help kids.

In this excerpt she begins by describing how her job environment became hostile towards her after she became pregnant to the extent of making her feel like she had made a mistake for having the desire to have children. She is very clear in expressing that her children are not a mistake; rather, she starts to view her job as an obstacle and feels like she needs to find a job that will accommodate her desire to be a mother.

The journey which led me to this research study began the day I heard my name called from the gymnasium platform "Sarida Peguero Gómez, Bachillerato en Ciencias Biológicas"[9] ¡Que rebulú tenia en la cabeza![10] My thoughts were a mixture of excitement for the present and anticipation of the future . . . .mi propia brújula[11] . . . After much anticipation, I found myself at a fork in the road. One path would take me to medical school. The next path wound through runny noses and scraped knees—Motherhood. I was faced "con la incertidumbre"[12] of a career that would be demanding of my time and choosing a career that would be fulfilling and allow for more family time. I knew which path I would take. I had grown up in a society where women are self-sacrificing in favor of the children and family. Puerto Rican society attributes high esteem to motherhood. Traditionally, when puertorriqueñas[13] have faced a conflict in roles they have usually opted for the roles as mothers (Acosta-Belén, 1986; Christensen, 1975).

---

[9] Sarida Peguero Gomez, B.S. in Biological Sciences
[10] My thoughts were jumbled.
[11] My own compass
[12] With the uncertainty
[13] Female Puerto Rican

My lived experiences have also influenced the epistemology for this study. Crotty (1998) described epistemology as the theory of knowledge embedded in the theoretical perspective and thereby in the methodology. The epistemology that guides this study is aligned with Dorothy Smith's (1987) feminist standpoint epistemology, which stresses the necessity of starting research from women's lives, taking into account women's everyday experiences through paying particular attention to finding and analyzing gaps that occur when women try to fit their lives into the dominant culture's way of conceptualizing women's situation.

This qualitative study was undertaken from a feminist perspective in which a former Latina scientist and her family were interviewed with the intent to understand the transition from research scientist to high school science teacher and the lived experiences which encourage her to change careers. A qualitative study needs to remain sufficiently open and flexible to permit exploration of whatever the phenomenon under study offers for inquiry (Bogdan & Bicklin, 2006; Lincoln & Guba, 1985; Patton, 2002). This study sought to answer the following question: How have the lived experiences of the participant, as engaged through cultural, historical, and social interactions, encouraged a transition in career from research science to classroom teacher?

This study is significant for a number of reasons. Results from this study are significant to feminist research. This study has brought a woman's lived experience, which Dorothy Smith (1978) described as being huddle at the margins of dominant knowledge, from the margins to the center. Feminist thinking and practice call for "taking steps from the 'margins to the center' while eliminating boundaries of division that privilege dominant

forms of knowledge building" (Hesse-Biber, 2007 b, p. 3). Richardson (1990) had this to say

> People make sense of their lives through the stories that are available to them. People live by stories. If the available narrative is limiting, people's lives end up being limited and textually disenfranchised. (p. 26)

Furthermore, for science education it is significant because researchers in this area have recommended that studies on gender issues in science education also explore the impact and interaction of social economic status, race, and ethnicity (Barton, 2001; Kahle & Meece, 1994; Krockover & Shepardson, 1995; Scantlebury & Baker, 2007; Upadhyay, Barton & Zahur, 2005). Many gender studies fail to acknowledge the ways in which ethnicity, class, gender, language, lifestyle, and religion interact to create the experience of an individual. Consequently the resulting message is that "White females are the norm for gender issues" and "gender has become a code word in science education that refers to White females' ideas" (Atwater, 2000, p.387). By focusing on one participant's lived experiences, I was able to explore in-depth gender issues and the interaction of social economic status, race, and ethnicity.

Theoretical Perspective Overview

Feminist research is focused on analyzing and understanding gender within the context of lived experiences; it is committed to social change and to challenging thinking about researcher subjectivity and the relationship between researcher and the researched (Reinharz, 1992). Feminism is a viewpoint with a set of principles that inform research approaches. Grbich (2007) noted how feminists use a variety of approaches right across the qualitative research spectrum within which these principles are applied. Grbich, delineated the following set of principles of feminist research.

> 1. That there is inequality in our society which has been constructed along gender lines and this has left women as a group unequal with and subordinated to men in terms of socio-economic status and decision making power. Structural and cultural expectations and practices continue to reinforce these inequalities.
> 2. That current modes of knowledge disadvantage women by devaluing their ways of knowing and their forms of knowledge construction.
> 3. That highlighting the experiences of women through research and allowing their voices to be heard may go some way to making these inequalities more widely recognized and may also encourage political action to redress oppressive practices.
> 4. That transformation of society through the empowerment and emancipation of women, particularly those participating in research, is seen as desirable outcome. (p. 96)

There is a range of political and theoretical feminist positions. Ramazanoğlu and Holland (2002) described feminist positions as follows:

> Feminism covers a diversity of beliefs, practices and politics, and these overlap and interact with other beliefs, practices and politics. For every generalization that one can make about feminism it is possible to find 'feminists' who do not fit, or who do not want to fit. (p. 5)

Feminist theory as Richardson (1997) noted "has been and is driven by political practice, the dismantling of the subordination of women" (p. 53). DeMarrais and LeCompte (1999) had this to say in concordance with Richardson:

> Feminism is both a theory of women's position in society and a political statement focused on gaining equal rights and opportunities for women and changing existing power relations between men and women. (p.35)

Many Feminist theorists can identify their position as liberal, radical, socialist, poststructural, black or womanism, Marxist, existentialist, postmodern, or postcolonial.

Definitions of Terms

Androcentrism: Male centeredness, which is the value set of our dominant culture based on male norms.

Feminist Research: Research that is focused on analyzing and understanding gender within the context of lived experiences, is committed to social change, and is committed to

challenging thinking about researcher subjectivity and the relationship between researcher and the researched (Reinharz, 1992).

Glass Ceiling: The term glass ceiling refers to situations where the advancement of a qualified person within the hierarchy of an organization is halted at a particular level because of some form of discrimination, most commonly sexism or racism.

Latina: Female of Spanish decent.

Lived Experiences: In this research the phrase “lived experiences” is used the way van Manen (1990) used it. He argued phenomenalogically that we read, interpret, and analyze our experiences through particular lenses. These lenses are shaped and curved by our social, cultural, and historical locations. The subjective reading of experience and the placing of value and meaning on the experience constitute lived experience. Therefore, the phrase “lived experience” differs from the more general phrase “experience” in that it implies an articulated web of interactions and subjective meanings crafted through cultural, historical, and social juxtapositions.

Snapshots: The term snapshot has been used in the literature to describe events, episodes, epiphanies and even poems. For the purpose of this study, lived experiences were called snapshots as used by Jodi Kaufmann to describe different facets of a person’s story.

Reflexivity: For the purpose of this study being reflexive involves self-questioning and self-understanding. To be reflexive then is to undertake an ongoing examination of what I know and how I know it (Patton, 2002). Hertz (1997) described reflexivity as having an ongoing conversation about experience while simultaneously living in the moment.

Methodological Overview

The methodology that guided this study was interpretive biographies. Denzin (1989) defined the interpretive biographical method as one that "involves the studied use and collection of personal-life documents, stories, accounts, and narratives which describe turning-point moments in individual's lives" (p. 13). The biographical methodology is a feminist method that ensures voicing and giving voice to those who have been silenced by the dominating discourses. This method allows a researcher to explore women's lived experience in a way that remains true to women's voices (Brotman & Kraniou, 1999). In this study, I called these lived experiences *snapshots* that have photographed the participant's journey as a scientist and then as a science teacher. Interpretive biographies were used to examine how the participant's transitioning of careers has been shaped by the social context of her lived experiences. The narratives were collected by means of in-depth interviews of the participant and of her family.

Interviewing as a method of data collection is appealing to feminist researchers because it offers entrée to people's ideas, thoughts, and memories in their own words rather than in the words of the researcher (Reinharz, 1992). Reinharz described this method as an "antidote to centuries of ignoring women's ideas altogether or having men speak for women" (p. 19). The interviews were divided into two phases. In the first phase, the main participant was interviewed individually in order to story snapshots of her life. I transcribed the participant's interview with the purpose of organizing the narratives into interpretable themes. In the second phase, the family members were interviewed individually, to create joint snapshots narratives. I used the themes that emerged from the participant's narrative to

focus the family interview so that the family helped produce a collective storytelling as they recollected past experiences.

Throughout the research process I kept a reflexive journal. In this journal I reflected on how the research process was going. Simplemente, reflexioné.[14]

Summary

While research on women in science has focused on the barriers and obstacles that contribute to the underrepresentation of women in science careers, there is an absence in the literature documenting the transition of a Latina scientist from research scientists to high school science teacher and the lived experiences as engaged through cultural, historical, and social interactions which encouraged her to change careers.

[14] I was reflexive and wrote down my feelings.

CHAPTER 2

METHODOLOGY

"Mama I am finished." My eight-year-old is beaming from ear to ear. She has just completed a Draw a Scientist Test (DAST) developed by Chambers (1983). In the instant before I glance down at her drawing, I am patting myself on the shoulder. I have made a conscious effort to raise an androgynous girl that will be able to trek through the maze of gender stereotypes that she will stumble upon as each chapter of her life unfolds. For her first birthday, she opened a big box with a play kitchen, toda niña tiene que aprender a cocinar[15] whispers my Mami's upbringing in my ears, and another box with Matchbox cars. She was the only first grader to brag about dissecting a frog and knowing which froggie was a girl "cause she had a bunch of eggs in her tummy . . . and guess what, the froggie had a bee in her stomach." I look down at the drawing. It is Einstein.

Will it always be like this for my little nena?[16] Will the influences of the dominant gender discourses have a greater impact on my nena than what she learns at home? I embarked on a journey donde camine con una mujer[17] who shared her story with me and other women who balance career and family. Together we set out in a journey to answer the

[15] little girls need to know how to cook
[16] Little girl
[17] I will walk with a woman

following question: How have the lived experiences of the participant, as engaged through cultural, historical, and social interactions, encouraged a transition in career from research science to classroom teacher?

Methodology

The methodology that guided this study was interpretive biography. Denzin (1989) defined the interpretive biographical method as one that "involves the studied use and collection of personal-life documents, stories, accounts, and narratives which describe turning-point moments in individuals' lives" (p. 13). Biographical approach is a valuable methodology of recording women's voices. Atkinson (1998) pointed out that more life stories of women and the voices of members of culturally diverse groups need to be recorded in order "to balance out the data bases that have been relied on for so long in generating theory" (p. 18). Reinharz (1992) added,

> Biographical work has always been an important part of the women's movement because it draws women out of obscurity, repairs the historical record, and provides an opportunity for the woman reader and writer to identity with the subject. (p. 126)

Laurel Richardson (1997) proposed that we write narratives in which the previously subordinated become "actors in the discourse and are speakers whose voices matter" (p. 59). As feminists critiqued the androcentric assumptions of social science—that men's lives and activities are more important than those of women and/or constitute the norm from which women's lives and activities deviate—they began to treat women's personal narratives as "essential primary documents for feminist research" (Personal Narratives Group, 1989, p. 4). Sociologist Sherna Gluck (1979) further explained that women's oral history is a feminist endeavor because it creates new material about women, confirms women's experience, improves communication among women, discovers women's roots, and

develops a previously denied sense of continuity by listening to previously silenced voices. Feminist researchers challenged social science knowledge about society, culture, and history (Personal Narratives Group, 1989; Reinharz, 1992). The biographical methodology, then, is a feminist method that ensures voicing and giving voice to those who have been silenced by the dominating discourses. This method allows a researcher to explore women's lived experiences in a way that remains true to women's voices (Brotman & Kraniou, 1999).

This study focused on the studied use and collection of biographical narratives. Narrative is the primary way through which humans organize their experiences into temporally meaningful episodes (Polkinghorne, 1988). Through his work, Jerome Bruner (1986) has illustrated that personal meaning and reality is actually constructed during the making and telling of one's narrative. Bruner explained that narrative is a way of understanding one's own and others' actions, or organizing events and objects into a meaningful whole, and of connection and seeing the consequences of actions and events over time. Biographies seek to uncover "how [one's] life reflects cultural themes of the society, personal themes, institutional themes, and social histories" (Creswell, 1998, p. 49).

Biography focuses on documenting an exhausting account of a person's life. The researcher remains present by interpreting and telling the person's story. When a writer writes a biography, "he or she writes him- or herself into the life of the subject written about" (Denzin, 1989, p. 26). This type of research is reflexive. Reflexivity is the ability to locate one's research activity in the same social world as the phenomenon being studied. Feminist researchers practice reflexivity throughout the research process. Hesse-Biber (2007b) had this to say about feminist research and reflexivity:

> Feminist research practitioners pay attention to reflexivity, a process whereby researchers recognize, examine, and understand how their social,

> background, location, and assumptions affect their research practice. Practicing reflexivity also includes paying attention to the specific ways in which our own agendas affect the research at all points in the research process. (pp. 16-17)

Denzin (1989) described how the biographical approach focuses questions on special or major life events and pays specific attention to thematic interpretations of these events and the way they are shaped by social context. A person has a life or a set of life-experiences which are his or hers and no one else's. This study focused its questions on how the participant's career transition was shaped by the social context of her lived experiences. In doing so, it included the narratives of her mother and daughter. In this study, I called these lived experiences *snapshots* that have photographed the participant's journey as a scientist and then as a science teacher.

The biographical narratives in this study formed *joint snapshot narratives*. I conceived this narrative by combining two different concepts: paired histories and joint narratives. Reinharz (1992) used the term "paired histories" to describe Susan Tucker's (1988) collection of the narratives of Southern Black female domestic workers and their White female employers. Juxtaposing how each woman spoke about her relationship with the other, Susan Tucker illuminated the texture of their relationships. Reinharz pointed out that encountering oral histories in this paired, contextualized way, the reader learns about each woman and about the social distance and myths that sustained their seemingly close relations. The next concept, *joint narratives,* comes from Hildenbrand and Jahn (1988) and their study of a farming community. Their starting point was the observation in family studies that families under study jointly narrate and as a result restructure and reconstruct domains of their everyday realities. Using this approach, the situation of the monologue of a single narrator is extended to a collective storytelling (Flick, 2006). In my study, the concept

of *joint snapshot narratives* combined Reinharz's paired histories and Flick's joint narratives in juxtaposing the participants' narratives with her family's narratives. The joint snapshot narrative in this study used the narrative produced by Daria, her mother, and her daughter as they storied her transition from a scientist to a science teacher and produced a collective storytelling of these events.

Theoretical Framework

Feminist Theory

Feminist theory is a transformation theory. Transformation theories give individuals' activities and desire an important role in the creation of culture. Weiler (1988) described theories of transformation as ways in which both individuals and classes assert their own experience and resist the ideological and material forces imposed upon them in a variety of settings. Feminism problematizes gender and brings women and their concerns to the center of attention (Devault & Gross, 2007). There is a range of political and theoretical feminist positions. Ramazanoğlu and Holland (2002) described feminist positions as follows:

> Feminism covers a diversity of beliefs, practices and politics, and these overlap and interact with other beliefs, practices and politics. For every generalization that one can make about feminism it is possible to find 'feminists' who do not fit, or who do not want to fit. (p. 5)

Richardson (1997) noted that feminist theory "has been and is driven by political practice, the dismantling of the subordination of women" (p. 53). DeMarrais and LeCompte (1999) had this to say in concordance with Richardson:

> Feminism is both a theory of women's position in society and a political statement focused on gaining equal rights and opportunities for women and changing existing power relations between men and women. (p. 35)

Waves in Feminism

Feminist thought is often portrayed as occurring in waves. Cudd and Andreasen (2005) described these waves as indicating key turning points in the history of feminist thought. The first wave is often connected to the publication of *Mary Wollstonecraft's A Vindication of the Rights of Woman* (1792). According to Cudd and Andreasen, first-wave feminism was influenced by nineteenth century liberal political philosophy. It was interested in obtaining equal political rights and economic opportunities for women. Liberal feminist political action brought about many important changes to improve women's circumstances. It resulted in women's suffrage in the 1920s, won property rights for women, more reproductive freedoms, and greater access to education and the professional realm (Cudd & Andreasen). Second-wave feminism can be dated to 1949 with the publication of Simone de Beauvoir's *The Second Sex*. Cudd and Andreasen stated that second-wave feminists viewed sexist oppression as "not simply rooted in legal and political arrangements; its causes are all pervasive and deeply embedded in every aspect of human social life" which include "economic, political, and social arrangements as well as unquestioned norms, habits, everyday interactions, and personal relationships" (p. 7). Second-wave feminists challenged the public/private dichotomy by examining the institution of marriage, motherhood, heterosexual relationships, and women's sexuality. Second-wave feminists aimed to radically transform almost every aspect of personal and political life (Cudd & Andreasen, 2005). Third-wave feminism began in the late 1980s by feminists like bell hooks (1984), who wanted to bring women's diversity from the margins to the center. There has been a growing emphasis on the sociological lens of race, class, and gender as significant dimension of radical political feminist discourse (Weiler, 1988). Women of color

maintained that their experiences, interests, and concerns were not fully represented by second-wave feminism (Cudd & Andreasen). One reason they gave was that, traditionally, second-wave feminism was mainly represented by middle-class White women who focused on the similarities of oppression without taking social circumstances into account. In response to this movement, feminists of color argued that women from different social groups experience different types of oppression (Cudd & Andreasen).

Feminist Waves in Science Education

Barton (1998b) has described three waves of feminism in science education. In many ways, these waves parallel key turning points in the history of feminist thought. First-wave feminism in science education emerged during the Women's Movement in the 1960s, along with the Civil Rights Movement. According to Barton, these movements led the science education community to take a closer look at the kinds of opportunities being given to girls and minorities. This first wave focused on the inferior treatment received by girls and minorities in schools and in other informal science education programs. Barton described the liberal feminist perspective as one that "played an important role in creating programs and opportunities to get more girls into science and to help them achieve there" (p. 3). These opportunities embraced demasculinizing and demystifying science by exposing girls to role models and providing them with career information, improving girls' self-confidence as well as their perceptions of their ability to do science, implementing teaching strategies that allowed girls to be involved in science lessons, developing girls' skills in science, and offering science experiences such as field trips, and laboratory exercises (Barton, 1998; Kahle & Meece, 1994).

Second-wave feminism began to have an impact in science education in the 1980s and 1990s. Barton (1998) described second-wave feminist studies in science education as one that has focused on *the nature and practice of science* and on *ways of knowing in science.* The arguments are based on the premise that science is not a practice completely separated from other ways of knowing and doing. Barton explained it as being "connected to, and influenced by, ways of knowing and doing that permeated every other aspect of life, from religion to survival, and that knowledge produced with the science community is not value-free or independent" (p. 4). Feminist researchers in science education have used this movement to understand science as a social construct and to initiate discussions about ways of knowing science and implications that this has for science for all (Barton & Osborne, 1995; Eisenhart, Finkel, & Marion, 1996).

Third-wave feminist science education incorporates the belief that science and science education have traditionally been cultures of exclusion that have ignored the multiple narratives, histories, and voices of culturally and politically subordinated groups (Barton, 1998b). This viewpoint embraces the subject and finds ways to ground science teaching and learning in understandings of embodied identities, differences, historicities, and multiple narratives of science and schooling (Barton; Turnbull, 1997). Third-wave feminist scholars have argued that it is important to make visible the position of science within global ecosystems, which Barton argued "demands a close examination of the connection between the production and use of scientific knowledge and authority" (p. 16). If all students are to participate in science in authentic ways, science education needs to be re-created so that teachers and students can work together to create and analyze science and its role in their lives (Barton).

Feminist Positions

Many feminist theorists can identify their position as liberal, Marxist radical, socialist, poststructural, Black or womanist, existentialist, postmodern, or postcolonial. In what follows I describe liberal, Marxist, and radical points of view. Liberal feminism received its classic formulation in Mary Wollstonecraft's *A Vindication of the Rights of Woman* and John Stuart Mill's *The Subjection of Women.* Its driving force, as Rosemarie Tong (1989) described it, is that female subordination is rooted in a set of customary and legal constraints that blocks women's entrance and/or success in the so-called public world. Because society has the false belief that women are, by nature, less intellectually and or physically capable than men, it excludes women from the academy, the forum, and the marketplace. As a result of this policy of exclusion, the true potential of many women goes unfulfilled.

Bryson (1992) affirmed that liberal feminism is based upon the belief that women are individuals possessed of reason, that as such they are permitted to full human rights, and that they should therefore be free to decide their role in life and explore their full potential in equal competition with men. Liberal feminists work to transform understanding of male and female roles at home and in the workplace; they advocate individual choice rather than biological sex differences as the factor that determines what men and women do in their families and in the work place (Weedon, 1987). One criticism that has clouded liberal feminism, according to Alison Jaggar (1983), has been that it is too eager to adopt male values and its conception of the self as a rational, autonomous agent. However, Tong (1989) asserts that for all its limitations

> we owe to liberal feminist many, if not most, of the educational and legal reforms that have improved the quality of life for women. It is doubtful that

> without liberal feminists' efforts, so many women could have attained their newfound professional and occupational stature. (p. 38)

The liberal feminist position has been vital in helping women get access to institutions and systems of privilege to which men have always had access. The focus is on equal opportunity for women in the current system in regard to education and job opportunities.

Marxist feminists think it impossible for anyone, especially women, to obtain genuine equal opportunity in a class society where the wealth produced by the powerless many ends up in the hands of the powerful few. Marxist feminist claim that women's oppression originated in the introduction of private property, an institution that obliterated whatever equality the human community had previously enjoyed (Engels, 1972). Private ownership of the means of production by relatively few persons, originally all male, inaugurated a class system whose contemporary manifestations are corporate capitalism and imperialism. Reflection on this state of affairs suggests that capitalism itself, not just the larger social rules under which men are privileged over women, is the cause of women's oppression.

Radical feminists argue that it is the patriarchal system that oppresses women, a system characterized by power, dominance, hierarchy, and competition, a system that cannot be reformed but only ripped out, root and branch (Tong, 1989). Tong argued that it is not just patriarchy's legal and political structures that must be overturned; its social and cultural institutions, especially the family, the church, and the academy, must also go. Initially, radical feminists were preoccupied with the enslaving aspects of women's biology and psychology (Firestone, 1970). Most radical feminists came to view women's biology and the nurturing psychology that flows from it as potential sources of liberating power for

women (O'Brien, 1981). What is oppressive is not female biology as such, but rather that men have controlled women as child-bearers and child-rearers. Consequently, if women are to be liberated, each woman must decide for herself when to use or not to use reproduction-controlling technologies and reproduction-aiding technologies (Corea, 1985) and each woman must also determine for herself how to rear the children she births (Rich, 1976).

Feminism is a viewpoint with a set of principles that inform research approaches. Grbich (2007) noted that feminists use a variety of approaches right across the qualitative research spectrum within which these principles are applied. Grbich delineated the following set of principles of feminist research

1. That there is inequality in our society which has been constructed along gender lines and this has left women as a group unequal with and subordinated to men in terms of socio-economic status and decision making power. Structural and cultural expectations and practices continue to reinforce these inequalities.
2. That current modes of knowledge disadvantage women by devaluing their ways of knowing and their forms of knowledge construction.
3. That highlighting the experiences of women through research and allowing their voices to be heard may go some way to making these inequalities more widely recognized and may also encourage political action to redress oppressive practices.
4. That transformation of society through the empowerment and emancipation of women, particularly those participating in research, is seen as desirable outcome. (p. 96)

Grbich concluded that the debatable issues in feminist research continue to relate to who has the most power and control over the research design, data collection and analysis together with the issues of empowerment and emancipation of participants.

Participants

Fast forward 15 years from the time, I was awarded a B.S. in Biology, and now, I am a Latina mother, wife and high school science teacher. My lived experiences have brought me to the threshold of this research study. "Personal experience can be the very starting

point of a study," wrote Reinharz (1992) "the material from which the researcher develops questions, and the source of finding people to study" (p. 260).

Participants were selected through the purposeful sampling method. Purposeful sampling is based on the assumption that the investigator wants to "discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (Merriam, 1998, p. 61). Patton (2002) argued that "the logic and power of purposeful sampling derive from the emphasis on in-depth understanding" which in turn leads to "selecting information-rich cases for study in depth" (p. 46). To begin purposive sampling, you must first establish which selection criteria are necessary in choosing the people to be studied. The selection criteria for this study were as follows: a Latina female scientist who worked as a research scientist for several years and is transitioning careers, currently working in what is stereotyped as a female career—teaching. For the purpose of this study, she should be married and have children or is planning to have children. Daria fit these criteria. She is a Latina born and raised in a Spanish Caribbean Island. She was a single mom to Sophia for a long time. Sophia is in her middle teens and wants to study medicine. Sophia has started looking at premed programs close to her home. One of her criteria is that she wants to live at home while she completes her undergraduate degree. Daria has been married for 5 years and has a 4-year-old son. She and her husband are expecting their second son soon. Daria's mother, Sara, lives in the same city as Daria and is an active presence in her daughter's life. She helps Daria with the children when needed. Throughout the pilot study, it was apparent that Daria's lived experiences were intertwined with those of the women in her family; hence the decision to broaden the study to include her mother's narrative. At times, the lived experiences of each woman were woven together seamlessly;

at other times, the disparities between their lived experiences were evident. Sara is a lawyer that put herself through night school while holding a full-time job. Once she completed her degree, the Ministry of Tourism offered her a position which took her around the globe. Daria's grandmother came to live with them so that Sara could go to school, and she stayed on while Sara traveled with her job. Sara was the first to migrate out of the island and made it possible for Daria, Sophia, and Daria's brother to migrate and eventually reach the United States. Sara currently works as a Spanish coordinator in a local school system. Daria's father still lives in her country of birth.

Daria worked as a molecular biologist for 7 years in her country of birth and continued to do so when she moved to the United States. She worked in a genetic research laboratory for 3 years in an educational institution in a large city in the southeastern United States. For the past 3 years Daria has been teaching ninth grade biology at a local high school.

These criteria fit the research question perfectly. But there was that one looming query that appeared to be raising eyebrows. ¿Una participante?[18] Barton and Yang (2000) were faced with similar barrage. "We have heard it argued in science education circles that single case studies are simply not enough information to provide the community with meaningful research findings" (p. 877). Who determines what meaningful research findings are? The dominant discourses of research? Other research fields find merit in generating data from one participant. "There can be no doubt that single case study research, the 'most' qualitative of methods, has a long and favorable history in psychiatry and has been valuable in generating knowledge" (Winship, 2007).

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[18] One participant?

I deliberated about adding that this research would be limited because of the number of participants and that the narrow focus would limit the generalizability of the study. This study does not pretend to generalize its findings. The more I was reflexive about this issue, the more I began to understand that Daria is not just one participant that limited this study; caminamos juntas y compartimos nuestras historias y experiencias.[19] She is a Latina mother, wife, daughter and sister to her family. Daria is a teacher, a role model to her students and most importantly she is a silenced Latina voice in the dominant discourse of science education. This study was carried out with one participant in order to story the intrinsic relationship between the participant, her family and the cultural, historical, and social interactions. Hesse-Biber (2007a) observed that the logic of qualitative research is concerned with in-depth understanding and usually involves working with small samples. The goal she noted "is to the look at a "process" or the "meanings" individuals attribute to their given social situation, not necessary to make generalizations" (p. 119). Studying a single individual over an extended period of time provided a wealth of detailed data of her lived experiences and allowed the flexibility and fluidity of a true qualitative study. In the course of the study I set out to answer: How have Daria's lived experiences as engaged through cultural, historical, and social interactions, encouraged her to transition in career from research science to classroom teacher?

Methods of Data Collection

This study used several sources of data. One source of data was open-ended in-depth interviewing. Interviewing as a method of data collection is appealing to feminist researchers because it acts as an entrée to people's ideas, thoughts, and memories in their

[19] We walked together and shared our stories and experiences.

own words rather than in the words of the researcher (Reinharz, 1992). Reinharz continued to describe the method as "an antidote to centuries of ignoring women's ideas altogether or having men speak for women" (p. 19). Feminist interview research diverges from other interview research in the types of questions feminists ask. It is research that Hesse-Biber (2007a) described as one that gets an "understanding of women's lives and those of other oppressed groups, research that promotes social justice and social change, and research that is mindful of the researcher-researched relationship and the power and authority imbued in the researcher's role" (p. 117).

The in-depth interview looks to understand the lived experiences of the individual. Hesse-Biber (2007a) noted that in-depth interviews are interested in getting at the subjective understanding an individual brings to a given situation or set of circumstances. She continued to describe the in-depth interviews as being issue-oriented, in which "a researcher might use this method to explore a particular topic and gain focused information on the issue from the respondents" (p. 118). Feminists are particularly concerned with getting at experiences that are often hidden. In-depth interviewing allows the feminist researcher una entrada a las voces de aquellos marginalizados en la sociedad[20]; women, people of color, homosexual individuals, and people living in poverty are examples of marginalized groups.

In-depth interviewing relies on discrete open-ended questions. Open-ended questions explore people's views of reality (DeVault & Gross, 2007; Reinharz, 1992), "maximizes discovery and description" (Raymond, 1979, p. 16) and permit the researcher to take the lead from the respondents—"going where they want to go, but keeping an overall topic in

[20] an entrée to the voices of those who are marginalized in society

mind"(Hesse-Biber, 2007a, p. 115). The data that are obtained consist of verbatim quotations with sufficient context to be interpretable.

In carrying out the interview, Atkinson (1998) suggested that the researcher should allow the person to hold the floor as long as she or he can or wants to, on a given topic or period in her or his life. He noted that this strategy can lead to more of a free association of thoughts and therefore, deeper responses. In using an open-ended interview approach, having specific questions ready to ask only when needed is most appropriate. Riessman (2004) explained that the researcher gives up control when she opens up the interview to extended narration by the participant. She continued that "although we have particular experiential paths we want to cover, narrative interviewing means following participants down their trails" (p. 709). Riessman also mentioned that by power sharing in interviews "genuine discoveries about a phenomenon can come" (p. 709). These in-depth interviews constituted the first phase of the study.

The first interview took place in Daria's home around her kitchen table. The purpose of this preliminary interview was to obtain signed consent forms for the study and to obtain basic background information from Daria.

Sarida: Before we start the interview I want to obtain background information from you. How old are you?

Daria: I am thirty eight years old.

Sarida: Tell me about your family

Daria: I am married. I have a fifteen year old daughter and a three year old son. We are expecting our third baby. I have one brother who is married. My mother lives here in the U.S. and my father still lives in the island where I was born.

Sarida: What was your previous occupation and for how long did you work in it?

Daria: I worked for seven years as a molecular biologist research scientist.

Sarida: What is your current occupation?

Daria: I have been a science teacher for past three years.

After this interchange, I explained to her the concept of snapshots that I was going to use as themes for this study.

> Sarida: I have called episodes in your life snapshots. I want you to imagine a series of pictures taken at different moments in your life, what would they look like?
>
> Daria: In the childhood snapshot I was definitely a tomboy. In the teenage years one I was very rebellious. My head was almost shaved and I had the earrings and a lot of bracelets. I was very eccentric. I think the short hair was already a sign I did not want to be identified as woman even when I was. The short hair was horrible in my country. I know my dad wanted to die. By the time I was in college my first daughter was already born. I became a little more settled and was very responsible for her so I started my struggle of trying to put both worlds together. I remember I was very thin back then because it was a struggle for me to try to be myself and still take care of her at the same time. Years later it was freedom because I left my country of birth so I was a happier person. I thought that here I could accomplish what I wanted. I knew I was going to find a way to have it all because nobody would be judging me.

The idea to set up this question as a series of pictures came from Butler and Rosenblum's (1991) *Cancer in Two Voices.*

> I try to imagine a series of pictures of me taken at 9 a.m. Three months ago they would have shown a bright, spunky woman walking her dog or eating a big breakfast of ham and eggs, complete with cups of steaming coffee made from first-class beans ground only moments before filtering . . . Three weeks later the 9 a.m. pictures would be different. Breakfast a small bowl of porridge and I may be sitting at the table in my bathrobe rather than in my daily clothing…Another three weeks pass. The 9 a.m. images are different yet again. I sit at the table in my bathrobe, staring at the glass of orange juice and the anti-nausea pill. The next image shows me struggling to get it down. (p. 202)

This preliminary session lasted approximately 45 minutes. Before I left her driveway, I wrote in my journal. My hands were trembling; I had started my dissertation study and was scared and excited about the work that awaited me in this chapter of my endeavor. I had so many questions to write down but couldn't seem to write fast enough and keep up with my brain. How was I going to formulate open-ended questions? How was I going to resist from jumping in when Daria was telling her story? What if I didn't ask the right questions? How

about if I wouldn't be able to figure out when to ask her to elaborate? How many missed opportunities would I regret? Why would she even want to let me in to her story?

In the process of transcribing this preliminary interview the thought came to me that I should use Daria's description of the snapshots to guide the preparation of the open-ended questions for the subsequent interviews. Taking Atkinson's (1998) advice to have specific questions ready to ask only when needed, I prepared a list of open-ended questions to take to the subsequent interviews. Using the childhood and teenage years snapshot, I prepared several questions: How would you describe your parents? What was your upbringing like? How would you describe your cultural background? I was not able to use any of the other questions that I so naively thought I would use as the story followed its own path and guided the questions that were asked.

The three subsequent interviews also took place in Daria's kitchen table. Each interview lasted approximately an hour. We scheduled the interviews before I left Daria's house in order to give her time to arrange her schedule to fit an interview before it was time for her to prepare dinner for her family. After each interview I did not let a day go by before immediately transcribing the audio recording. This kept her story fresh in my memory and allowed me to read it over carefully before our next scheduled interview. In concordance with Reinharz (1992), multiple interviews are likely to be "more accurate than single interviews because of the opportunity to ask additional questions and to get corrective feedback on previously obtained information" (p. 37).

In the second phase of the interview process, I talked to Sophia and then with Sara. The purpose of these interviews with members of her family was to create joint snapshots narratives. Before I met with Sophia and Sara, I had transcribed all of Daria's narratives and

organized them into tentative themes. In doing so, I was able to see clearly where there was room in Daria's narration for additional details storied through her mother's and daughter's eyes. I used the themes that had emerged from Daria's narrative to focus the interviews with Sophia and Sara. Sara and Sophia felt they could be more open if they interviewed alone with me. Their story helped produce a collective storytelling that gave rich narration to the Daria's story. I began Sophia's interview with a statement that Daria had made: As a girl you were expected to learn certain things at home that were more important than the things you were learning at school. What do you think your mother meant with that? This prompted Sophia to talk a little, but after a while I noticed that she was not comfortable with the whole process and I decided to end the interview. Sara, on the other hand, was an engaging storyteller—and at times I felt in awe of the story she told. Sara added rich narration to Daria's story. Throughout the interview with Sara I only intervened in order to guide the conversation to another snapshot of Daria's life.

Another source of data that was used throughout the research process was a reflexive journal. In the *Compaginando Sus Mundos* [21] chapter, some of my journal entries are found in italics. After each interview, I sat in my car and wrote my thoughts and observations before heading home. I jotted down ideas that came to me after transcribing segments of the interviews, prepared questions to pursue in subsequent interviews or thoughts I wanted to include in my writing. This journal became my closest collaborator throughout the study. It went with me everywhere. It did not complain when the baby put it in her mouth and chewed on it to comfort her teething gums. It did not complain when the baby scribbled on its pristine pages. It did not mind when my third grader could not find a piece of paper to

[21] Putting both worlds together

practice her spelling words and tore out a page. It patiently listened when I rambled on about my study and when I complained about the long hours it took to transcribe each interview. At times it broke out in laughter at the things I wrote down—it made me chuckle, too. It allowed me to share my inner-most thoughts that tormented me throughout the study. It heard me when I whispered my doubts in my ability to finish and my fear of disappointing the women in my family whose shoulders have held me up. When I stammered, it patiently waited for the words to come out. It stayed by my side late into the night without a hint of weariness. When I thought I could not write another sentence, its empty page waited ever so patiently for the words to come. And the words came. Simplemente, reflexioné.[22]

Methods of Analysis

Narrative analysis and interpretation begins with the story the informant chooses to tell. Reissman (1993) noted that "informants direct interpretation by the way they organize their narratives, including parts and their relation to the whole" (p. 60). In describing narrative analysis, Riessman (2004) said "narratives do not speak for themselves or have unanalyzed merit; they require interpretation when used as data in social research" (p. 706). Laurel Richardson (1997) affirmed "the unanalyzed transcript is not worth reading" (p. 20).

The focal point of narrative analysis is the stories told by participants. The story aspect is seen as a complete entity in itself with a beginning, middle and an end (Grbich, 2007). The thematic approach that was used to analyze this study is the socio-cultural approach. This approach looks at the broader interpretive frameworks that people use to make sense of everyday happenings/episodes, usually involving past-present-future linking (Grbich, 2007). Grbich outlined the process of analysis using this type of approach. First

[22] I was simply reflexive and wrote down my feelings.

identify the boundaries of the narrative segments in the interview transcript. These narrative segments may be entire life stories or specific life episodes recorded in interactive talk or interviews. This study was interested in specific life episodes that revolve around the research question. In order to identify the boundaries of these life episodes, I began the dialogue by asking Daria to describe different snapshots of her childhood, adolescences, and adulthood. Her response follows:

> In the childhood snapshot I was definitely a tomboy. In the teenage years one I was very rebellious. My head was almost shaved and I had the earrings and a lot of bracelets. I was very eccentric. I think the short hair was already a sign I did not want to be identified as woman even when I was. The short hair was horrible in my country. I know my dad wanted to die. By the time I was in college my first daughter was already born. I became a little more settled and was very responsible for her so I started my struggle of trying to put both worlds together. I remember I was very thin back then because it was a struggle for me to try to be myself and still take care of her at the same time. Years later it was freedom because I left my country of birth so I was a happier person. I thought that here I could accomplish what I wanted. I knew I was going to find a way to have it all because nobody would be judging me.

These experiences were so meaningful to her that she recalled snapshots often with tears in her eyes as if reliving them as she storied. I selected the boundaries from the narrative snapshots produced from this question. The boundaries that I chose seemed to bind the lived experiences that best displayed the subtle process of negotiation between family and career. These boundaries would guide the themes that emerged. This is the first boundary.

> In the childhood snapshot I was definitely a tomboy. In the teenage years one I was very rebellious. My head was almost shaved and I had the earrings and a lot of bracelets. I was very eccentric. I think the short hair was already a sign I did not want to be identified as woman even when I was. The short hair was horrible in my country. I know my dad wanted to die.

The second boundary follows.

> I became a little more settled and was very responsible for her so I started my struggle of trying to put both worlds together…I thought that here I could accomplish what I wanted. I knew I was going to find a way to have it all because nobody would be judging me.

The second phase of this process continued with the exploration of the content and context of the story Daria was telling. The responses lent themselves to fragmentation into discrete thematic categories that best displayed the subtle process of negotiation between family and career which was the interest of this study. Using Daria's initial description of her life snapshots as a guide, I formulated open-ended questions to guide the interview process to ensure that as Daria storied we would be able to talk about all the snapshots she had mentioned. Several themes emerged naturally from Daria's narrative. Reissman (1993) warned that when looking for themes one may fall into reading the narrative that is produced simply for content or to read it as evidence for a prior theory. Instead Reissman recommended beginning with the structure of the narrative identifying underlying propositions that make the talk sensible, including what is taken for granted by speaker and listener in order to privilege the teller's experience.

> In the childhood snapshot I was definitely a tomboy. In the teenage years one I was very rebellious. My head was almost shaved and I had the earrings and a lot of bracelets. I was very eccentric. I think the short hair was already a sign I did not want to be identified as woman even when I was. The short hair was horrible in my country. I know my dad wanted to die.

This snapshot gave way to *Wishing to be a boy*. This theme encompasses gender socialization and sociocultural aspects. In this section I explored her upbringing in a patriarchal household and Daria's resistance to be molded into a replica of the status quo. This snapshot also gave way to Daria's career choice which she described as "a career that is mainly taken by males." The following themes: *Dreaming towards Science* and *Becoming a Scientist* are intertwined with the sociocultural aspects of her upbringing and the androcentric nature prevalent in science which transcends country boundaries. Questions that gave way to *A Mommy Friendly Environment* and *To Iron or to do Science* emerged from the following snapshot:

> I became a little more settled and was very responsible for her so I started my struggle of trying to put both worlds together…I thought that here I could accomplish what I wanted. I knew I was going to find a way to have it all because nobody would be judging me.

These two themes explored Daria's struggle to compaginar[23] her home life and her professional life. I went where the narrative took me—to Daria's struggle with the skills she has learned at home and the dominant discourse of Western science that proposes that her knowledge system is not worthy of being integrated to the dominant discourse of Western science. *She Gave me Wings* and *Through our Grandmother's Eyes* emerged naturally from the interview series. *She Gave me Wings* looks at parental influence that shaped Daria's career decisions. *Through our Grandmother's Eyes* brings Daria to a complete circle. She now embraces the upbringing that once made her shudder. Daria has been amoldada[24] by her grandmother's upbringing and her mother's tenacity of wanting it all. This was apparent throughout the interview process.

In the third phase of the analysis process, I compared Daria's story and her mother's story. At times their narrative seemed seamless and other times their narrative took different paths. One of the themes that emerged during the study was *Wishing to be a Boy*. In this snapshot, Daria is describing why she felt she was unfit as a girl. I asked Sara why she thought Daria felt unfit as a girl. Her response diverged from Daria's response.

> Daria It was just part of the culture. It wasn't their fault. Like my father wasn't a bad man or bad person it was what he actually thought what was right for me. I just remember that I struggled a lot. I was very opinionated I had a lot of issues. I was very unfit as a girl in my family and I always felt that way.
>
> Sarida: Why do you think you were unfit?

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[23] Put
[24] molded

Daria: Well I remember my aunts and everybody judging me and worrying and telling me you need to calm down, you need to do this and this you need to listen to your grandmother because otherwise you are not going to be happy. Somehow they were trying to take away importance to my dreams. They were truly worried that I was not going to be able to find a husband and be happy.

Sarida: Why do you think Daria feels that she was unfit as a girl?

Sara: Well I think somehow she tried to reach the place we had given her brother and I have to say honestly that Daria was a tomboy for a long time. When I saw her again after living in Caracas for five years she was no longer a tomboy. The woman that was standing at the airport was not the tomboy I had left behind. She had recovered her identity as a woman because she no longer had to compete.

The fourth phase linked stories to relevant political structures and cultural locations. Many times Daria's narrative took me to the cultural and political underpinnings of her story. Daria's narrative was rooted in her experiences as a Latina woman growing up in a socialist patriarchal society.

Daria: The only two science track high schools in my country are even more controlled by the government than regular high schools. I am a free spirit, and I didn't want to belong to the government. Those schools are on the country side, so you lived there and went home every two weeks. Once there, they brainwash you into graduating and working at one of the state owned research centers to do whatever they think you should do with your talent. They control every single aspect of your life—they even control which kinds of books you read. Once you graduate, when you go to work for one of those centers, you can't leave the country because the government wouldn't let you.

Table 1

Socio-cultural approach of narrative analysis

Phase	Description
First	Identify snapshots
Second	Find emerging themes
Third	Compare the participant's story with the story her family is telling in the joint snapshot narratives
Fourth	Link stories to relevant political structures and cultural locations
Final	Interpret stories, being aware of your own positions and reactions and how these shape the text

In the final phase of analysis, I have interpreted Daria and Sara's stories, being aware of my own positions and reactions and how these have shaped the final text. I found that I was always writing the self "because our biography shapes what we see and hear, how we interpret, and how we choose to write" (Hesse-Biber & Piatelli, 2007, p. 507).

In the end the themes of the participant's narrative account that were selected for interpretation in this study were connected to the evolving research question of this study, theoretical/epistemological positions held by the researcher, y mi propia biografía.[25]

Method of Representation

Las voces de las mujeres fueron las protagonizas de este estudió.[26] The snapshots produced by the participants were kept in the words of the person telling the story. Patti Lather and Chris Smithies (1997) described the voices of their participants:

[25] My own biography.

> As such, this work has made a claim on us to not drown the poem of the other with the sound of our own voices, as the ones who know, the "experts" about how people make sense of their lives and what searching for meaning means. (p. xvi)

The joint snapshot narratives allowed a layering of the story that stitched Daria's narrative with her family's narratives. The idea of layering the story came from Patti Lather and Chris Smithies in their presentation of the research on experiences of women living with HIV/AIDS. The book is organized as layers of information: "They move from inside to outside, across different levels and a multiplicity and complexity of layers that unfold an event" (p. xvii). The text is horizontally split on the page, allowing the interaction between two narratives to reflect issues back to the reader. The upper texts portray voices from the conversations among the female participants while the lower text displays researcher-voiced commentaries "regarding our experiences in telling the women's stories that moves between autobiography and the academic 'big talk' about research methods and theoretical frameworks" (p. xvii). Sprinkled throughout the pages are "factoid" sidebar-boxes placed alongside the other two texts. These "factoid" boxes contain statistics, research findings and useful information about AIDS and writings about some of the women in the form of poems, letters, speeches and e-mails. In this process of multiple layering "the text turns back on itself, putting the authority of its own affirmation in doubt, and undercutting that causes a doubling of meaning that adds to a sense of multivalence and fluidities" (Lather, 1996, p. 543).

This study adapted Lather and Smithies's (1997) representation of the stories from women suffering from HIV/AIDS. The participants' narratives were kept in the words of the person telling the story. The family's narrative followed Daria's narrative allowing the

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[26] The voices of the women were the protagonist of this study.

interaction between the two narratives to reflect issues back to the reader as they storied side by side. The narratives that were included in the texts revolved around the research question of this study. My theoretical interpretation of the story followed these narratives. Entries from the reflexive journal that I kept during the research process were included in the text in italics. This collective storytelling was a joint collaboration between the participants and me that added gusto[27] to the story.

Placed alongside the other two texts are scholarly literature-text boxes which contain the literature review for this study, popular literature as well as personal communication with experts in the field. These text boxes are organized in such a way that they converse with the participant narratives and with me as the researcher. At times the conversations seemed to be exclusively between the narrative and the scholarly literature. I felt left out. When we thought it appropriate we opened the circle to popular literature and liked the ideas these voices added to the conversation. When we doubted ourselves and didn't know where the conversation was leading us, we asked the experts to join in so that they could confirm that indeed we were on the right track. There were moments of long uninterrupted silences where we didn't want to continue the conversation, yet one of us would inadvertently become excited and break the silence. The focus of our conversations was to answer the following question: How have the lived experiences of the participant as engaged through cultural, historical, and social interactions influenced a transition in career from a research scientist to a classroom teacher?

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[27] flavor

The text was infundido[28] with Spanish words which were translated and footnoted for the benefit of the monolingual reader. In the words of Gloria Anzaldúa (1987)

> 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 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)

Al infundir el texto con mi lengua me sentí parte de la historia que se estaba produciendo.[29]

Sara's interview was done entirely in Spanish. I transcribed the narration in Spanish and then translated the original narrative into English inside a parenthesis. When Sara's Spanish narrative appears in the text, it is in italics. This way the reader who knows Spanish can read the original version. The English translation follows the Spanish text. In translation, literal equivalency in wording often transmits meanings that are not parallel across languages and cultures (González y González & Lincoln, 2006). Finnegan and Matveev (2002) affirmed that "a deeper linguistic issue is that words often do not translate because elements in one culture are not found in another" (p. 17). The difficulty in translating is mostly a cultural problem. Some words that are essential to understanding the meaning of the narratives have a specific meaning within the context of a given situation (Aroztegui Massera, 2006). One such instance in Sara's narration was her explanation of why she didn't spend more time with her children. Her words are so powerful that an English translation cannot capture the passion in her words: *Pero no es porque yo haya sido ni mala, ni egoísta, ni nada, sino porque la vida me metió en una vorágine que me perdí nunca tuve al lado a nadie, mi marido no me ayudo en eso.* The closest translation is: It is

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[28] infused
[29] Infusing the text with my language will made me feel as part of story being produced.

not because I was bad or selfish or anything like that. Life put me in a tornado and I became lost. My husband did not help me. The word *vorágine* captures her deep regret of having left her children in the care of her mother to pursue her career and in the process was not able to resume her home life the way her culture dictated. The translation makes it seems as if Sara was trying to accomplish too many things at the same time.

Quality

Narrative data is respected for its subjectivity. Catherine Riesmann (1993) discussed the dilemma posed by establishing the validity of a person's story.

> How are we to evaluate a narrative analysis? Can one tell a better one from a worse one? Prevailing concepts of verification and procedures for establishing validity . . . rely on realist assumptions . . . A personal narrative is not meant to be read as an exact record of what happened nor is it a mirror of a world 'out there.' (p. 62)

Denzin and Lincoln (2005) described a form of validity proposed by Laurel Richardson (1997), a deliberately "transgressive" form, the crystalline. In writing experimental text, particular poems and plays, Richardson (1997) has sought to "problematize reliability, validity and truth" (p. 165) in an effort to create new relationships: to her research participants, to her work, to other women, to herself. She says that transgressive forms permit a social scientist to "conjure a different kind of social science . . . [which] means changing one's relationship to one's work, how one knows and tells about the sociological" (p. 166). In order to see "how transgression looks and how it feels," it is necessary to "find and deploy methods that allow us to uncover the hidden assumptions and life-denying repressions of sociology; resee/refeel sociology. Reseeing and retelling are inseparable" (p. 167).

The way to achieve such validity is by examining the properties of a crystal in a metaphoric sense. Here is an extended quotation to give some flavor of how Richardson (1997) visualizes how this validity might be described and arranged.

> I propose that the central imaginary for "validity" for postmodernist text is not the triangle-a rigid, fixed, two-dimensional object. Rather the central imaginary is the crystal, which combines symmetry and substance with an infinite variety of shapes, substances, transmutations, multidimensionalities, and angles of approach. Crystals grow, change, alter, but are not amorphous. Crystals are prisms that reflect externalities and refract within themselves, creating different colors, patterns, arrays, casting off in different directions. What we see depends upon our angle of repose. Not triangulation, crystallization. In postmodernist mixed-genre texts, we have moved from plane geometry to light theory, where light can be both waves and particles Crystallization without losing structure, deconstructs the traditional idea of "validity" (we feel how there is no single truth, we see how texts validate themselves); and crystallization provides us with deepened, complex, thoroughly partial understanding of the topic. Paradoxically, we know more and doubt what we know. (p. 92)

Denzin and Lincoln (2005) pointed out that the properties of the crystal-as-metaphor help writers and readers alike see the "interweaving of processes in the research: discovery, seeing, telling, storying, re-presentation" (p. 208). In the crystallization process, the writer tells the same story from different points of view. There is no one "correct" telling of the event. Each telling, like light hitting a crystal, reflects a different perspective on this story.

Lather and Smithies (1997) had a compelling outlook on validity. While reading the literature on HIV/AIDS, they were disappointed to find that the findings from their research study were nothing new, only many repetitions of what was already out in the literature and in the media. They decided that the "repetition of themes is a kind of validity—if our findings are being repeated across various sources on dealing with AIDS as well as other terminal illnesses, then we must be on the right track" (p. 135).

This research endeavor looked at these two perspectives when it considered validity, Laurel Richardson's (1997) crystallization and Patricia Lather and Christine Smithies's

(1997) repetition of themes across various sources. In keeping with the crystallization process, I told the same story from Daria's, Sophia's, and Sara's points of view. There was no one "correct" telling of the event. Each telling, like light hitting a crystal, reflected a different perspective on this story—through the eyes of the women telling the story. Having the literature text boxes follow the participants' narration was a logical way or showing repetition of themes across various sources including scholarly literature, popular literature and experts in the field.

Ethics

Feminist researchers are aware of the harms produced by generations of androcentric research that distorted women's realities. Because of this they have set themselves an even higher ethical standard (DeVault & Gross, 2007). When our research involves working with human beings, we can never completely know what kind of consequences our work will have on them. We cannot control context and readings but "we can have some control over what we decide to write and how we write it . . . for me, it might be "text"; for them, it is life" (Richardson, 1997, p. 117).

This study involved narrative interviews from Daria, Sophia, and Sara. Before initiating these interviews, I submitted a request to conduct this type of research to the Institutional Review Board (IRB). The IRB is responsible for the protection of human participants of research by reviewing and approving research proposals. Its focus is on what happens during the period when data are collected (Preissle, 2007). Once the IRB approved this research proposal, I secured informed consent from the participants. The consent form was given in English to Daria and Sophia. It was given in Spanish to Sara, who feels more

comfortable in her first language, Español.[30] During the interview process, DeVault and Gross (2007) suggested that the researcher should conduct the interview in ways that are sensitive to participants' concerns and feelings; they also proposed protecting the identity of interviewees by using pseudonyms and, if necessary, changing some details when representing them in research reports. The participants of this study have pseudonyms and any details that may give their identity away have been changed to ensure confidentiality.

In the process of analyzing and interpreting data, feminist interview researchers encourage the investigator to ask research participants to amend or approve data and even share interpretive authority (DeVault & Gross, 2007; Preissle, 2007). Disputed materials may be omitted from the report or disagreements about material may be included in reports (Preissle, 2007). I thought that I would struggle with this aspect of sharing interpretive authority. I did not. For the duration of the study, Daria was part of the interpretive process. One way that I kept Daria involved in the process was by revisiting sections of her narration that I had interpreted during each visit. At times I had made assumptions from the data and Daria clarified my inaccuracy or simply elaborated on some of the snapshots. On several occasions I had heard what I wanted to hear from the data and Daria was able to tune my ears again to what the data were really telling me. One of the areas I wanted to get clarification on was why she had not attended one of the science track high schools in her country. I had made incorrect assumptions and Daria was gracious to clarify. Merriam (1998) referred to this process as member checks. I gave Daria the completed *Compaginando Sus Mundos* chapter to read, and she did not amend the data. In keeping with feminist research, I thought it appropriate to include Daria's recommendations. Daria voiced

[30] Spanish

her recommendations as to how she thought the science education community and the science research community could retain women in science. These recommendations are found in textboxes following each assertion in the last chapter.

Why did I feel so strong about the possibility of being challenged? No se.[31] Preissle (2007) noted that when representing participants, we are also representing ourselves and facets of ourselves that we share with the participants. Similarity and difference fuse, and the "ethics of research become the ethics of everyday life" (p. 527). In taking off my authoritative researcher hat, this study gave us voice to represent ourselves in a way that may improve the lives of women who have been muted by a patriarchal society.

Summary

This qualitative study was undertaken from a feminist perspective in which a former Latina scientist and her family were interviewed together with the intent to understand the transition from research scientist to high school science teacher and the lived experiences which encourage her to change careers. The methodology that guided this study was interpretive biography. The biographical methodology is a feminist method that ensures voicing and giving voice to those who have been silenced by the dominating discourses. The narratives were collected by means of in-depth interviews of the participant and of her family. The narratives were then analyzed with a socio-cultural approach.

"Mama, I didn't know I was going to love her this much!" My eyes are locked in my nena's teary brown eyes. She is overwhelmed by the experience of seeing her baby sister born and the labor pains that accompanied this event. At that instance, I took back my life

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[31] I don't know

from all those years of shouldering the remoldimiento[32] for not choosing the other path that day at the fork on the road. The path I chose has led me to this moment that has defined the rest of my life. The “what if’s” ya no van a susurrar en mis oídos.[33]

[32] remorse
[33] Will stop whispering in my ears

CHAPTER 3

COMPAGINANDO SUS MUNDOS

> Una mujer es una madre que sale a la calle a trabajar y a superarse.[34][Sara]

My thoughts were interrupted by a small little voice strapped in the car seat "Mama am I white?" Those words were like una puñalada[35] to my heart. I was transported back to being a little girl in a playground feeling embarrassed of who I was and hoping I would blend in with other children in the playground. I would never blend in. My hair would always be black and curly. I would always have brown eyes. Once again, "Mama am I white?" Her little voice interrupted my thoughts again and I was brought back to the present. My nena was beginning her personal struggle with her identity as a Latina. Her little face was so perplexed when I responded "No 'Nena' you are Latina." "What do you mean Mama I am as white as Meri? I wish I could sooth her little frown away. "Sana sana colita de rana si no te sanas hoy te sanas mañana."[36] The story I want to tell es un camino[37] traveled by many women whose stories have been "confined into the erotic narrative which Pollitt, 1988 said leads to the altar and ends soon after with a house and babies and, theoretically, bland contentment. This story not only fails to fill a lifetime, it puts the plotline in the hands of

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[34] The mark of a woman is a mother that expands herself beyond the home to improve herself. Sara's view on what it means to be a woman.
[35] A stab
[36] Little phrase used to sooth a child who has been hurt. Exact translation: Heal, heal little frog's tail. If you don't heal today you will do so tomorrow.
[37] Is a path

others, the men who do or do not admire, love, offer marriage, and make full female adulthood possible. It also fails to accommodate what Pollitt described as women's "multiple selves and layered experiences" (p. xvi). "Storylessness, after all, has been women's big problem" (xvii).

Dating back to the turn of the 20th century, researchers report the underrepresentation of females in science professions as well as the barriers that account for this phenomenon. In 1964, sociologist Alice Rossi addressed the Conference of American Women in Science and Engineering at the Massachusetts Institute of Technology (MIT). Ironically, the focal point of her query posed four decades ago is still being debated among researchers today. What is there about women on the one hand, and science on the other, that leads to such a very low affinity between them in American society (Rossi, 1965). Forty years later, Lawrence H. Summers, the president of Harvard University, appeared to broach an answer to Rossi's query, albeit a rather provocative suggestion that issues of intrinsic aptitude between men and women might be one reason fewer women succeed in science and math careers (Summers, 2005). Disparaging remarks uttered by Summers act as a clear indication of how society at large sums up the biological differences between the sexes, and through societal typecasting, immediately link disparities between female and male, as a deficiency among females, and therefore not fit to fill the rigorous expectation of becoming a scientist.

These kinds of beliefs are embedded in the American culture and hold testament to the pervasive androcentrism which continues to plague the social structure of science, and society at large (Harding, 1991, 2006; Etzkowitz et al. 2000; Fox Keller, 1985).

Wishing to be a Boy

> I remember looking at my brother because he was treated differently. My brother was allowed to go play outside and I couldn't. I had to watch from the window and could never, never go outside. Oh God I hated him so much and that's why I think I became so good at doing things and efficient. I wanted to prove to my father that I could be better than my brother. I remember during a big part of my childhood and teenage years I wanted to be a boy. I never had a problem with my identity as a female; it is just that I didn't have time for that stuff. I was into books and doing sports, and reading. It was just that I wanted to be taken as a man. I wish I could be like boys I was so young that I didn't think in "we" I didn't know it was other women's problems I thought it was just me. Why can I not belong to that group? I actually remember that my father would love me more if I would be a boy. [Daria]

Fitting the mold her culture had cut out for her resulted to be very difficult for Daria. She was high spirited, independent and very sure of herself. From her mother's account she could not only read and write by the time she was four, she also had her own alarm clock that she set herself to wake up "nunca hubo que despertarla por la mañana."[38] She had little interest in learning what was expected of her as a girl: cooking, cleaning and ironing. She was more interested in playing outside and reading about how things worked. Her competitive nature became evident at an early age. She always wanted to be the best and attributes this competiveness to "wanting to prove to my father that I could be better than my brother." Her mother adds to this by saying "Bueno yo pienso que de alguna manera ella trataba de alcanzar el lugar que nosotros le dábamos a su hermano y hay que decir

[38] we never had to wake her up

honestamente que Daria fue una tomboy mucho tiempo."[39] This need to prove to her father that she was smarter and better than her brother shaped her nature as a student and later in her career choice. From early adolescence until early adulthood Daria wanted to be part of the boys club. Membership to this select club came with the privilege of playing outside, had little or no responsibilities in household chores and seemed to be held with high regards in her culture. She was never to reach membership status even when she became "very rebellious" and almost shaved her head so she wouldn't be identified as a woman. Nor did she obtain membership when she chose a career regarded to be a member's only career path. This exclusion from the club would define a better part of her adolescence and early adulthood.

MacKinnon (1989) points out that in isolation; women are deprived of the knowledge of how women are systematically treated. Alone, women may find it difficult to see the role the unfair beliefs and practices in their micro settings play in the overall oppression of women within the macro contexts of science and society.

Journal Entry: "I didn't think in 'we'. I didn't know it was other women's problems I thought it was just me." This phrase has had a big impact on me. Daria felt isolated because women's narratives are not the dominant discourse. Not knowing that indeed it is other women's problem gave her a sense of isolation. If girls had access to other girls' stories that are similar to theirs, not the eternal girl in distress that needs rescuing they read and learn about in school curriculums, at home, or in the media, maybe Daria might have felt that indeed 'we' exist.

[39] Well I think that in some ways Daria tried to reach the place we gave her brother. She was a tomboy for a long time.

Daria was unfit as a girl in her family which was a mirror reflection of the culture she was born into. She was born into a culture that expected her to seek fulfillment and find her happiness in her role of mother and wife. The women in her family could not understand why that was not enough. Daria's angustia[40] was that they "were trying to take away the importance of my dreams."

> I came to feminist consciousness in the patriarchal household of my upbringing. And launched feminist rebellion by choosing higher education against the patriarchal beliefs of my father and the fears of my mother that too much education would leave me "unfit" to be a real woman (bell hooks, 1984, p. xi).

Daria: It was just part of the culture. It wasn't their fault. Like my father wasn't a bad man or bad person it was what he actually thought what was right for me. I just remember that I struggled a lot. I was very opinionated I had a lot of issues. I was very unfit as a girl in my family and I always felt that way.

Sarida: Why do you think you were unfit?

Daria: Well I remember my aunts and everybody judging me and wondering and telling me you need to calm down, you need to do this and this you need to listen to your grandmother because otherwise you are not going to be happy. Somehow they were trying to take away importance to my dreams. They were truly worried that I was not going to be able to find a husband and be happy.

Sarida: Why do you think Daria feels that she was unfit as a girl?

Sara: *Bueno yo pienso que de alguna manera ella trataba de alcanzar el lugar que nosotros le dábamos a su hermano y hay que decir honestamente Daria fue una tomboy mucho tiempo cuando yo recibí a Daria en Caracas en el aeropuerto yo me quede anonadada porque la mujer que estaba al frente a mi no fue el tomboy que yo deje cuando me fui de cinco años atrás entonces de manera que ella recupero su como puedo decir que recupero su yo de mujer porque ya no tenia que competir.*[Well I think somehow she tried to reach the place we had given her brother and I have to say honestly that Daria was a tomboy for a long time. When I saw her again after living in Caracas

[40] anguish

> for five years she was no longer a tomboy. The woman that was standing at the airport was not the tomboy I had left behind. She had recovered her identity as a woman because she no longer had to compete.]

Sara understood that her daughter felt unfit as girl and saw her as "una tomboy mucho tiempo." [41] Her interpretation was very different from Daria's. Daria saw herself unfit because she did not fit the norm that her source for happiness should come from being a mother and wife. She wanted to be taken seriously and contribute more than a nicely ironed shirt to society. Sara on the other hand thought that Daria felt displaced by the birth of her brother and consequently felt unfit as a girl because she wanted to have the same place her brother had been given in her family. Her brother was born to a family that did not have boys. Her grandmother, who was the main caregiver while Daria's mother was at work and school, had three daughters. Her husband already had two daughters before a baby boy came along. Naturally Sara said that much attention was given to the only boy in the family.

> *Lo que pasa que mi hijo llegó a mi familia en una familia donde no mas habían puras mujeres. Mi mama había tenido tres hijas hembras. Yo nunca había tenido un hermano varón yo no había crecido nunca con hermanos varones y de repente a mi casa a mi nueva familia se incorpora mi hijo. El fue el ultimo yo no tuve más hijos. Un poco que fue el niño de todo el mundo. Fue el niño de mi mama un varón que nunca tuvo fue mi único hijo varón fue el único hijo varón de su padre porque su padre tenía ya dos hembras y por demás era un muchacho que era muy como dijeran aquí muy 'easy going' sabe se amoldaba. Siempre he sentido que mi hijo es más débil que mi hija porque mi hija fue una mujer independiente es recia es dura. A Daria no había que calzarla para nada al otro avía que calzarlo para todo entonces a eso se añade mi mama que venía con la escuela vieja de que a las hembras hay que exigirles porque tienen porque son las futuras amas de casa, porque son las futuras madres porque son las que tienen mayor responsabilidad dentro de un hogar entonces a mi hijo pues lo tu sabes lo sobreprotegía y lo malcriaba a lo mejor es también necesita también eso pero no lo evidenciaba tanto como mi hijo. Daria me ha reclamado, no me ha comentado muchas veces que ella sintió que a ella la habían criado y le habían exigido cosas que a su hermano y yo mirando hacia atrás pues tendré que decir ¿porque no porque no? Uno no vine con un librito a la vida para criar a nadie.* [My

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[41] tomboy for a long time

son came into a family of only women. My mother had only three daughters. I didn't have a brother. Then my son is born. He was everybody's boy. He was my mother's boy a boy she never had. My husband's only son. He was very easy going not a very complicated boy. I have always felt that my son was weaker than my daughter. Daria on the other hand was independent and strong. Add to this my mother who was from the old school where girls are asked to do more because they are the future housewives, the future mothers because they have the biggest responsibility in the home. So my son was spoiled he needed more attention. Maybe Daria needed it too but it was not as evident as my son. Daria has commented many times she felt that much had been expected of her and not of her brother. As I look back why not? Why not? We do not come with an instruction book on how to raise our children.]

Albert Bandura (1977) devised a social learning theory which emphasizes modeling/imitation or observational learning as a powerful source of development. Based on this research area gender role begins with learned behavior and gradually a cognitive identity is formulated by the individual. Preschoolers first acquire gender-typed responses through modeling and reinforcement and only later organize these behaviors into gender-linked ideas about themselves. Gender-appropriate behavior appears so early in the preschool years that its initial appearance must result from modeling and reinforcement, as social learning theory suggests. Children discover what it means to belong to any society through a socialization process which begins in the formative years. Through verbal and nonverbal interactions with family members and other caretakers, they learn behavior suitable to the cultural norms. As part of this process, they learn how to be males and females (Maccoby, 1998). Gender identity starts to emerge around the age of two.

Children can associate toys, colors, and clothes with one of the two sexes. From birth parents perceive their daughters and sons differently. This is noted by the clothes and color they choose for each sex; the toys that boys receive stress action and competition whereas the toys girls receive emphasize nurturing, and beauty (Leaper, 1994). They expect boys to be independent and girls to be dependent—assisting the girls at every corner. The language that parents use also provides children with cues about gender categories e.g. boys don't cry, or it is not ladylike to climb trees (Fagot & Hagan, 1991). By the time they enroll in school children have already started formulating their own gender identities. These identities are reinforced by the teacher who continues to make clear distinction between the two sexes. Some teachers ask children to read aloud in groups according to gender or classroom games that pit the girls against the boys (DeMarrais & LeCompte, 1999). When reprimanding a boy the teacher may often refer to the quiet nature of girls (Campbell, Shirley, & Candy, 2004). At school children will most likely associate with members of the same sex which in turn is a potent source of gender-role learning.

The more they play with the same sex the more the behavior becomes gender-typed (Martin & Fabes, 2001). Maccoby (2002) noted that the separate social worlds of boys and girls result in two distinct subcultures of shared knowledge, beliefs, interests, and behaviors. Girls' and boys' gender identities follow diverse paths in middle childhood. From third to sixth grade, boys tend to reinforce their identification with "masculine" personality traits, while girls' identification with "feminine" traits declines (Serbin, Powlishta, & Gulko, 1993).

Boys tend to stick to “masculine” pursuits, while girls, more often than boys, considered future work roles stereotyped for the other gender, such as firefighter and astronomer (Liben & Bigler, 2002). These changes mirror a mixture of cognitive and social forces. School-age children of both sexes are aware that society attaches greater prestige to “masculine” characteristics. For example, they rate “masculine” occupations as having higher status than “feminine” occupations (Liben, Bigler, & Krogh, 2001). Children who identify themselves as “masculine” have higher self-esteem than “feminine” individuals, perhaps because many typically feminine traits are not highly valued by society (Boldizar, 1991; Harter, 1998). Television and other media play a critical role in transmitting the culture’s gender role behaviors and values. At an early age girls are being socialized into distinct gender roles that society has defined for females. The media is filled with advertisements of products that every little girl must have, from a doll that cries when she needs a diaper change, to a new improved kitchen with running water. When the Mattel Company introduced its second talking Barbie doll, the company inadvertently created uproar by including the phrase "Math class is tough" in Teen Talk Barbie's repertoire (Sullivan, 1992). Members of the public, the media, and particularly the American Association of University Women (AAUW) vehemently objected to the phrase. In a letter to Sharon Schuster, president of the association, Mattel's president, Jill E. Barad, said the company made a mistake.

> In hindsight, the phrase 'math class is tough,' while correct for many students both male and female, should not have been included. We didn't fully consider the potentially negative implications of this phrase, nor were we aware of the findings of your organization's report. (New York Times, 1992, p. D4)

Popular culture transmits messages about the values, behaviors, and communication styles of men and women, generally in stereotyped and often derogatory forms (DeMarrais & LeCompte, 1999). These stereotypes in the media are so prevalent that they have become the norm. Women are attractive, caring, emotional, and are seen in romantic and family contexts while males are usually powerful heroes (Signorielli, 2001). In a 2008 CSI episode "Theory of Everything" Wendy and Hodges are in the lab having a discussion which Wendy wins. Hodges concedes by saying "You are like a geeky nerdy guy trap in a woman's body" (Mendelsohn & Rambo, 2008). Why can't she be geeky and nerdy as a woman? Why does she have to be a guy trapped in a woman's body? In a Disney Channel's Hannah Montana episode "Bye, bye ball" Billy Ray Cyrus is building a bookshelf. He comes in the door and says hello to Miley and her friend. When the girls asked him if he is having fun he responds "Just doing what men do, you know, building stuff and loving it" (Poryes & Correll, 2007). These types of story lines perpetuated in TV shows only cement society's stereotypes. Referring to society's gender biases Makrakis (1992) stated "a gender-biased society teaches girls to have gender stereotyped interests" (p. 285). It is no wonder that by age 6 or 7, children have a clear idea about gender roles, prefer sex-segregated play, and tend to strive to conform to stereotypic gender roles. These stereotypes and the attitudes and behaviors of parents and teachers that promote them-influence children's preferences for certain subjects and, in turn, how well they do at them. Boys feel more competent than girls at math, science, and athletics and girls feel more competent than boys at language arts (Bhanot & Jovanovic, 2005). Adults' gender-typed judgments of children's competence can have lasting consequences (Bleeker & Jacobs, 2004).

> I remember I was one of those children that loved school. It was a thrill. I remember that I wanted to go back for more. I loved being at school. I don't know maybe for me it was a way to escape too you know? I remember in the fifth grade for the first time I was learning about world history and we were talking about Egypt. I was totally fascinated about those people that were so different from us. I remember I would think a lot about me being somebody else. Maybe for me learning was a way of being that person whoever I wanted to be because at home they had this plan for me that just didn't seem to fit. [Daria]

Journal Entry: I remember daydreaming about being a medical doctor from an early age. I would play Doctor with my Barbie and Ken. I always made Barbie the Doctor. She was always saving Ken from an imminent death caused by a Dengue infested mosquito bite or a terrible car accident. Barbie always saved the day with her skills. It would always end with Ken falling in love with Barbie and sweeping her off her feet—and of course living happily ever after. Deep down I thought my parents didn't think I was smart to be a doctor. Who did Daria want to be? What did she daydream about when she was in school?

> Sarida: What person did you want to be when you were in school?

> Daria: I wanted to feel like I was doing some kind of work that was important for everybody. Maybe I thought that cleaning and cooking was not important. I remember when I was nine years old I told my mom I wanted be a scientist and do mysterious things and discover something important. I always thought with a lot of sadness that people thought that I didn't have to be thinking about those things. I should just take care of the little micro world that was going on at home. School gave me the chance to be part of the world in a way that didn't seem possible for me at home.

The sentiment of being 'unfit' could be attributed to many factors. From the beginning I see Daria more interested in playing outside than learning how to iron. I continue to see her wanting to be a scientist and work in a lab doing mysterious things and discovering something important. She wanted to make a contribution and have a bigger impact outside of the home: "I just always thought with a lot of sadness that people thought

that I didn't have to be thinking about those things. I should just take care of the little micro world that was going on at home." According to her culture she should have been aspiring to care for a household. She was able to transport herself to other places while she sat in school learning about different countries. In these places she could be all those things that are traditionally looked upon as male aspirations without the prying eye of her culture that saw it as compromising her identity as a female. She on the other hand never had a problem with her identity as a female; "I never had a problem with my identity as a female; it is just that I didn't have time for that stuff. It was just that I wanted to be taken as a man." She gave more value to male traits than she did female ones. This could have been a reflection on what values her culture placed on male versus female traits. Her mother was aware of the place her family had given the only boy "fue el niño de todo el mundo."[42] Deliberately or unconsciously the place her family gave her brother was the same place their culture gave boys. This place would always elude Daria.

Within the traditional Spanish Caribbean culture, gender roles have been strictly defined and differentiated. Gender roles are encouraged early in the socialization process when boys and girls are taught different codes of behavior. Though all family members share a sense of family obligation, strict demarcations of gender roles leave most of the burden of domestic life to women (Cofresí, 1999). Girls are expected to be passive, obedient and homebound (Comas-Días, 1987; Acosta-Belén, 1986).

[42] He was everyone's boy is the exact translation. But this phrase in the context that it was said could mean that he was overindulged by the family.

This strict demarcation has created phenomena in the culture known as *machismo* and *marianismo*. In this society, the code of *machismo* dictates the male as the source for the well being of the family and the one responsible for the honor of the family. In their roles as heads of their families, men are expected to manage the family finances and make decisions that affect all family members (Comas-Días, 1987; Cofresí, 1999). Men are considered to be *de la calle*, which means that men can come and go as they please. *Marianismo* is the cult of female spiritual superiority which gives them the capacity to endure all the suffering and abuse inflicted by men (Stevens, 1973; Acosta-Belén, 1986). A martyr complex among traditional women states that the female must accept and adjust to their partner's *macho* behavior. Women are considered to be *de la casa*, which means that they are expected to spend their time at home or in family sanctioned activities (Stevens, 1973; Acosta-Belén, 1986). This society attributes high esteem to motherhood. Traditionally, when these women have faced a conflict in roles they have usually opted for the roles as mothers (Espinoza-Herold, 2007; Acosta-Belén, 1986; Christensen, 1975).

Sarida: Could you expand more on your cultural upbringing?

Daria: Women and men had a totally different role in the family even when both of my parents worked. As a girl you were expected to learn certain things at home that were more important than the things you were learning at school. Family was very important and since family is very important your role in your family as a girl or as a woman becomes so important. If family didn't have such an important role, ironing wouldn't big such a big deal. I remember when I was about 8 years old my grandma made me spend hours learning how to iron a shirt. That was such an important part of my education. I hated every second of it because I had a very inquisitive mind and was very nerdy girl. I was into books and reading and always knew I wanted to go to college and work in a lab. So the whole idea of my

grandmother telling me " all that sounds very pretty but you need to learn how to iron a shirt because your husband blah blah blah blah..." I hated that.

Sarida: What do you think of this: As a girl you were expected to learn certain things at home that were more important than the things you were learning at school.

Sara: *Bueno no por parte mía. De su abuela yo si pienso que fue así. Mi mama era una mujer que en el año 59 era una analfabeta. Mi mama aprendió a leer después de ser una mujer adulta. Mi mama venía con un pasado demasiado lastrozo y digamos mi padre y ella se separaron cuando yo tenía dos años. Crió a tres niñas sola. Tuvo que trabajar de criada limpiando piso, planchar, lavar. Mi mama venia con otra escuela. Paradójicamente o quizás no paradójicamente pero fíjate que en mi familia la primera universitaria soy yo entonces como yo voy a ver a mi hija de otra manera? No yo veía a mi hija como mismo me vi yo. Yo quería que mis hijos fueran profesionales los dos yo hice muchos sacrificios para estudiar derechos para estudiar la carrera de abogado teniéndolos a ellos trabajando en contra de mi marido todo una serie de cosas. Y yo soñaba que mis hijos fueran universitarios los dos. Ósea yo fíjate yo no le daba peso ninguno a lo que pudieran hacer lo que supieran hacer en la casa. Ella lo único que tenía en la casa era que cooperar a ti te toca fregar hoy a ti te toca fregar mañana tu lavas los baños tu limpia la casa pero eso pero que yo le diera más importancia a las labores de la casa que a una profesión o a la universidad para nada.* [I didn't think that. Her grandmother thought so. My mother learned to read as an adult. She had a very difficult past. When I was two years old my parents separated. She had to raise three girls on her own. She had to work as a maid cleaning floors, ironing and washing clothes. My mother was of the old school. I was the first to attend the university in my family. How else will I see my daughter but as I saw myself? I wanted both my children to be professionals and I made many sacrifices in order to study law. I already had two children. I did it against my husband's will. I wanted both my children to attend the university. I did not care what they could do around the house. I expected them to do chores around the house. But that I thought house chores were more important than a profession or the university? Never.]

Sophia**:** Well I think that you won't get anywhere in life learning to iron and cleaning. When it comes down to it it's more important to have an education school wise than house wise. I think is a difference in culture. Here it is more important to have an education when she was growing up things were different. Women's roles were different. It was more important to be at home than to have a real job and all that.

In the pursuit to go further than those who came before her, Sara sacrificed a great deal. “Entonces yo tenía que trabajar ocho horas. Yo me quedaba estudiando hasta las tres y cuatro de la mañana después me levantaba a las ocho de la mañana me iba a trabajar y así me metí tres años.”[43] Sara was absent from the day to day nuances of her household. Sara depended on her own mother to fill the gap left in the nurturing of her children. Daria’s grandmother mirrored the culture in which she was rooted in. “Mi mama venía con otra escuela.”[44] Daria had Sara’s ambition to do more to have an impact outside of the home, but her grandmother expected her to learn certain things at home that she considered were more important than the things Daria was learning at school. Perhaps if Sara had been a greater presence in her early years Daria would not have felt unfit as girl. Her grandmother epitomized the cultural expectations of girls who were expected to be passive, obedient and homebound. Forward four generations of women in Daria’s family and we find Sophia, her daughter. Sophia is growing up in a suburb of a major city in the south of the United States. She is clearly aware of her culture heritage but snickers at the thought that the things you learn at home are more important than the things you learn at school. “When it comes down to it it’s more important to have an education school wise than house wise.” She feels that in the culture her mother grew up, “it was more important to be at home than to have a real job.” She is not too far from Daria’s feeling at that age. The difference is that she does not have to cut her hair short or be rebellious.

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[43] I had to work eight hours. I would stay up until three or four in the morning. I would wake up at eight and would go to work. I did this for three years.
[44] My mother was of the old school.

Dreaming Towards Science

> I chose a career that is mainly taken by males. Not a lot of women go into research. Most of the women I met and had succeeded in the lab have very strong personalities. They have social issues because they have very strong personalities. Most of the people that I was around were males; I was very competitive maybe because of the way my father was always trying to put me down. I remember him saying things like you need to learn to iron a shirt, instead of wasting time with all those books and all that day dreaming. That's okay but after you learn to iron those shirts and that got me so mad. [Daria]
>
> Sarida: Did you always want to be a scientist?
>
> Daria: I remember my mom always tells me that ever since I was a little girl I always wanted to do science. I was very curious about bugs and the human body. I wanted to work in a lab or in research and understand how people and things work. I remember my mom would take me and my brother every month to a book store and she would let us choose one book and my books were always about medicine, the human body and about science.
>
> Sarida: Did Daria always want to be a scientist?
>
> Sara: *O si, O si. Daria nació queriendo ser Científica. Daria nació segura de lo ella quería. Daria es todo lo que sea superración. Ella lo mismo te puede decir que hoy voy hacer abogada, que mañana voy estudiar medicina que a lo mejor si hago un curso de ingeniería puedo levantar el puente que falta en aquel camino. Ella no tiene techo esa es Daria. Daria a los cuatro años leía y escribía. Ella sabía lo que quería desde chiquita*. [Yes, Daria was born knowing that she wanted to be a scientist. Daria epitomizes getting ahead. One day she would tell you that she wanted to be a lawyer, the next day that she was going to study medicine and maybe if I take a course in engineering I could put up a bridge in that road. She wants to reach the stars. At four she could read and write. She knew what she wanted to be from a young age.]

Daria, notwithstanding the pressure of a society that expected her to be happy caring for a husband and children, persisted from an early age to pursue her interest in science and eventually chose what is perceived as a male career. "I chose a career that is mainly taken by males, not a lot of women go into research." It is evident that she was interested in science from the books she chose to read as a child about medicine, the human body and

science. Her mother confirms that "Daria nació queriendo ser Científica."[45] From her mother's account I can see that she wanted to be a scientist she wasn't quite sure what kind of scientist. One day she wanted to be a doctor the next day an engineer. She seems to be interested to know how things work and do mysterious things in a lab "desde chiquita."[46]

Evelyn Fox Keller (1985) noted that the belief that science is masculine has been disseminated, when scientists, teachers, and parents assert quite boldly that women cannot, should not, be scientists that they "lack the strength, rigor, and clarity of mind for an occupation that properly belongs to men" (p. 77). Today such assertions are too bold and offensive to say out loud; instead they have become subtle in our language, such as science is hard. The identification between scientific thought and masculinity is so deeply embedded in the culture that children "grow up not only expecting scientists to be men but also perceiving scientists as more "masculine than other male-professionals" (p.77). Researchers have been studying students' perceptions of scientists as early as 1957. Margaret Mead and Rhoda Métraux's seminal study collected data from 35,000 high school students who were prompted to write an essay in their own words of what they thought about science and scientists. Analysis of the essays revealed that the typical high school student perceived scientists as being men who wear a white coat and work in a laboratory.

[45] Daria was born knowing she wanted to be a scientist.
[46] From a very young age

Mead and Métraux also found that girls rejected science as a possible form of work for themselves, and viewed it as being concerned with things rather than with people. Moreover, they viewed science as a highly demanding career that would take them away from their future husbands and children.

Thirty years later, Chambers (1983) developed a method—the Draw-A-Scientist Test (DAST) which appeared to complement Mead and Métraux's study, asking students to draw a picture of a scientist on a piece of paper—and obtained data from 4,807 elementary children from kindergarten to grade five in Canada and the United States. Chambers used the drawing method to describe in detail the stereotypical images reflected in children's drawings of scientists. In this study, Chambers noted that students started to develop a stereotyped image of scientists by the second grade. Remarkably, Chambers reported that only 28 of the 4,807 drawings done by elementary students were of female scientists. Subsequent studies using DAST (Schibeci & Sorensen, 1983; Fort & Varney, 1989) with children obtained similar findings. In one of these studies, Odell, Hewitt, Bowman and Boone (1993) revealed that gender and race emerge as two obvious stereotypes when student images of scientists are examined. They reported that students of one ethnicity typically drew images of that ethnicity, but also noted that minority students drew images of Caucasians. Fung (2002) administered the DAST to Chinese students in Hong Kong, and concluded that these students held similar stereotypic images of scientists to Western students. Research has shown that stereotyping of science as masculine affects children's expressed interest in specific science topics and later in their science course selections.

According to Kelly (1985), the masculinity of science is often the prime reason that girls tend to avoid the subject at school; this perception disheartens girls from expressing interest in science. She goes on to say that the three reasons science is perceived as masculine are: the numbers who practice and who are rewarded in science; the way in which science is packaged in curricular and instructional materials; and the way in which science is practiced in schools. Garratt (1986) found that gender stereotyping of subjects may be extended to the suitability of certain subjects for academically able children. He noted that biology is perhaps perceived as being suitable to girls of all abilities, but only appropriate for boys of average ability. On the other hand, physics may be seen a suitable for a broad ability of boys, but only for girls of higher ability. The more masculine the branch of science (e.g., physics), the less likely it is that girls will like it or do well (Brickhouse, Lowerey, & Shultz, 2000). In a study to explore girls' attitudes toward science Baker and Leary (1995) noted that the girls made an intriguing distinction between a 'scientist' who studies biology and a 'scientist scientist' who uses chemicals or works with rockets. Biology, often considered to be a "softer" science than chemistry or physics, is seen as a helping science, people-oriented, and nurturing-characteristics typically associated with females (Jones & Wheatley, 1990; Blickenstaff, 2005). By adolescence, gender socialization has affected career plans. In many ways women are unable to choose to do science; society has already chosen who will do science through its construction of gender roles (Etzkowitz et al., 2000).

Sarida: What would you say was the most significant event in your life up to age 12?

> Daria: I remember when I was in fifth grade there was this club that was going to be done out of school. Two kids from every school in the county were selected to go to the Russian embassy to meet with astronauts once a week. Can you believe that? I really wanted them to select me because it was a competition within the school. You had to have good grades and write an essay. They chose the kids they thought could get the most out of the experience. I had the opportunity to go and sit down in a round table with these astronauts. I was dreaming towards science since I was little. That's why I wanted to participate so badly. I still get very emotional. I felt so lucky. That was big. The astronauts would tell you a little bit about their experience and then they would allow us to ask them whatever questions we had.

As Daria narrated this experience with the Russian astronauts she became very emotional, her eyes filled up with tears and her voice cracked a few times. She relived this episode that had cemented in her the desire to become a scientist, she was "dreaming towards science" from a young age and for a few months her dream was made a reality. 'Dreaming towards science' as she described her aspiration to become a scientist, would be a steep slippery slope for Daria, she did not have mentors or role models that would pick her up and dust her off each time un peñón se cruzaba en su camino.[47] She had a spent a better part of her childhood competing; she would need this skill to continue her quest of becoming a female scientist.

She Gave Me Wings

> I was very lucky because I had my mom as a role model. I was smart and had that spark. She helped me find my way through. I remember when I was a child I wanted to try a lot of things. I went to a lot of different clubs and different extracurricular activities. I did music, I did clay modeling, danced, played the guitar, swimming, and lots of other things. I remember my mom was very supportive because she understood I was very experimental and needed to try things. My father did not take it seriously. That's how I felt my whole life that he never took me seriously. Now I got over it because I understand he didn't take any women seriously period. You could have won the Noble prize, and still it didn't matter much to him. Can you cook? My mom pushed me in the right direction. My mom was the first woman in her

[47] A boulder rolled down her path.

family that went to college so she was open minded. My grandmother had all these ideas of women being in the house with husbands and you just have to take care of your husband. I remember being a very inquisitive girl and my grandmother trying to kind of shut that down like that's not very girl like. But my mom would encourage me. She always gave me wings, to explore, to be myself, to think about going to college. When I went to college I knew I was doing something that she would approved just based on her life. And then she was so proud of me and she would allow me to go to the library and study with friends, bring friends over to have study groups at home. She would leave us alone and provide little space for us to meet. She would ask "how is school going?" I remember she had this nice book shelf and she emptied it so I could put my books there. [Daria]

Sarida: How did your family react when they knew you were pursuing a science career?

Daria: Well my dad never took me seriously. It was unbelievable. I was already studying to become a doctor and he would not even take me seriously. My father is a very 'typical Hispanic man.' My father was the first man that got uncomfortable around me. He didn't know how to deal with me because I was into books, and I was going to change the world. Then I wanted to work in lab, do research, and medical stuff. I remember my father just being very concerned about it.

Journal Entry: It seems that Daria's dad has issues with her interest in a science career. He probably thinks it is too male oriented. I wonder if he would have been o.k. if she would have wanted to be a teacher or nurse. I'll have to ask Daria.

Sarida: Why was your dad concerned about you working in a lab?

Daria: My dad wasn't concerned about me working in a lab. He was concerned about me working, period. You have to understand, my dad was a highly ranked diplomatic for a communist government. He was ambassador in a few countries. Anyway, he was also a "machista,"[48] he couldn't stand successful, thinking women. Actually my mom went back to college when we came back from our travels, she got into law school, and by the time she had a successful job they divorced: he couldn't stand it! He never figured me out. I was weird to him and I was also very defiant towards him because since he was such a powerful guy, everybody was always sucking up to him. He came home and treated everybody as if we worked for him.

Sarida: Sara, why did you end up getting a divorce?

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[48] Chauvinist

Sara: *Porque a él no le interesaba que yo fuera más de lo que yo era eso a él no que no le interesara que no le importaba ósea quizás comenzó ahí ya dicotomía la contradicción entre nosotros dos yo tenía un interés el tenia otros intereses y en el sentido de que yo me llamaron del ministerio de turismo me ofrecieron una posición como bilingüe me dijeron y empecé a viajar el mundo entero entonces el ya se resintió y dijo no entones ahí se fue quebrando el matrimonio pero el mismo espíritu de superación que yo tuve en mi vida yo se lo trate de trasladar a mis hijos. Yo tenía todo en contra para no ser una profesional. Mi familia me arrastraba, Me arrastraba todo me arrastraba cuando me case con un hombre machista. Tan machista que tiro por la borda un matrimonio de 17 años porque no quería que me montara en un avión y viajara sola.* [Because my husband did not want me to be more than what I already was. He was not interested in my career advancement. Maybe the dichotomy between us started then, I had certain interest and he had others. When the Ministry of Tourism offered me a position that required traveling he was very resentful and my marriage started to fall apart. I tried to pass on to my children the same desire to be more. I had everything against me to become a professional. My family weighed me down. The chauvinist man I married weighed me down. He was so chauvinistic that he threw out the window a marriage of 17 years because he did not want me to board a plane by myself.]

Sarida: How did the rest of the family react to your decision to go to college?

Daria: My mom was very proud of me. Oh wow! She was so happy and thrilled that I was going to go to college. My grandmother was very concerned. She thought I was not going to get married or I was not going to be happy if I got married but at least I was going to be a doctor.

Sarida: Why do you think you grandmother thought you wouldn't be happy?

Daria: My grandmother had all these ideas of women being in the house with their husband and you just had to take care of your husband. People thought you were happy if you had a husband and you had kids. That's my happiness right now my family is my happiness. I'm not against that idea. What I was against was the idea you could not find somebody that is going to understand that you have a little bit responsibilities beside your house, besides taking care of your family and your house. That was crazy to me that men did not expect you to do anything else but take care of the family.

Parents play a powerful role in their children's success in science. Gender role socialization within the family is structured differently for boys and girls. Much research suggests that the socialization experiences children receive in the home such as dance classes and dolls for girls and Pewee football and blocks for boys (Eccles, Wigfield, Harold, & Blummenfield, 1993) are not likely to encourage success in science (Etzkowitz et al., 2000; Brickhouse et al., 2000; Huston, 1983). In 1990 a team of Canadian researchers visited young children's homes. They found boys' rooms filled with sports equipment, toy vehicles, tools, and building kits. The girls' rooms contained children's furniture, kitchen utensils, and lots of dolls. The research team concluded that parents are still raising girls and boys in environments that are globally different; they are still encouraging sex-typed play by selecting different toys for female and male children, even before the child can express her or his own preference (Pomerleau, Bolduc, Malcuit, & Cossette, 1990). Girls are disadvantaged in science before they even get to school because they are encouraged to play with dolls rather than blocks. The toys for girls are playthings of the mother-dolls, dishes, miniature household appliances (Hoffman, 1977; Astin, 1974; Casserly, 1980; Etzkowitz et al., 2000) which encourages nurturance, interpersonal skills, traditionally female domains (Sadker & Sadker, 1994). Research has shown that parents encourage their sons more than their daughters to take advanced mathematics, chemistry, and physics (Eccles, Adler, & Kaczala, 1982; Tenenbaum & Leaper, 2003), regardless of their children's actual abilities and performance levels (Jacobs, 1991).

In a recent study, Bleeker and Jacobs (2004) followed the same families over an extended period and found that after controlling for parents' gender stereotypes, parents' earlier perceptions of their children's abilities were related to their daughters' career choices twelve years later. Young women whose mothers had regarded them as highly capable at math were far more likely to choose a physical science career.

Clearly parents can indirectly and directly influence their children's achievement in science. Much of the research suggests that parents treat their sons and daughters in ways that have important implications for their academic interest, skills and attainment (Kahle & Meece, 1994). Most of the prominent women scientists never would have entered science at all if it had not been for the encouragement of close family members. Most attribute their love of science to their parents, especially their fathers, and know that they never would have preserved through the many years of schooling without the support of families (Dean & Fleckenstein, 2007).

Daria's father held a powerful position in the government and expected to convey this authoritarian position at home. From a young age Daria denied the androcentric sculptor to chisel her to resemble the female replica of the culture she is growing up in. Her father's concern grew when she decided that she "wanted to work in lab, do research, and medical stuff." His concern is not funded in the view that science is a masculine career, but that his daughter wants to pursue a career aside from the career he thinks is the perfect fit for women, housewife. He felt so adamant about women acquiring a profession that would take them outside of the home that he went as far as divorcing Daria's mother over it. His apprehension with her choice to go to college and work outside of the home was genuine

concern that she would not find happiness in a male dominated society. From an early age Daria was fascinated and intrigued by human behavior and human social groups and knew that she wanted to be a scientist and work in a lab. She is not dissuaded by her father's distress towards her aspirations to be a medical doctor or by her grandmother's concern for her happiness. The shadow cast by her father and her grandmother is eclipsed by her mother's ongoing support of her career ambitions. Her mother supports her unconditionally. Sara is very proud that her daughter is going to follow in her footsteps and continue on to college after high school. Her grandmother as well as her father is a product of the culture where this story is unfolding, that correlates happiness with a husband and children not with a career outside of the home. They walk with a cultural yoke around their neck that dictates that a woman is first a wife then a mother. Any ambitions outside of the home that she may have to superarse[49] would have to fit around being a housewife. Daria finds herself in the fork of both worlds and as a young adult chose the less traveled road, the road few women in her country choose due to cultural and political restrains. She chose a career in science. For Daria it was the only road.

> Sarida: Sara, how did your mother react to your ambition of going to college?
>
> Sara: *O no mi madre siempre me apoyo, fíjate si me apoyo que se hizo cargo de mis hijos y de mi casa para que yo estudiara. Mi madre mira aquí hay tres generaciones de mujeres que somos muy parecidas. Mi mama con sus limitaciones, yo con mis limitaciones que tuve con mis hijos y Daria. Aquí hay tres generaciones de mujeres que somos muy parecidas echadora para adelante y no tenemos techo. Mi mama tampoco tenía techo. Mi mama fue una mujer excepcional, mi mama es una mujer excepcional también y yo la admiro muchísimo ella fue capaz de salir adelante con tres hijas hembras en medio de una sociedad tan dura, tu sabes y entonces ella no ella siempre que tu quiere ser mi amor mi mama siempre me decía tu naciste abogada así que ve a la universidad y gradúate. Mi mama siempre fue mi piedra mi roca*. [My mother always gave me support. She took care of my children and my house

[49] To be more

> so that I could study. Here are three generations of women who are very much alike. We will push forward, the sky is the limit. My mother is an exceptional woman and I admire her very much. She was able to raise her three girls in a very hard society. My mother always told me "you were born to be lawyer, go to the university and get a degree." She was always my rock.]

There seems to be a contradiction in how Daria's grandmother treated her desire to go to college and have a career and how she treated her own daughter's desire to become a lawyer. It appears to me that Daria's grandmother did not oppose women having a career. She viewed a husband, children, home and then a career as a woman's priority. Perhaps Daria's grandmother held her back because she wanted Daria to have all the qualities cherished by the society she was growing up in. She wanted to make sure that Daria left the house equipped to take care of a home someday. She also thought that someday a husband would appreciate these qualities above a career outside of the home. Her grandmother was preparing her for the reality of her world.

Becoming a Scientist

> I went to a horrible public school in middle school and high. I remember that in my high school there were just two people that got into the medical program. I was one of them—that was a big thing for me. When I got there I was at a disadvantaged position compared to other kids that came from science high schools that I didn't go to. I remember that when I got there I was the last one in my class whenever we did test and quizzes. Oh my God at the beginning I always failed. It was horrible. It was a crisis because I thought I was smart—it turns out that I'm not. Then I found out that they weren't smarter, it was just their background. I started studying my own high school at night. I pulled out all my high school books and little by little ended up among the first 10 in my class even in first year and went on like that until I graduated Summa Cum Laude. [Daria]

Journal Entry: Why did Daria attend a horrible high school? Wasn't her father a diplomat? Surely there were better schools she could have attended. Her mother sings her praises about how she could read and write by the time she was four. Why didn't she attend a

science track high school? Her mother seems to be so proud of her yet did not give her the best possible skills to be successful. I wonder if her brother would have shown more interest in school had he been given the opportunity to attend a better learning environment. Note to self: Ask Daria why she wasn't enrolled in a science track high school.

> Sarida: From a young age you wanted to be a scientist. Why didn't you attend a science track high school?
>
> Daria: The only two science track high schools in my country are even more controlled by the government than regular high schools. I am a free spirit, and I didn't want to belong to the government. Those schools are on the country side, so you lived there and went home every two weeks. Once there, they brainwash you into graduating and working at one of the state owned research centers to do whatever they think you should do with your talent. They control every single aspect of your life—they even control which kinds of books you read. Once you graduate, when you go to work for one of those centers, you can't leave the country because the government wouldn't let you. I always knew that I wanted to leave my country, so that was not an option for me. I took all of that into consideration when I was tested and recommended to go to one of the schools. I was 14 years old. I almost did it. I had everything ready and then a few weeks before the school year started, I told my mom that I couldn't do it, that I would die if they locked me up like that. I used to hang out with older girls that lived in the same neighborhood and we shared books, old newspapers, and magazines from all over the world. My father was ambassador in a few countries and my brother and I spent our childhood traveling with him and my mom (Another reason why I got so much influence from "the world" beyond the control of the government)... That was very important to me, to stay in touch with what was going on around the world. I didn't want to be brainwashed, I was actually very scared of that. In any case, the only difference was that those kids that went to the science high schools had more supplies and access to really cool labs and science competitions, but I knew I could catch up once we all went to the University … and I did! It was just harder. It is kind of the same reason I didn't become a Doctor before getting a PhD which is what I wanted, and went to get my degree in Biochemistry instead. Medical School was too controlled by the government. You see, beside the whole cultural aspect of it -machismo, etc, there is a side to my life that is related to my survival in a communist country and wanting to get out of there. That complicated everything and I had to make some sacrifices. I hope I could explain myself… that is a really important question and unfortunately it is impossible to answer without talking about politics.

Journal Entry: Wow! I am so shaken with her response. I made all these assumptions in my head without having read about the socialist educational system that was modeled in her country. The President nationalized and banned non-Communist institutions, and created a system operated entirely by the Communist government. This country's constitution states that educational policy is based on Marxist ideology. This means that all children will attend the same schools and be indoctrinated with this ideology. I came so close in going the wrong direction with this.

Centro Vocacional Lenin en Ciencia Exacta: A Pre-Univesity Institute

The Centro Vocacional Lenin en Ciencias Exactas enrolls 3,300 students with a special aptitude for science. Employing 200 teachers, the center is located in the periphery of the capital. Organizations such as the Union of Young Communists, the Communist Party, the Students Federation and the Teachers Union are active in the life of the school. Student admission quotas are set in order to guarantee equal possibilities to different municipalities. Admission scores tend to start from 85 points up, in comparison with scores for other pre-university schools, which start from around 60. As part of the curriculum, students are prepared to defend themselves from natural disasters and military aggression during military preparation activities.

> The school has a farm, where students observe applications of theoretical scientific studies such as plant mycosis and other pathologies. The learning- teaching methodology adopted by the Lenin Vocational Center combines a clear emphasis on autonomous research and learning with strong sense of community and group work and emulation. Flexibility allows students to focus on the different curricula areas, building on their specific strengths. Teachers in these schools for excellence act as learning facilitators to prepare students for university learning and for managerial tasks. The school's population reflects a student's family cultural and social background. As observed in other socialist countries, the Center provides high quality education for children of the elite, despite quotas designed to mitigate inequalities in student recruitment. Excerpt from L. Gasperini's *The Cuban Education System: Lessons and Dilemmas*

Daria knew she wanted to go to college, and was one of two students accepted from her high school into medical school. Being accepted into medical school was a big accomplishment for Daria because she went as she described to "a horrible public school in middle school and high school" and she felt at a disadvantaged compared to the students that came from science track high schools "those kids that went to the science high schools had more supplies and access to really cool labs and science competitions." At fourteen she was accepted to a government science track school but after much deliberation decided she was too free spirited to belong to the communist government. Choosing to stay home instead of attending one of these science high schools could have forfeited her chances of being accepted into medical school. At the start of the term she was making the lowest grade in

her class. “Oh my God I always failed tests and quizzes it was horrible.” She spent a better part of her first year playing catch up with the other students poring over her high school books and learning the background information she needed for medical school. Daria had set out to be a scientist albeit of all the obstacles she confronted. At home she was weighted down with the machismo culture. The same culture was intertwined with a socialist educational system that she refused to succumb even though she was giving up opportunities that would have put her at a playing field with the other students in medical school. She sacrificed her desire to be a medical doctor as the medical school was “too controlled by the government” and instead went into biochemistry after a couple of years. Her enthusiasm for science fueled her as she clambered over the peñones que se cruzaban en su camino.[50]

> Sarida: How did your professors treat you in college?
>
> Daria: I was into science in college. I was very well respected as a student especially by men that were running the lab because that is basically what you find in science. I am the kind of person that asks questions and they liked that as long as they were my professors and it was established that I was below them. Based on the experience I had with my father, I knew when men around me would get uncomfortable. I knew when a man was giving me the ‘you are coming at it too strong.’ Being a very enthusiastic learner I challenge the things that I don’t understand. I would say let’s discuss this and they would object to that behavior because in their eyes that is not how a girl is supposed to behave. She is supposed to be meek and address her professors by excusing herself “Excuse me, may I ask a question please?” They would never let me reach their level.

Women that pursue a career in science or engineering are confronted with the weed-out system in large universities at the bachelor’s level. Women often come across a ‘weed-out’ system of courses based upon a competitive model that is designed to reduce unwanted numbers of prospective students (Etzkowitz et al., 2000).

[50] Boulders that crossed her path

This system has an even more negative effect on women that it does on men because its encoded meanings are ambiguous to young women, whose education was grounded in a different system of values, produce feelings of rejection, discouragement, and lowered self-confidence (Seymour, 1995). Some studies of college science and engineering suggest that gender imbalance is attributed to the structure and culture of the education system, designed for males, benefits male students more than female students (Powell, Bagilhole, Dainty, & Neale, 2000). Etzkowitz and colleagues (2000) described this system as one that tests for characteristics traditionally associated with 'maleness' in Anglo-Saxon societies and is based on motivational strategies, such as the idea of 'challenge', understood by young men raised in that tradition. In addition Longino (1989) suggested that science labs are typically structured hierarchically and that scientists relate to one another through competition. The degree to which women adapt to the system depends upon the extent to which they have already accepted competition as a way of relating to others in high school, or in sports and games. Entry to first year science, mathematics or engineering suddenly makes explicit, and then widens, what is actually a long-standing discrepancy in the socialization experiences of young and men and women (Etzkowitz et al., 2000).

> When I got to the lab after I graduated from college my principal investigator wanted to give me the opportunity to do the Ph.D. with him but just because he wanted me to be his slave. He was nice because he knew I was good. He wanted to keep me but it was always with the approach of how I am going to use you. And he had these big talks with other post docs and I was never included and it was like that in college too. [Daria]

> Sarida: I was wondering if you thought that perhaps the androcentric nature prevalent in science laboratories transcends country boundaries.
>
> Dr. Etzkowitz: Unfortunately, the answer to your question is a strong "Yes." Gender barriers in science transcend country boundaries, even in Scandinavia where formal protections are high; informal discrimination is commonplace.
> (Henry Etzkowitz, personal communication, May 16, 2009)

Daria quickly understood the androcentric culture of the science lab. Being a very enthusiastic learner she challenged the concepts that she didn't understand. Her professors would not engage in a discussion with her if her viewpoint differed from theirs. She was to accept her professor's viewpoint and not object or question the answers she received from them. She was never to reach their level and would always stay below them, a place that made them feel comfortable about having a girl in the lab. Daria is also confronted with another issue. She is being excluded from the "big talks with the post docs" which could have lead to isolation in the lab where she worked.

Daria was used to competing from an early age. She competed at home "I was very competitive maybe because of the way my father was always trying to put me down." She continued to compete for a codiciado[51] place in medical school "in my high school there were just two people that got into the medical program I was one of them that was a big thing for me." Once accepted she realized how far behind she was compared to her peers who had attended science track high schools. She continued to compete in the lab for her professor's attention and approval. By the time she enters the workforce she knows how to act in the androcentric culture of the science lab, always being a hard worker even if the credit would not be hers.

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[51] coveted

In the recent bid for the Democratic Presidential nomination senator Hillary Clinton's concession speech whispered to thousands of woman the androcentric nature of western society.

> As we gather here today, the 50th woman to leave this Earth is orbiting overhead. If we can blast 50 women into space, we will someday launch a woman into the White House. Although we weren't able to shatter that highest, hardest glass ceiling this time, thanks to you, it's got about 18 million cracks in it. And the light is shining through like never before, filling us all with the hope and the sure knowledge that the path will be a little easier next time. (Milbank, 2008, p. A01)

Excerpt from Senator Hillary Clinton's Presidential concession speech.

The androcentric culture in Daria's university lab was the same culture she found in the lab she worked in after she moved to the United States. Interestingly Daria found the same culture in the new lab despite the fact that she had moved away from her country of birth where androcentrism was ubiquitous in the greater society. She was accepted only to be treated inferior and as their errand girl. Perhaps the androcentric nature prevalent in science laboratories transcends country boundaries.

Women around the world face prevalent gender barriers in the scientific workplace. Etzkowitz and colleagues (2000) described how differing socio-economic systems appeared to have little effect on the condition of women in science. In capitalist countries women encounter an authoritarian 'male' style of laboratory leadership and gendered division of labor in the scientific community. In socialist countries women are confronted with the persisting patriarchal culture of the scientific workplace, and are viewed by men as less able to do science even when direct discrimination was prohibited in the socialist ideology (Etzkowitz et al., 2000).

In addition to being part of the societal power pyramid, Barton (1998b) argued that traditional science has its own, internal power pyramid based on competition, capital, and control. Consequently, Dean and Fleckenstein (2007) suggested that these "cultural barriers and rigid stereotypes of what constitute a successful person and personality in science indeed hampers women in scientific careers" (p.33). Professional isolation is another way women are being excluded in the scientific workplace. Rosser (2004a) reported that low numbers of science women faculty resulted in women feeling isolated, having limited access to role models and mentors, and having to work harder to gain credibility and respect from their male colleagues. Women are not being invited as extensively as their male peers to be part of the professional network that leads to contacts and potential job openings. Early inclusion and participation in a strong network provides initial access to a scientific career (Dean & Fleckenstein, 2007; Etzkowitz et al., 2000; Delamont, 1989).

To Iron or to do Science

> Teaching is so important to me. I am so happy with this profession because it was hard for me when I was working in the lab to be able to do everything. I had to put in so many hours and the science environment is not very woman friendly or not Hispanic women friendly. Teaching has giving me the opportunity for more time and freedom. [Daria]
>
> Sarida: Why do you think few Latina women pursue science related careers?
>
> Daria: I think that's a problem that goes beyond the Hispanic culture. It just gets worse in our culture. I think women are a minority in science throughout the world but I think in Hispanic countries it is even worse because science is not easy and you need a lot of skills that are not linked whatsoever to what you are trained to do at home. You cannot bring any background from home to science. For example if you are an executive and work in a corporation

> you will need some organizational skills that you can draw from your background as a Hispanic woman because at home they teach you to be organized. You can take that background and put it to your profession. But science has no relationship whatsoever with ironing so you have to put a lot of effort and be very strong too because there's a lot of people that will snub you because science in the first place is not understood by everybody. It is hard for them to understand that a woman is going into a professional life like that. Then on top of that you are talking about things that they don't understand. I remember the first time I said at home I am going to study biochemistry my grandmother was like what in the world are you talking about? She thought what is that? That doesn't even exist? It is just so far away from everybody's understanding, so far away from whatever skills they teach you at home that it is you against everybody else so you really have to have a passion for it otherwise you are just going to be practical and choose something else.

Journal Entry: "Science has no relationship whatsoever with ironing." Daria's analysis of why Latina women are not signing up to be scientists is so profound. As a Latina scientist she feels that the socialization she received at home did not prepare her with the skills she needed to be a scientist. I wonder if that is the case for other Latina women who aspire to a career as a scientist. Why does Daria think that she cannot take her socialization to a science laboratory?

Not too long ago, most people of European descent understood that there was only one collection of ideas and practices worthy of the name "science"—modern Western ones. Sandra Harding (2006) said:

> It was thought that the knowledge systems of other cultures were infused with magic, superstition, religion, and other forms of irrationalism and anthropomorphism, making them unreliable guides to nature's regularities and their underlying causal tendencies, and leaving the thought of those cultures firmly lodged in the premodern. Such knowledge systems did not deserve the name "sciences," and because of their cultural elements they could not be integrated into a unified or harmonious relation with modern Western sciences. (p. 5)

The global reach of European imperialism has given Western science the appearance of universal truth and rationality; it is a form of knowledge that lacks the cultural fingerprints that seem much more conspicuous in knowledge systems that have retained their ties to comparable knowledge's of nature produced by some indigenous societies (Harding, 1994; Gough, 2002). This lack of cultural fingerprints leads to what Harding (1993) called 'scientific illiteracy', namely, the Eurocentrism or androcentrism of many scientists, policymakers, and other highly educated citizens that severely limits public understanding of science as a fully social process. Turnbull (1997) added to Harding's view by stating that by analyzing diverse knowledge systems we can find ways in which diverse knowledge traditions can co-exit rather than on displacing others. He argued that all knowledge traditions are spatial in that they link people, sites and skills. If we now carry this argument to the door steps of science education than we can see with clarity why women and people of other cultures have been knocking on the door and have yet to receive a warm welcome in the science community.

Harding (1986, 1991, 2006) contended that the androcentric nature of science has not viewed a woman's experience equally as valid a resource as a man's. Scientific inquiry must allow questions that originate in women's experiences. Harding (1991) explained that because the current scientific knowledge has been shaped exclusively by men, science is male biased and that at present the discipline is permeated with European, middle-upper-class, and heterosexual values. It therefore presents a partial or distorted view of the world and represents an excluding knowledge.

As a result girls and women who love doing science are faced with negotiating their gendered identity in a context hostile to the association of science with femininity and womanliness. Furthermore, as they are encouraged to develop feminine traits, they are disabled from being successful in fields that have associated succeeding in science with distinctively masculine traits (Harding, 2006). Harding (1986) highlighted stereotypic dualisms that the androcentric ideology of contemporary science posits as necessary.

> Culture vs. nature; rational mind vs. prerational body and irrational emotions and values; objectivity vs. subjectivity; public vs. private-and then links men and masculinity to the former and women and femininity to the latter in each dichotomy. Feminist critics have argued that such dichotomizing constitutes an ideology in the strong sense of the term: in contrast to merely value-laden false beliefs that have no social power, these beliefs structure the policies and practices of social institutions, including science. (p.136)

It seems that Daria has internalized the dominant discourse of Western science that proposes that her knowledge system is not worthy of being integrated to the dominant discourse of Western science. Perhaps she has also bought into the set of dualisms present in the dominant discourse: tough vs. soft; rational vs. emotional; competitive vs. noncompetitive; masculine vs. nurturing; rigorous vs. delicate. The former socialization skills have been deemed essential to run or work in a science lab. Being socialized with the latter is perceived as preparing you to run a household not a lab. Daria thinks that women who are raised in a Latino household cannot bring any background from home to science because the skills needed to be successful in science are not aligned to what you are trained to do at home. In her words “you cannot bring any background from home to science…

science has no relationship whatsoever with ironing… it is just so far away from whatever skills they teach you at home so you really have to have a passion for it otherwise you are just going to be practical and choose something else." She continued to explain herself with an example of an executive working in a corporation. She said "you will need some organizational skills that you can draw from your background as a Hispanic woman because at home they teach you to be organized." Why does Daria feel that these skills are not necessary in a science lab?

Funds of Knowledge

Sarida: Dr. Moll I was wondering if you thought I could use the 'funds of knowledge' lens to analyze this narration?

Dr. Luis Moll: Gracias por tu nota (thank you for your note). There are indeed many experiences in everyday life that can serve as a basis for the learning of science, some easy examples would include, ideas about raising and caring of animals, about plants, about heat, energy, chemicals, etc...all these experiences lead to the formation of concepts from which the formal teaching of science can proceed...even ironing lends itself to scientific analysis... (Luis Moll, personal communication, May 5, 2009)

The concept of 'funds of knowledge' refers to the culturally based resources of education and knowledge found in Latino families. These historically developed bodies of knowledge (e.g. ideas, practices, traditions, skills) are essential to household functioning and the well-being of culturally diverse families (Moll, Amanti, Neff, & González, 1992; Vélez-Ibáñez & Greenberg, 1992).

> Ezpinoza-Herold (2007) described educación [education] as "a broader concept about personal development in Latino culture than the limited sense of formal intellectual development and academic learning than the equivalent concept 'education' in the English language" (p. 262). Educación in the Latino family include manners, moral values, and rules of conduct, in addition to aspirations and expectations for the future funds of knowledge-based in cultural experience-are rooted in and operate synchronously with this broader concept of learning and social development in the Latino world (Espinoza-Herold, 2007).

Through the eyes of this Latina scientist, I can appreciate how she perceives that traditional socialization that begins at home is not compatible with the masculine characteristics that are a 'prerequisite' of becoming a scientist. This issue of compatibility has been established by a society that continues to perpetuate science as an androcentric endeavor. If Western science culture would embrace the socialization of women and people of other cultures then perhaps Daria and other women would find that the skills they received at home would be valuable even in a science lab. If Daria would see merit in her socialization she may have given an example of how research scientists "need some organizational skills that you can draw from your background as a Hispanic woman because at home they teach you to be organized." Instead she used the example of an executive working in a corporation. Daria may be one of many Latina scientist that felt she had to be "practical and choose something else" because she embraces the dominant discourse that embodies masculine traits as those needed to be a scientist.

> Intelligence is not linked to the Y chromosome; to exclude half the population from scientific inquiry is to deny us, as a nation, an extraordinary amount of ability and intelligence. The need for scientific brainpower will only increase as we proceed into an information age in which science and engineering will touch our lives like never before. (Colwell, 2000, p. ix)

A Mommy Friendly Environment

I came from research to teaching. I remember one of the big things that led me to teaching is that I was looking for a more mom friendly kind of environment. I worked in a place where I worked just with men. Research is a very male oriented field and it was very stressful to me. My Principal Investigator and I had a very nice professional relationship; I know he had a very good opinion of me from an intellectual point of view. Everything changed when I got pregnant. My PI was very upset because I had gotten pregnant there is just no other way around it. I could not believe such a ridiculous idea but then I realized that there was no other explanation. He was very frustrated that I had decided to have a child because he had plans for me he wanted me to do the PhD in his lab. I got this feeling that I had made a mistake, my son was like a mistake. It wasn't like that in my personal life. But that's the way they made me feel. My pregnancy was very stressful. When I had my baby I decided that I just couldn't handle my son's childhood going through that same kind of thing. At that point I realized that I was not going to have his support and his support meant the support of the whole community. Especially because I wanted to do my PhD and the circumstances would have been horrible. I remember being driven by the need to find a job where I am still doing science but my children are not a mistake. Being a mom has to be something positive not something bad that I have to hide from people, like a disease or something. I couldn't put the same amount of hours in the lab anymore but I still wanted to be a scientist and decided to teach science. [Daria]

Sarida: Did you lose interest in being a scientist?

Daria: My interest never went away. It is actually hard for me to think about those days in the lab because I miss it so much! I miss doing research, reading papers, working with my colleagues, going to those weekly meetings to discuss our progress or problems and brainstorming together. I miss the professional, although informal, environment. I really miss it! I think that biological research is tremendously underpaid and women in research are probably just a subcategory in that big problem that United States faces. I couldn't take more than 4 or 5 days straight of vacation time to spend with my children because that made my boss very unhappy and as the PI he was the one in charge of renewing my contract. And it even got to the point where

> it was hard to schedule an appointment to take my children to the Dr. because it was seen as a problem, while other PhD students from other countries were willing to sleep in the lab. I actually believe that the science research field today is for women to spend a few years after college, before getting married and having children, and then they should transition to related fields less competitive and more mommy friendly, as teaching for example. I don't regret my years in the lab or complain about the fact that I didn't fit after a while. I enjoyed the ride and was able to fulfill my childhood dream of working in research. I was not willing to give up on having a family, or neglecting mine, to keep doing genetic research. The way I see it, it was a great opportunity.

> Traditionally, scientific research in all disciplines has demanded single-mindedness, exclusive devotion, and aggressive self-promotion that are not appealing to many women and many ethnic or cultural groups historically underrepresented in STEM disciplines. The image of the scientist in the laboratory at all hours of the night and weekend is not far from the reality sometimes demanded. Scientific research does not easily allow for other pursuits such as care of a family, especially during the early years of a career. It is much easier for men to conform to this obsessive standard than for women. (Dean & Fleckenstein, 2007, p. 33)

Daria described how her job environment became hostile towards her after she became pregnant to the extent of making her feel like she had made a mistake for having the desire to have children. She is very clear in expressing that her children are not a mistake; rather, she starts to view her job as an obstacle to motherhood and feels the need to find a job that will accommodate her desire to be a mother. Not being able to or willing to neglect her family to spend weekends and nights in the lab she looks into teaching science.

Daria finds herself once again at a fork in the road. One path is filled with precipicios y peñones[52] rolling down faster than she can scramble over them. She has been on this path for several years; it is the only path she thought she would take. She knows where the path will lead her. It is different now; it is more hostile than before. At this fork

[52] Precipices and boulders

she has come to terms that if she continues down this familiar path she will not have the support of her principal investigator and his support means the support of the whole community. It will become increasingly more difficult to get up and dust off. The other path is unfamiliar yet inviting. The environment is "very mommy friendly," with the flexibility to take the children to doctor's appointments and spend time vacationing with her family, where your free time is respected without questioning your loyalty or how good you can do your job, where you would not be questioned because you leave at the time you are supposed to instead of five hours later. You can attend parent conferences and open house meetings at your children's schools without having to slip out incognito. The closer Daria looks down this path the more it feels like the path she wants to be on, not because she is giving up on her dream to be a scientist but because she wants to widen her lens and include her children in that dream.

> To a Latin[a], the world consists of a pattern of intimate personal relationships, and the basic relationships are those of the family. An individual's confidence, sense of security, and identity are perceived in the relationship to others who constitute the family (Fitzpatrick, 1987).

Journal Entry: Daria has such love for scientific research. Her eyes light up every time we talk about her days in the genetics laboratory. She seems to be at peace with her decision but I wonder if she has professional regrets. She is now able to spend more time with her family, but does she dread getting up every morning to go "baby-sit" 28 kids? It must have become more unbearable at the lab than she has let on. She had the most important quality required to succeed in research—love for scientific research.

If women persevere in science or engineering and start a career in these areas, they now encounter a new challenge: balancing career and family life. The incompatibility of professional life and personal life is the major hurdle for women aspiring to career success (Rosser, 2004b). Despite the increased entry of women in science, opposition to their full participation continues. In order to compare women's experience in science in different countries Etzkowitz and colleagues (2000) addressed the following question: 'Is women's limited participation in science an inevitable feature of the persistence of traditional gender roles?' They found that women regardless of the country encountered a rigid structure in the scientific workplace that does not take into account their need for flexibility so that they can combine career and family.

Elga Wasserman (2000) noted that the less a woman's chosen career is consonant with a "feminine" role the more directly her career may be viewed as in conflict with the role as wife and mother and "that many of the barriers that present-day scientist come across are rooted in this disconnect between the realities of women's lives and assumption about their lives based on traditional stereotypes that remain entrenched in our society" (p. 26).

Cultural norms still reinforce the traditional division of labor (Dean & Fleckenstein, 2007; Etzkowitz et al. 2000; Evetts, 1996), in which women are expected to fit careers around childbearing and husbands' career needs (Wasserman, 2000), viewing the husband's job as essential to the economic well-being and survival of future families (Coser & Rokoff, 1971; Machung, 1989).

Women may fail to pursue nontraditional female careers in science and technology not because they doubt their ability to perform the requirements of these careers (Stickel & Bonett, 1991) but because they had doubts about combining family life with a science career (McLure & Piel, 1978; Stickel & Bonett, 1991).

Implicitly 'male' standards of behavior seep into scientific time and space, "including a belief that a researcher is most productive when their time is devoted to investigation to the virtual exclusion of all other aspects of life" (Etzkowitz et. al, 2000, p. 26). Women often unconsciously shape their career, and lifestyles around these normative constraints (Bianchini et al., 2000). The explicit norm of competition in science does not accommodate women's biological clock (Horchschild, 1975), which often is out of synchrony with tenure clocks (Dean & Fleckenstein, 2007) making it relatively more difficult for married female scientists in the early stages of their careers to balance work and family (Xie & Shauman, 2003; Etzkowitz et al. 2000; Bianchini et. al., 2000) forcing female scientist striving to meet tenure deadlines in academe to choose between having children when they are young or to focus on their scientific careers when young and delay having children until they are older, when it may be more difficult (Dean & Fleckenstein, 2007; Etzkowitz et al., 2000; Wasserman, 2000). In 2001, the National Science Foundation (NSF) initiated a new awards program, ADVANCE, which focuses on institutional rather than individual solutions to empower women to participate fully in science and technology.

Survey responses from almost 400 Professional Opportunities for Women in Research and Education (POWRE) awardees from fiscal year '97, '98, '99, and '00 reveal the barriers that academic women scientist and engineers identify as most challenging for their careers. Sue Rosser (2004b) found that POWRE respondents considered balancing career and family the most significant challenge facing women scientists and engineers today. Based on these results, institutions must seek to remove or at least lower these and other barriers to attract and retain women scientists and engineers. One breakthrough in favor of women scientists came about on January 29, 2001 when research universities responsible for maintaining women and girls at the periphery of the science communities recognized that indeed institutional barriers still exist for women. The presidents, chancellors, provost and 25 women professors of nine research universities met at MIT in an unprecedented dialogue on equitable treatment of women faculty in science and engineering. The following statement was issued at the end of the meeting: “Institutions of higher education have an obligation, both for themselves and for the nation, to fully develop and utilize all the creative talent available. We recognize that barriers still exist for women faculty” (Joint statement by nine university presidents on Gender Equality in Higher Education).

They agreed:

1. To analyze the salaries and the proportion of other university resources provided to women faculty.
2. To work toward a faculty that reflects the diversity of the student body.
3. To recognize that this challenge will require significant review of, and potentially significant change in, the procedures within each university, and the scientific and engineering establishments as a whole.

Daria: My mom. She was looking at the whole issue from a different perspective she was already a teacher and I remember she was supporting me a lot with my daughter. I remember in the summer thinking I could be doing this with my daughter instead of this. I did not have any flexibility. I could not even take a whole week off in that job. The experiments need you full time. It's a very competitive field and you are competing with people from all over the world that want to come to the United States because it's the country where there is money for research. Basically you have a lot of 20-ish year old kids who are here just to do that. I think my mom understood my struggle so she told me you could teach science. She said to me 'you could have a profession, and at the same time you could have the flexibility.' She helped me in that transition.

Sarida: Why did you think teaching was the right career path for Daria?

Sara: *Mira te voy a decir una cosa Daria es una profesional pero es una madre excepcional. Ella adora la vida en familia. Ella adora la vida con sus hijos. Cuando nosotros llegamos a los Estados Unidos Daria llego casi con 10 anos de más de lo que idealmente hubiera podido ser. Cuando Daria decidió bueno yo quiero estudiar medicina que fue su sueño de toda la vida que en nuestro país no lo hizo porque no quería trabajar para el gobierno comunista. Cuando llego aquí se no sentamos junta bueno con 1500.00 dólares te van a dar para que hagas un carrera de medicina o haga un Ph.D o haga eso. ¿Tú quieres eso? Tu quieres llegar a los Estados Unidos a empezar otra vez a sacrificarte después que te sacrificaste tanto en nuestro país porque ella hizo una carrera con 80 mil sacrificios hasta pasando hambre porque no había comida, vamos a estar claro. Yo le dije: '¿Mami porque no tratas de compaginar las dos cosas porque no tiras una buena carrera como maestra? Porque tiene dos meses de vacaciones al año. Tienes 15 días en diciembre puedes disfrutar tu familia, tu casa tu vida y llegar ya a la madurez y a la vejez. Tú no tienes techo siendo maestra. Deja que tu marido vaya y gane dinero. Tú vas a ganar mucho dinero también pero vas a tener una vida. Yo quiero que ella tenga una vida por eso yo la embulle a ella para que fuera maestra, ella se lo merece. Yo realmente le dije yo si realmente la impulse para también la sigo impulsando para que no se quede simple de maestra. Porque yo no puedo hacer un PhD, pero ella sí. Cuál es el problema de hacer una investigadora una researcher en el laboratorio donde todo el mundo la tenía a esto a lo otro le salió embarazada y la empezaron a mirar mal. Oye tú no te mereces eso tú te mereces el cielo, el cielo.* [Look, Daria is a professional but she is an exceptional mother. She adores her family; she adores her life with her children. When we arrived in the United States, Daria decided she wanted to study medicine which has always been her dream, but she didn't want to work for the government in our country. I sat her down and said is this what you want? Do you want to relive all the sacrifices that you went through to get your degree? She finished her career with 80 million sacrifices including going without food

> because there was none to have. So I said to her why not try to put both worlds together. As a teacher you will have time off with your children. Allow your husband to make the money. You will make money also but you will also have a life. I want her to have a life. She deserves to have a life that is why I convinced her to become a teacher. I am pushing her not to stay just as a teacher, because I can't do a PhD, but she can. Why be an investigator where they had her running around like a maid? She became pregnant and they started giving her dirty looks. She does not deserve that; she deserves the stars.]

Daria has now started walking down the path where she can start to compaginar[53] her science background and the family life that she cherishes. Teaching science seems to be the perfect fit. She can use her science background to "teach children how to think scientifically, how to approach things inquisitively, and follow a series of steps the scientific way of thinking, even if they are not going to do science." She can spend the summer vacation with her children and as her mother sums it up "have a life."

The path Daria has chosen does not come free of sharp curves and potholes. She has transitioned from a research scientist to a high school science teacher—two different worlds. It has not been without its frustrations and disappointments that she has begun this new career path. As a child she wanted to feel like she "was doing some kind of work that was important for everybody," work as a scientist in a "lab and do important things and mysterious things and discover something important and make some kind of contribution." As a teacher she may not do mysterious things but she will do important things that will have an impact on the children she teaches.

> Sarida: What has been the most difficult aspect about transitioning careers?
>
> Daria: I think I miss that feeling of being relevant to the world. It's not that my job as a teacher is not relevant. The particular setting where I'm working is responsible for that in some way. I think that if would have gone to work at a different school with a different population better socio-economic level, I

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[53] Put both worlds together.

> would feel more relevant. Working at a low socio-economic environment with a lot of minorities African American, Hispanic populations and so forth doesn't make my job feel so relevant because the environment is not that professional. Sometimes I feel people have no idea how smart and creative I am. And how much I know about so many things, how much I have traveled or how much I have read. Sometimes it just feels I'm babysitting 28 kids and doing some irrelevant paperwork to look like we're busy. I feel it's an extension of what I do at home when I take care of my own kids. It doesn't feel that relevant anymore but again it may be not just something intrinsic to the profession but the place where I am practicing. I guess that I don't feel that important or relevant many times I don't feel that I am making that contribution that I wanted to make to the world. It's not that what I do at home is not important. It is so important that I ended up leaving the lab and coming to teaching that's how important my children and my house became. I wanted to feel that I could get in my car go away and do something relevant. The lack of intellectual challenge, the lack of professionalism, and the lack of teachers with the right credentials, that's been hard. It doesn't feel like you are special and can do something that nobody else can do.

It is useful to compare the "science" of education with the "science" of medicine. Ginsburg (1988) described both as applied fields that make use of information and techniques developed in the natural and social sciences. The difference according to Ginsburg is that one has high status and the other doesn't. The difference appears to be the seriousness with which medicine and other more traditional professions address the need for rigorous study prior to practice. Extensive advanced study in biology, chemistry, physics and other background courses is required before the techniques of medical practice are learned (DeMarrais & LeCompte, 1999). However DeMarrais and LeCompte (1999) described, the four years of teacher training as being crowded and not spending enough time for studies of the social and psychological anatomy of learning or the logical structure of mathematics and social studies. Another issue is the entry into the profession.

> In medicine and law, panels of doctors and lawyers set licensing standards. Teacher certification is determined by market factors and legislation. In addition, individual school districts can waive specific requirements if qualified personnel are not available. Teachers often are assigned to teach in their minor area of study, or in areas for which they do not have any preparation for such as mathematics and science which experience chronic shortage. Hospitals would never be permitted to hire a dermatologist to do brain surgery, not matter how severe the shortage of brain surgeons. Nonetheless such practices are routine in education (DeMarrais & LeCompte, 1999).

Daria has gained a 'mommy friendly environment;' however, she has lost her sense of relevance. She does not "feel important or relevant many times" or that she is making that contribution that she wanted to make to the world. Transitioning from a research lab to a high school science classroom is a significant change in pace and environments. As a scientist she has so much to offer a high school science classroom having been involved first hand in the scientific process. She brings knowledge and in depth understanding of the 'language' of science and its intrinsic nature. She is bringing real world experience into a classroom and making it relevant to the students, not just dictating mandated state standards for the students to memorize. Science is not about memorizing key terms, it is about being scientifically literate. Science is not about reading from a recipe of steps to perform a laboratory experiment. It is about inquiry through laboratory work and finding different ways to solve problems. Daria has all that to offer her students and more. She is smart, creative, and has traveled around the world; yet she has not been able to get past

"babysitting 28 kids and doing some irrelevant paperwork to look like we're busy. I feel it's an extension of what I do at home when I take care of my own kids." She doesn't feel that what she does as a science teacher is special or "something that nobody else can do" which she attributes to the lack of professionalism, intellectual challenge and the shortage of teachers with the right credentials. Daria is accustomed to the culture of the science laboratory which demands specialization. This may account for why Daria is having difficulty adjusting to the educational system that at times waives requirements due to shortages of qualified teachers.

Journal Entry: I can relate. Teaching science has stopped being about making our students scientifically literate but about preparing the students for mandated standardized state tests. Gone are the days of creativity or of inquiry based science labs. I feel I am running a race with time to rush through a set of standards chosen by some invisible committee in a tall building who expect the children to learn science the same way a third grader learns the multiplication tables: A set of standards to memorize.

> Sarida: What has been the easiest aspect about transitioning careers?
>
> Daria: That the environment is very mommy friendly. I feel so happy that I can focus on my children. I can go to the doctor and it's not a big deal. I can go to a parent conference with my children's teacher nobody rolls their eyes like children what is that? Because we work with children everybody understands your role in your family and how important family and parenting are. When I was in the lab my children were seen as a problem and obstacle like an alien situation. It gives me a fulfillment that my other job didn't give me even when it felt maybe more important because I was doing research in a lab, and changing the world and discovering things. But the stories of my kids my students make this job so emotional so personal. I like that. I think it makes me feel that I am doing something important.

Daria is willing to overlook the shortcomings she has found teaching because she can focus on her family. It is "so important that I ended up leaving the lab and coming to

teaching that's how important my children and my house became." She has found a different kind of fulfillment that being a research scientist was not able to give her. As a scientist she felt she was doing something important because she was "doing research in a lab and discovering things." As a teacher she has being able to focus on her family. As her mother described Daria, "she adores her family; she adores her life with her children." She has also found that her students are not just individuals sitting in her classroom; they have stories that have made teaching emotional and personal. She is a chapter in a child's story. That is, after all, doing something important.

Journal Entry: I felt a little bit intimidated today while I was sitting around Daria's kitchen table for our fourth interview. I had a chance to look around the house. Her house was immaculate. While she started dinner she was on the phone with her mother who was on the way for my interview with her. She was peering over her daughter's shoulder who was sitting around the kitchen table trying to figure out an English assignment. She had already been to work all day teaching, and her house looked as if she had been home all day cleaning and cooking just waiting for her family come in. She looked over Sophia's shoulder to examine her homework and reminded her that she couldn't help her with English but she could help with biology and chemistry. I felt like such an intruder in her sanctuary. I was the only thing out of place in her immaculate home. I had the sudden urgency to go home to my own kitchen, cook dinner for my family, read my girls a bedtime story, and tuck them in for the night.

Wanting it all comes with Guilt

> My concept about being a woman has expanded; it's not that it has shifted to a different place. I am so many different women. At home I am a typical Hispanic woman. I am cooking, and folding everybody's laundry. But I am not restricted to cooking and taking care of my husband. I work full time and

> I have my own intellectual challenges at work. I want to have an advanced degree in education so now I am a student. [Daria]

As Daria has settled into teaching science she has decided that she is going to get a Master's degree in science education. Her mother has been encouraging her to get her PhD.

> Daria: I was talking to my mom yesterday and I was telling her that the hardest part about graduate school beside the books I have to read is that I miss my family so much. I feel guilty a lot of times and unfortunately on the weekend I try to overcompensate. I may be spoiling my children because I feel guilty that I am not there for them and I am so busy. My daughter needs somebody to be on her all the time. Is she on My Space? Is she talking on the phone? Maybe she needs to have a conversation and I am not there. Because they are different ages my son needs a bath and reading time but she needs someone to talk to right now and I am not there and she may feel lonely.
>
> Sarida: You became a lawyer going to school at night; do you share Daria's feelings of guilt?
>
> Sara: *Es muy duro muy duro solamente el afán de superación el afán de ir más allá de lo que había sido mi familia. Yo siempre me impuse a mi misma hacer lo que no se había hecho nunca en mi familia yo siempre yo siempre dije siempre que pasaba por la universidad, la universidad tiene una escalinatas gigantes la alma madre queda allá arriba y el edificio queda más arriba pero tu cuando viene subiendo por la calle San Lazaro lo primero que te encuentra es la escalera de la universidad y el alma mater es un edificio bellísimo en los años treinta y yo siempre que pasaba por ahí decía yo nunca subí las escaleras de la universidad porque yo siempre dije que yo iba a subir esas escaleras cuando yo fuera universitaria. Entonces yo como todo me llego un poco tarde me desvié y hice una escuela digamos técnica yo hice traductora e intérprete de inglés eso me daba el nivel de highescul pero no me daba el nivel de college. Pero ese certificado me daba para hacer algo para hacer algo en la universidad entonces cuando yo regrese de Venezuela yo decidí que yo quería ser abogada yo quería estudia en la universidad y me y fui la primera mujer graduada de la faculta de derecho independiente. Ósea yo iba a la universidad examinaba me hacia mis propios textos. Por ejemplo todo el movimiento obrero en mi país lo que la gente está estudiando es lo que yo deje escrito. Ósea yo hice sin computadora yo hice una compilación de todas las leyes de los años 40 como el movimiento obrero como porque para esa asignatura no había texto no había libro así que yo me metí e hice una investigación y eso cuadernos mío han seguido rodando en mi país me dicen siguen rodando lo que la gente está estudiando porque no se escrito nunca nada. Entonces yo si yo tenía que trabajar ocho horas. Yo me quedaba estudiando hasta las tres y cuatro de la mañana después me*

*levantaba a las ocho de la mañana me iba a trabajar y así me metí tres años. Entonces yo tuve que fajarme con el ministro de educación de mi país porque yo quería examinar 16 asignaturas en un año y no me lo permitían y fui a reuniones y contra reuniones y contra reuniones y hicieron un decreto especial para que todos lo que estábamos en esa facultad que éramos 8 que habíamos llegado hasta allá arriba nos dejaran hacerlo y lo hicimos por eso me pude graduar en tres años y la prisa de graduarme en tres años era porque yo sabía que yo estaba ausente de mis hijos yo estaba ausente de la vida de ellos y yo me desesperaba pero no tenia alternativa ósea le daba gracias a Dios por tener a mi mama. Mi mama para mí fue un no era la mejor abuela en el sentido de educar pero ella lo cuidaba como yo sabia a la única persona en mi vida que yo le deje a mis hijos fue a mi mama a mas nadie. Nadie puede decir que me cuido a mis hijos nadie ni una vecina ni una hermana nadie mi mama que era la única persona que a mí me daba la confianza que mis hijos no iban acostarse sin comer que mis hijos se iban a bañar e iban a tener su ropa limpia. Con mucho sacrificio de mi madre con mucho sacrificio de mis hijos porque yo se que ellos tuvieron que sacrificarse con eso y con una terrible presión en contra de mi marido yo me hice abogada. Yo lo único que tengo es un solo regret en mi vida y es no haberle dedicado más tiempo a mis hijos. Y eso creo que lo voy a llevar por toda mi vida. Pero no es porque yo haya sido ni mala, ni egoísta, ni nada, sino porque la vida me metió en una vorágine que me perdí y nunca tuve al lado a nadie, mi marido no me ayudo en eso. [*It is very difficult only the ambition to go further than what my family had been. I always pushed myself to do what had never been done in my family. In front of the University is a huge flight of steps. On top of the steps sits the beautiful alma mater building. Every time I passed in front of the university I would say to myself I will not walk up those steps until I am a student at the university. I went to a technical school to become an English interpreter which was compatible to a high school diploma. That certificate allowed me to start a college degree. I decided that I was going to study law. I was the first woman to graduate from the college of law in independent studies. I had to make my own textbooks. I researched and wrote a compilation without a computer of the complete labor movement of the 40's in my country. The notebooks I wrote are still being used today because nothing has been written in that topic since. I had to work an eight hour days. I would study until three or four in the morning go to bed and wake up at eight to go to work. I did this for three years. I graduated in three years after much opposition from the ministry of education. My big rush to graduate in three years was because I knew I was absent from my children's life. I would become desperate but I did not have another choice. I thank God for my mother. My mother was not the best grandmother to educate my children but I knew she took care of my children like no one else could. I felt confident that my children did not go to bed hungry, and that their clothes were clean. With many sacrifices from my mother and my children and with the terrible pressure from my husband I became a lawyer. My only regret in life is not having dedicated more time to

my children. I will carry that with me the rest of my life. But it wasn't because I was bad or selfish. Life tossed me into a tornado and I got lost. I never had my husband at my side to support me.]

University steps that Sara mentioned

Journal Entry: I have to say that I feel relief to know that other women feel guilty about wanting to have it all. Is the science education discourse so frayed of text that includes women scientists who have chosen a 'mommy friendly career' that I have to look for other women who, like me, have chosen to accommodate more time with our families? Sadie and Sophie I wish I could give you back every hour I have spent away from you finishing this chapter in my life.

Elga Wasserman (2000) took it upon herself to contact all 86 living women members of the National Academy of Sciences in the biological, physical, mathematical, and engineering sciences who had been elected to the Academy between 1957 and 1996. They included three Nobel laureates, eight MacArthur "genius" award winners, and 18 recipients of the National Medal of Science. The main themes that Wasserman found were the dilemma of balancing career and family responsibilities. Almost four-fifths of the women in the Academy married, and more than three-fifths had children. The issue of whether and when to have children is closely intertwined with the career plans for most women scientists since the childbearing years coincide with periods in which tenure decisions are made. The majority of Academy members who raised children used day time household help, day care, or a combination of both. Virginia Valian (1999) noted that most working mothers cope not only with the dual demands of work and home but also with feelings of guilt and worry about their children's well-being. One member said: "Stress the message that you can't do everything. A high-level science career requires help with home and kids…women must be willing to accept this" (p.192).

Two generations of women each with ambitions beyond the walls of their home. Each has had to deal with wanting to have it all and the guilt that grips at their soul. Both feel remorse over the same issue, leaving their children for others to care for. The 'others' that are taking care of the children in one case is the children's father and in the other case the children's grandmother. They have left their children in the care of other family members to

pursue a better education. Sara is the first woman in her family to attend and graduate from the university yet, she does not show much pride in this feat that she has accomplished albeit the terrible obstacles she faced for three years. In the end she laments the sacrifices her children had to endure in order for her to become a lawyer and her regrets for not spending more time with them. In her words: *Pero no es porque yo haya sido ni mala, ni egoísta, ni nada, sino porque la vida me metió en una vorágine que me perdí nunca tuve al lado a nadie, mi marido no me ayudo en eso*.[54] Daria, like her mother, also laments not being able to be there for those few hours she spends twice a week in graduate school. Being able to attend the university to study after already putting eight hours of work is not an easy task. Wanting to do it should come with a sense of pride. Instead it comes with a guilt yoke that they carry around their neck. It may seem then that the values promoted in their cultural of a woman's role in the family nucleus is so entrenched in their very being that wanting more than a husband, children and a house to care for is perceived as a selfish act through the eyes of their soul. In their culture you are not a good wife or mother if you don't take care of your husband, children and the house.

Journal Entry: On the fourth day that Sadie was born, she was in class with me. I was finishing my Master's degree. I had convinced myself that I could do it all. Take care of a new baby, work full- time and study at night between feeding times. Eight years later, I am now sitting in class holding Sophie; she is a week old. Once again, I think: I can still do it all. My little nenas' eyes have patiently followed me. Is this your last class Mama? How many more pages do you have to write? Mama let's pretend we are astronauts and we can wear the pans as helmets. Can you take me to the movies tonight? The baby holds up her

[54] It is not because I was bad or selfish or anything like that. Life put me in a tornado and I became lost. My husband did not help me.

hands and says "I you Mami."[55]*Each time I pass her to Papi, and each time I tell my nena "Maybe later" the grip that guilt has on me squeezes the very last breath from my soul. Have I interpreted their guilt through my eyes? Have I been able to separate their narrative from my narrative that is always peeking out? Whose story am I analyzing theirs, mine or ours?*

Michelle Obama has been both admired and criticized for being a successful working mother who decided to take a backseat to her husband's ambitions. But she is not listening to the critics. "I know who I need to be," she tells me as she cools her heels in a borrowed conference room between campaign appearances in New York. "I've come to know myself at the age of 43. Now maybe if I were 23 or 33, I'd still be struggling with that. But I'm a grown-up. And I've seen it up, and I've seen it down, and I know who I need to be to stay true to who I am and to keep my family on track. We don't always figure that out for ourselves as women." Barack Obama, chatting by phone from the trail, says, "There's no doubt that a lot of women identify with Michelle, because she's prototypical of women who came of age when they had career opportunities that didn't exist in the past, yet they continue to cherish and value their family lives." Still, Michelle admits it's not easy. "I think my generation of professional women is sort of waking up and realizing that we potentially may not be able to have it all—not at the same time," she says (Ifill, 2008, p. 21).

Excerpt from Gwen Ifill's article in Essence Magazine: *Michelle Obama: Beside Barack*

[55] I want you Mami

Through our Grandmother's Eyes

We can't run away from what we got from our grandmothers even if we want to. Those ideas are still somewhere, and we are judging ourselves through our grandmother's eyes we can't help it. [Daria]

Daria: I learned to iron those shirts. I have become my grandmother. My house cannot be a mess it makes me feel bad because I know that in my culture you are not a good wife or a mother if you don't take care of all that for your children and your husband So I still got trapped into that.

Sarida: What did you get trapped into?

Daria: If I am going to go work it's because my house is already taken care of. I am still thinking that having an opportunity to have a career is a privilege instead of a right. It is like you have to finish all your homework here at home before you go and play out in the real world. That's the feeling I have inside of me. That's what I got trapped into.

Sarida: Do you judge yourself through your mother's eyes?

Sara: *Yo pienso que sí. Yo me veo mucho en mi mama en muchas cosas. Ella tenía el espíritu de familia. Ese es el que nosotros tenemos. Nosotros tratamos de ser una familia muy unida. Yo creo mucho en la familia. Creo en las mujeres de mi familia muchísimo.* [I think so, I see a lot of my mother in me. She had family spirit. That's the one we have. We try to be a very close knit family. I believe in the family. I believe in the women in my family.]

Never manage to make it all happen, and never expect to make it all happen. I think, you know, the first thing that you need to do is to be kinder to yourself. Many women think that they have to achieve that perfect balance between family and work and everything else. And that balance just does not exist. There are some days when you feel it's all—you've got everything under control, and other days where it's just all chaotic. It's about, you know, reorganizing your priorities every day, about being flexible, about accepting help and asking people to assist you. And it's about having a bit of a sense of humor, and just being kind to yourself.

[Queen Rania of Jordan in an interview that aired October 19, 2008 with Fareed Zakaria of CNN's Global Public Space (GPS)]

In the end Daria is a product of the values she rejected early on in life. Daria spent her early years wanting to be a boy, to be taken as a boy. She did not want to learn how to iron those shirts or clean a house. She was dreaming about being a scientist working in a lab doing mysterious things and discovering something important. Did this dream slip away from her? Or did she expand this dream to include what she had come to cherish so dearly, her family? Today she thinks that to "have a career is a privilege instead of a right." It seems that Daria has become one of the woman that Michelle Obama described as "my generation of professional women who is sort of waking up and realizing that we potentially may not be able to have it all—not at the same time" (Ifill, 2008). Perhaps the time came for Daria to be practical and choose something else. For Daria that something else has meant having it all. She found a way to compaginar sus dos mundos.[56]

[56] Found a way to put both her worlds together

CHAPTER 4

DISCUSSIONS & IMPLICATIONS

Introduction

Daria has now finished her third year as a ninth grade biology teacher. Even though she is content with her new teaching career, she tears up when she talks about her days as a molecular biologist. She does not regret her years in the lab or complain about the fact that she didn't fit after a while. She enjoyed the ride and was able to fulfill her childhood dream of working in research. She was not willing to give up on having a family in order to keep doing genetic research. Daria's daughter, Sophia, has experienced her mother's transitioning from a research scientist to a science teacher. What effect will Daria's choice to transition careers have in her daughter's future career path? For the time being, Sophia wants to follow in her mother's footsteps to be a medical doctor, while simultaneously echoing her grandmother and mother's view that being a woman means being a mother who is able to go out and support her family the best you can. How will Sophia's cultural upbringing influence her if she finds herself at the same fork in the road her mother found herself in?

> Sarida: Your mom has talked a lot about you Sophia, but one of the things that your mom talked about is not having time for you when she was working in the lab.

> Sophia: The thing I remember the most is the summers because whenever she was working she had to work over the summer and now she's home the whole summer. That's the one thing I do remember.
>
> Sarida: Do you know what you want to be when you grow up?
>
> Sophia: I want to be a doctor. I am just very interested in the human body. I just think it's very interesting how it works and I also like to help people.
>
> Sarida: Do you think your mom will support you if you were a doctor?
>
> Sophia: Oh yeah, Oh yeah I think she would support me no matter what I decided to do. But I think it makes her a little bit happy that I want to be a doctor because that's what she wanted to do.
>
> Sarida: What do you think it means to be a woman?
>
> Sophia: I don't know… I think it means being strong and being able to support yourself no matter what situation you are in and to be able to get through it. If you have kids to take care of them the best you can.

From a young age, Daria's lived experiences led her down the path she has chosen to follow. Her ethnicity, class, and gender significantly amoldaron[57] her role as a mother, a wife, a scientist, and, later, a teacher. While certain aspects of her story are unique, much of what I recorded fit well into the body of existing research concerning other women scientists. When I took a closer look at her narrative, the differences began to speak loudly. Daria's culture, language, and ways of knowing are different from those that are legitimated not only in the science community but also in the science education community. These differences have left Daria on the doorsteps of these communities and at times she has even been swept under the welcome mat. Atwater (2000) described that many studies dealing with gender largely fail to acknowledge the ways in which ethnicity, class, gender, language, lifestyle, and religion interact to create the experience of an individual, leading to the resulting message that "White females are the norm for gender issues" and "*gender* has

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[57] shaped

become a code word in science education that refers to White females' ideas" (p. 387). Barton (1997) described the discourses of science and education as guided by "a discourse that does not include the essence of our lives as gendered raced and classed individuals" (p. 143). The science education community's exclusiveness has discriminated against Daria's gender and ethnicity and has made it seem as if she is deficient. Barton pointed out that feminist theory provides a lens from which to reflect on inclusiveness in science education. Barton explained that this effort stems from attempts to rethink the nature of science and science education rather than from a belief that equality in the sciences can be attained through the implementation of compensatory programs for women and minorities. Barton urged that the focus should shift from "centering on the deficiencies held by women or minorities to deficiencies and discriminatory practices in science and education" (p. 141).

Deficiencies and discriminatory practices in science and education begin early with school-based barriers. Studies of elementary-, middle-, and high school science demonstrate a persistent pattern in which teachers give more attention to boys' scientific interest and provide them with more science experiences (Eisenhart & Finkel, 1998). Girls and boys are not necessarily recipients of the same type of science-related experiences, and girls have fewer opportunities to use tools and equipment in schools even when they are registered in the same classes (Jones, Brader, Carboni, Carter, Rua, Banilower, & Hatch, 2000; Jones & Wheatley, 1990). Women who persist in pursuing a career in science or engineering are now confronted with the weed-out system in large universities at the bachelor's level based upon a competitive model that is designed to reduce unwanted numbers of prospective students (Etzkowitz et al., 2000). Other studies of college science and engineering suggest that gender imbalance is attributed to stereotyped expectations about who should participate in

science and engineering (Steele, Reisz, Williams, & Kawakami, 2007). These stereotyped expectations follow women scientists to the workplace. Lawrence Summers (2005), president of Harvard University, suggested that

> the most prestigious activities in our society expect of people who are going to rise to leadership positions in their forties near total commitments to their work. They expect a large number of hours in the office, they expect a flexibility of schedules to respond to contingency, they expect a continuity of effort through the life cycle, and they expect--and this is harder to measure--but they expect that the mind is always working on the problems that are in the job, even when the job is not taking place. And it is a fact about our society that that is a level of commitment that a much higher fraction of married men have been historically prepared to make than of married women.

These comments not only reinforce the stereotype in our society that these fields are not appropriate for women (Steele, Reisz, Williams, & Kawakami, 2007) but also support society's subtle discriminatory gender norm expectations of women's obligations to family (Harding, 2006).

The purpose of this study was to explore the career transition of a Latina former scientist from a research scientist to a high school science teacher and the lived experiences that influenced her career transition. This qualitative study was grounded in feminist perspectives. Feminist research focuses on analyzing and understanding gender within the context of lived experiences; it is committed to social change, and to challenge thinking about researcher subjectivity and the relationship between researcher and the researched (Reinharz, 1992).

Harding (1991) emphasized that feminist research should begin with women's lives. From a feminist perspective, the participants would feel free to reflect on their lived experiences in their own voices. With this goal in mind, several methodological approaches were used in this study: biographical narratives of the participant and her mother; interviews

with the participant, her mother and her daughter; and my reflexive journal that was kept throughout the study.

Assertions

Socialization vs. Science

> I was about 8 years old my grandma made me spend hours learning how to iron a shirt. There were certain steps to it. That was such an important part of my education.

The first finding of this study was the conflict between Daria's socialization in a Latino household and the Eurocentric culture of science. This finding lends support to the contention that science as a discipline has been shaped exclusively by a Western world view. Eurocentric views include themes of male supremacy, racism, class exploitation, and colonial and imperial exploitation and domination (Harding, 2006). The global reach of European imperialism has given Western science the appearance of universal truth and rationality; it is a form of knowledge that lacks the cultural fingerprints that seem much more conspicuous in knowledge systems that have retained their ties to comparable knowledge's of nature produced by some indigenous societies (Gough, 2002; Harding, 1994). This lack of cultural fingerprints leads to what Harding (1993) called "scientific illiteracy," namely, the Eurocentrism or androcentrism of many scientists, policymakers, and other highly educated citizens that severely limits public understanding of science as a fully social process. Many feminist theorists have argued that the political and social efforts of the past two centuries to limit the representation of women and minorities in Western science have resulted in a scientific culture permeated with a set of norms that conform to White, middle-class, heterosexual, and masculine world views (Fox-Keller, 1985; Harding, 1986, 1991, 2006; Longino, 1989) that present a partial or distorted view of the world and

represents an excluding knowledge (Harding, 1991). The myopic Western world view has left women and people of other cultures on the doorsteps of the scientific community.

> Science has no relationship whatsoever with ironing. You have to put a lot of effort and be very strong. It is just so far away from everybody's understanding. So far away from whatever skills they teach you at home. It is you against everybody else. You really have to have a passion for it. Otherwise you are just going to be practical and choose something else.

Daria was a Latina middle-class heterosexual scientist. The *Latina* has kept Daria on the doorsteps of the scientific community. Being a Latina woman makes a person of a non-dominant culture in a Western discourse— two traits that do not fit the norm. Daria has internalized the dominant discourse of Western science that proposes that her knowledge system is not worthy of being integrated to the dominant discourse of Western science. I see Daria trapped between two worlds: the domestic and the scientific. At home learning how to run a household was more important than what she learned at school or in a science laboratory. The Eurocentric culture of the scientific world rejected her Latino socialization; hence, Daria also rejected her socialization. Why wouldn't she? The dominant discourses have been telling her that the skills she has learned at home are only useful to run a household, not to work in a science laboratory. Daria thinks that women who are raised in a Latino household cannot bring any background from home to science because the skills needed to be successful in science are not aligned to what you are trained to do at home. In her words, "you cannot bring any background from home to science . . . science has no relationship whatsoever with ironing . . . it is just so far away from whatever skills they teach you at home so you really have to have a passion for it otherwise you are just going to be practical and choose something else." She continued to explain herself with an example

of an executive working in a corporation. She said “you will need some organizational skills that you can draw from your background as a Hispanic woman because at home they teach you to be organized.” Why couldn’t Daria intertwine her socialization with the Eurocentric culture of the science laboratory? The answer is obvious. While society at large, the science education community, and the science community continue viewing science through a Eurocentric lens, women like Daria will struggle to intertwine the domestic with the scientific. Daria’s experience adds an important dimension to the existing research on the Eurocentric nature of science and it is of paramount importance that it becomes part of the discourse. When the Eurocentric science culture begins to embrace Daria’s socialization skills as valuable for science research, only then will scientists like Daria be able to intertwine their socialization with the Eurocentric culture of the science laboratory.

The concept of *funds of knowledge* refers to the culturally based resources of education and knowledge found in Latino families. These historically developed bodies of knowledge (e.g. ideas, practices, traditions, skills) are essential to household functioning and the well-being of culturally diverse families (Moll, Amanti, Neff, & Gonzalez, 1992; Vélez-Ibáñez & Greenberg, 1992). The concept of funds of knowledge could be extended to become an inclusive lens used to incorporate other knowledge systems in the science culture. Through this lens, Daria would be able see that as a research scientist she “needs some organizational skills that you can draw from your background as a Hispanic woman because at home they teach you to be organized.” Instead Daria has found that her socialization had been a great asset for raising a family and running a household smoothly and subscribed to the dominant Western science discourse that embodies masculine skills as those needed to be a scientist. Adding to this argument, Harding (1991) suggested that the

discipline of science demands that the viewpoints of women, minorities, and working-class students who have been kept at the fringes of the inner circle of science be included. Barton (1998b) added that "incorporating the lived experiences of all people, but especially the experiences of the groups still struggling for a space in science, makes possible the construction of an inclusive science and science education" (p. 9). The current structure of the science culture needs to change in order to include the lived experiences of this Latina scientist whose voice has leaked out of the science pipeline.

> In terms of pre-college science education, there should be more access to young girls to colleges and science laboratories. There should be summer camps just for girls to go and have a firsthand experience in the science field. I think that women in research should be invited, and even given some budget money, to put together structured educational activities to offer these girls. There has to be more effort in connecting real women researchers to middle schools and high schools. [Daria's recommendation]

Androcentric Nature of Science

The second finding in this study was that the science laboratory work environment is rooted in androcentric practices. This finding lends support to the debate that the androcentric culture ubiquitous in science laboratories transcends country boundaries. Noble (1992) described the androcentric exclusivity of science:

> For the male identity of science is no mere artifact of sexist history; throughout most of its evolution, the culture of science has not simply excluded women, it has been defined in defiance of women and in their absence. Thus, predictably, the world of science has remained an alien world for women, and a hostile one, a world where women are not merely marginalized but anathematized, where they face not just discrimination but dread. (xiv)

Harding (1986) stated that "women have been more systematically excluded from doing serious science than from performing any other social activity except, perhaps, frontline warfare" (p. 31). Daria has not only internalized the dominant discourse of Western science,

she has also bought into the set of dualisms present in the dominant discourse: tough vs. soft; rational vs. emotional; competitive vs. noncompetitive; masculine vs. nurturing; rigorous vs. delicate. The former socialization skills have been singled out as essential to run or work in a science lab. Being socialized with the latter is perceived as preparing you to run a household not a lab. Harding (1991) described what it means to be scientific in our society:

> We can begin to sense the contradictions when we note that conventionally, what is means to be scientific is to be dispassionate, disinterested, impartial, concerned with abstract principles and rules; but what it means to be a woman is to be emotional, interested in and partial to the welfare of family and friends, concerned with concrete practices and contextual relations. (p. 47)

The male dominated work environment in the science laboratories where Daria worked was prevalent in our conversations. She described the women that were successful in the research lab setting as having strong personalities and as having social issues because of their strong personalities. Daria's description of these women is in keeping with Harding's (1991) description: "In order to succeed as scientists, these women usually had to force their lives as closely as possible into life cycles designed to accommodate the lives of men in patriarchal societies" (p. 23). Following this line of thought, Dean and Fleckenstein (2007) believed that, traditionally, scientific research has demanded single-mindedness, exclusive devotion, and aggressive self-promotion that are not appealing to many women or many ethnic or cultural groups historically underrepresented in scientific research.

> We all know that science is a very competitive and not well rewarded field in our society. We have many universities bringing very young students from abroad to fill their Ph.D. and post doc positions. These people are not married, and do not have families here. Many just want to stay, and as a consequence spend hours in the lab. They never have to solve any personal problem such as a child's doctor appointment.

From the science laboratory in her country of birth to the laboratory in the United States, Daria was exposed to discriminatory practices by the men in charge of the laboratory. As a student, Daria is constantly reminded she is a girl and should behave as one. She is also made aware that she will never reach the level of her male counterparts. One would say that this culture in Daria's university laboratory is a direct reflection of the patriarchal society in which she has grown up; therefore, societal nuances such as a woman's inferior level in the hierarchy have permeated into the laboratory culture. As Daria transports her life to the United States and resumes her work in a research laboratory, she is also confronted with gender discriminatory practices. Daria mentioned on several occasions being the only woman in her research lab which was very stressful to her. The tensions increased when she became pregnant and the amicable relationship that she had with the Principal Investigator changed. He demonstrated hostility toward Daria on account of her deciding to have another child. She was made to feel that she had made a big mistake by getting pregnant. Dean and Fleckenstein (2007) discussed the issue of how women in American society have made great strides in gender equality yet when it comes to caring for the young they are still the main caretakers and at odds with demands of being scientists. Many institutions do not allow for flexible work schedules. Women deal with balancing career and family, which create barriers that are unique to women scientists (Xie & Shauman, 2003) and are often penalized when they have children (Burke, 2007; Dean & Fleckenstein, 2007; Etzkowitz et al., 2000; Wasserman, 2000). When up for tenure, women are afraid they may be deemed not productive enough, especially when compared with a man who did not change his schedule when his baby was born (Dean & Fleckenstein; Etzkowitz et al.; Wasserman). Time away from the laboratory can change a department's

perception of women scientists leading to being excluded from departmental decisions (Dean & Fleckenstein; Etzkowitz et al.; Wasserman). As Dean and Fleckenstein described the image of the scientist in the laboratory at all hours of the night and on weekends is not far from what is demanded of these scientists. Daria was not willing to sacrifice her family to conform to the masculine nature of her work environment. The androcentric nature prevalent in science laboratories continues to be deficient for not accommodating this Latina scientist's multiple selves—mother, wife, daughter, sister and friend and her lived experiences. Until the androcentric nature of science transforms into the *androgynous nature of science*, it will continue to view women scientists like Daria as deficient for not sacrificing their multiple selves.

> Once in college I wish they had better established pathways, resources, or counselors, to guide me when I started realizing that I needed to move on. It would have been an easier and less traumatic transition. College offices should extend their advisement services to set up some paths, based on other women's experiences in fields in need of professionals, for women to go from first careers in science into second careers where their expertise in science can be used. [Daria's recommendation]

Balancing Career and Family

Thus, the third finding of this study was that Daria's strong need to have a family was a powerful contributor to her selection of teaching as a second career. This lends support to the contention that women continue to be chronically underrepresented in scientific careers. As Etzkowitz and colleagues (2000) described, "significant numbers of women enter the science pipeline and then leave at disproportionate rates, or function less effectively, as covert resistance to their participation creates difficulties" (p. 6). In looking at the research question of this study (How have the lived experiences of the participant as engaged through cultural, historical, and social interactions influenced a transition in career

from a research scientist to a classroom teacher?), this finding can provide an answer into how Daria's lived experiences influenced her to transition careers.

> Teaching is so important to me. I am so happy with this profession because it was hard for me when I was working in the lab to be able to do everything. I had to put in so many hours and the science environment is not very woman friendly. Teaching has giving me the opportunity for more time and freedom.

Daria's socialization experiences at home and her experiences in the genetic research laboratory provided the setting for her decision to transition careers. At home she was taught the important role a woman has in the household. A woman's role is that of the main caregiver to her children and other members of the family. She is also responsible for the smooth functioning of the household. Even though Daria's socialization is not unique to the Latino culture, the Latino culture's patriarchal stance places great emphasis on women's role at home. As noted in the literature, most "woman scientists need to deal with the personal issues of their lives more than their male colleagues because they are still the main caretakers of the family" (Dean & Fleckenstein, 2007, p. 43). This role expectation laid out by her culture was conflicting with the expectations she had as a scientist. In the genetic research laboratory, Daria was expected to fit her life as closely as possible into the androcentric life cycle designed to accommodate the lives of men in the laboratory where she worked. This meant not being able to take consecutive days off for family vacations, not being able to take her children to the doctor, leaving the laboratory late in the night, not being able to attend parent teacher conferences and not allowing pregnancy get in the way of genetic research. Daria found that science research is structured in such a way that it

allowed her to be part of the field a few years after college before she wanted to start expanding her family.

Daria was not willing to continue neglecting her family in order to continue genetic research. Daria chose to transition to teaching, a less competitive and more mommy friendly field that accommodated her need to have a family and her need to use her expertise as a scientist. As a science teacher, she would have more time to spend with her family and at the same time she would be able to use her scientific expertise. Daria found a way to compaginar sus mundos.[58]

> Science departments should include more family oriented activities, not only would give an opportunity to mothers to share with their children, but also they would feel more comfortable with including their children in their professional life. At the same time, it is important to educate the scientific community to include their family lives in the dynamics of some department activities. Family picnics, days where children can go to their parent's labs would be great too. Science summer camps for kids would be a good resource to mothers, and even the community, and there are so many things to show a child in a lab. [Daria's recommendation]

Implications for Science Education

Reform initiatives, *Science For All Americans* (AAA,1989) and *National Science Education Standards* (NRC,1996), hold as central the belief that all children can learn science regardless of age, sex, cultural, or ethic background, disabilities aspirations, or interest and motivation in science (NRC, 1996). One of the most popular and prevailing phrases connected to science education reform in the last decade has been "science for all." The phrase *science for all* extends to all groups who are marginalized. The literature is extensive in outlining the marginalization of girls and children of other cultures in science education. *Science for all* is not inclusive. Girls and children of other cultures are not getting

[58] Put both worlds together.

equal proportions of the cake (Burke, 2007; Kahle & Meece, 1994; Etzkowitz et al., 2000; Dean & Fleckenstein, 2007). The demographic transformation in U.S. society continues to diversity schools. One in three children in U.S. schools now comes from an ethnically diverse family, and one in seven speaks a language other than English at home (Espinoza-Herold, 2007).

Lemke (2001) explicates the essence of this section: “Our curricula and teaching methods are by long tradition most closely adapted to the needs of middle-and upper-middle-class, culturally North European-American, fluent speakers of prestige dialects of English” (p. 307). Lemke added that we must stop and consider whether we are perhaps unnecessarily making the price of admission of science the rejection of other important components of students’ identities and values, the bonds that link them to other communities and cultures. Barton (1998a) explored this line of research by examining how students’ lived experiences used, manipulated, forced, pulled, and tugged to fit the confines of science. Her research was done with urban homeless children, one of the most marginalized groups of all the science students. She advocated that if all students are to participate in science in genuine ways, then teachers need to find ways to value the diverse ways of knowing brought to class by the students. Building on this idea, Barton (1998b) argued that children need to understand the social aspect of science and the connection that this has to the nature of science and scientific knowledge construction. She added that some feminist researchers have argued that science teachers use the social element in science to value ways of knowing, doing, and acting that traditionally have not been part of the practice of science.

Inclusive Science

Narrowly defined scientific ways of knowing, such as rational thinking that has been separated from feeling and emotion and ideas separated from context and personal experience, are particular problematic for female students (Brickhouse, 1994), because many women are taught to value relationships, connections and caring, which is not congruent to the scientific worldview that has been developed around male ways of knowing (Barton, 1998b). Consequently, feminist science educators have argued that one role of science teachers ought to be to use students' experiences outside of science (e.g., traditionally female activities and interests, such as child care and cooking) to create a more inclusive science (Barton, 1998a, 1998b; Howes, 1997). In order then to create a more inclusive science,

> science teachers need to have a thorough understanding of science, including its content, culture, and discursive practices, and an understanding of students and educational processes, so that they can provide opportunities for personally relevant engagement in science by students with diverse backgrounds. (Barton, 1997, p. 145)

Science teachers can embrace students' experiences outside of the science classroom by becoming aware of the cultural resources that students' households contain. Moll and colleagues (1992) termed these cultural resources as *funds of knowledge*. Funds of knowledge refer to "historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and well being" (Moll et al., 1992, p. 134). An essential assumption underlying the funds of knowledge concept being pursued by Moll and his colleagues in Arizona is that Mexican American families in the community know many things and have many skills, yet this wisdom is generally not recognized as legitimate sources of knowledge to the educational process of the schools.

Vélez-Ibáñez and Greenberg (1992) argued that these funds not only provide the basis for understanding the cultural systems from which Latino children emerge, but that they also are important and useful assets in the classroom.

Students are usually not aware of the funds of knowledge that they bring with them to the science classroom. Daria was not aware of the wealth of knowledge that she acquired at home through her socialization. When she heard through the discriminatory practices that this knowledge was illegitimate in the science laboratory, she too viewed her knowledge as illegitimate. Daria echoed the science community's stance that her socialization skills—ironing, organizational skills, cooking, caring for children as assets for running a household smoothly not for running a laboratory. Daria did not value these skills as ones that would help her in the pursuit of a science career. Students will view their funds of knowledge as legitimate resources of knowledge in the science classroom when the science education community embarks on the long awaited transformation to legitimize other sources of knowledge that are not Eurocentric.

Based on the findings in this study I would like to suggest the following recommendations:

Science Workplace

Researchers in the science education community have saturated the literature with initiatives to "fix" girls to fit the mold that the Eurocentric/androcentric culture of science has deemed suitable for a scientist. It is evident from this study that women also have a love for science and aspire to scientific careers. From an early age, my participant knew she wanted to be a scientist. She did not need after school programs, field trips, well-equipped science labs, or teachers and counselors to encourage her to take science classes. Women are

not disinterested in science: Science is disinterested in women. Like other women who are resilient and make it past undergraduate studies, my participant was confronted with subtle discriminatory practices in the science laboratory. With this said, how does the community move forward? Women scientists are usually the main caretakers of the family. The science community is well aware of this role society has placed on women regardless of profession, but it has chosen to look the other way. Creating flexible schedules for scientists who are raising young children is one way to ease the burden of balancing work and family. Providing in-house day care facilities for children of scientists would be another way that would facilitate motherhood for scientists. These recommendations are not innovative, but they would have made a difference to my participant if she would have had support from her research community at the time she was struggling to balance it all. The science community has heard these recommendations but has yet to make a universal initiative that would require laboratories, academia and any other research facility the creation of "mommy friendly" science cultures. Perhaps tying grant monies to initiatives would hasten the community's commitment to retain women scientists. Providing creative ways that would allow for flexibility in schedules could keep some of these women scientists from transitioning to second careers in order to have it all. Women scientists are not in need of "fixing"; the Eurocentric/androcentric culture of science is in need of a new label which should include words such as "androgynous," "all inclusive," and "international sciences."

Science Teaching K-12

The funds of knowledge concept can be extended to explore how teachers can use students' funds of knowledge within the context of the science classroom.

> When curriculum is meaningful to students, and when students can draw on their personal experiences and resources, such as family members, to make

> sense of the curriculum, they are more likely to engage in learning and to value their own backgrounds as having provided them with important sources of knowledge valued by teachers. (Monzó & Rueda, 2003, p. 90)

The interviews carried out with Daria and Sara revealed funds of knowledge based on resiliency to the multiple setbacks on the road to becoming a scientist, dependence on the women in the family to share the responsibility of child care, negotiated roles and responsibilities imposed by the culture both at home and in the science laboratory, and the creative approach that they developed to negotiate the migration to a new country with different ideology than their country of origin. Science teachers can use these resources to improve instruction in the science classroom. One such example is provided by Luis Moll:

> Indeed many experiences in everyday life can serve as a basis for the learning of science, some easy examples he used would include, ideas about raising and caring of animals, about plants, about heat, energy, and chemicals. All these experiences lead to the formation of concepts from which the formal teaching of science can proceed . . . even ironing lends itself to scientific analysis. (Personal communication, May 5, 2009)

Implications for Future Research

To extend the research that was done in this study, I have the following suggestions. For feminist science education researchers, more research into the lived experiences of other Latina scientists who have leaked out of the science pipeline should be published. Taking into account cultural, historical, class, and social interactions calls for further investigation to understand more deeply the conflicting roles of scientist and motherhood. The science education literature has swept Daria's voice under the welcome mat. Daria is but one voice of a Latina scientist who has transitioned to a second career after facing gender discriminatory practices in the workplace. Where have the other scientists who have leaked out of the pipeline gone? There is silence in the literature in place of voices telling their experiences as scientists in the male dominated work place. Furthermore, it would be of

interest to compare the lived experiences of Latina scientist in other Latin American countries to see how their lived experiences influence their career trajectory. Nothing yet has been done in this particular topic in science education.

For teacher educators it would be of interest to see how Latina scientists who transitioned into science teaching theorize, conceptualize, and concretize funds of knowledge ideas in the science classroom. I would be interested in knowing if Daria's funds of knowledge have seeped into her teaching. These teachers' funds of knowledge could potentially, as Monzó and Rueda (2003) described, "prove especially important in teaching students from similar non-dominant backgrounds, by drawing on these experiences and beliefs to develop curriculum that is both meaningful and allows students to relate new concepts to prior experiences" (p. 90).

For science teacher education programs, it would be beneficial to prepare preservice teachers to value the diverse ways of knowing brought to the science classroom by the student and strategies that would allow all students to participate in science in genuine ways. In order to extend the funds of knowledge concept to the science classroom, teacher training programs should provide science teachers with opportunities to learn how to incorporate the funds of knowledge from their student's households that approximate the total reality of the population in their classroom into the science standards that are required by each state.

For the science education community, it would be of interest to conduct a cross case study of women from different backgrounds to see how their lived experiences have aligned or misaligned with their home socialization and science lab experiences. Are the socialization experiences of these women different from the socialization of Latina women?

Limitations

This study was conducted with one Latina scientist and her family for the purpose of obtaining an in-depth understanding of her lived experiences and how these had influenced her career transition. The results of this study have several limitations. For example, the study was conducted with one scientist and her mother. The method of data collection that was selected was through narrative interviews in order to obtain a richer version of the events and experiences of these two women. Flick (2006) finds this method to be problematic because of the assumption that it "allows the researcher to gain access to factual experiences and events . . . What is presented in a narrative is constructed in a specific form during the process of narrating, and memories of earlier events may be influenced by the situation in which they are told" (p. 180). Therefore, I cannot generalize the outcomes. ¿Una participante?[59] I am struggling about adding that this research is limited due to the number of participants and the narrow focus would limit the generalizability of the study. This study does not intend to generalize its findings. Having only one participant's narrative and the narrative of her mother allowed me to story the intrinsic relationship between the participant, her family and the cultural, historical, and social interactions of her lived experiences. Daria is not just one participant who limited this study: She is a historically silenced Latina voice in the dominant discourses of science education. Studying a single individual over an extended period of time provided a wealth of detailed data with implications for the science education community and allowed the flexibility and fluidity of a true qualitative study. In the end the dominant discourses of research that find one participant to be a limitation to the outcomes of this study have won the debate.

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[59] One participant?

It is important to note that Daria's experiences are not the normative for all Latina scientists. For example, Latina scientists raised in middle-class households in the United States many have very different experiences, possibly experiences that may be more similar to those of White middle-class scientist. Daria's experiences are those of a Latina scientist raised in a Latin country with socialist ideologies intertwined in all aspects of society.

Sharing a similar cultural background to my participant facilitated a relationship that allowed me to be an insider. At the same time this insider position threatened to bring about researcher bias. To avoid bias, I used member checking every step of the way to ensure that I was hearing the data and not my own voice. I shared the data with Daria throughout the process which allowed her to shed light on and add to the story that was unfolding. I had intended to share the final product with her for member checking however as the research took a life of its own it made more sense to include her in the ongoing process. On several occasions I had heard what I wanted to hear from the data and Daria was able to tune my ears again to what the data was really telling me.

Final Reflection

I could feel sweat running down my back as I nervously tried to look calm. I had been nervous all week waiting for this interview. I looked at my watch for the hundredth time, but only a minute had passed. How bad could it be? I would sit in an office with a professor and answer her questions. Finally, I was asked to come in, it was bad—four other stern looking professors were sitting around a table. My head started spinning as the questions started coming from all directions. Why do you want to be accepted to this program? What is your research interest? The sweating got worse. Are you ready to commit to this program? Maybe they could see right through me and had decided I was not qualified

to start such a challenging endeavor. I knew I could go through with the program if they would only give me a chance. I was used to working harder than anybody else. My need to prove that my ethnicity and gender were not a set-back gave me all the motivation that I needed. After what seem like an eternity, the interview came to an end and I was informed that they were going to accept me. Did I hear them correctly? They were standing and shaking my hand and wishing me luck, which I suspected I would need. Walking to my car it started to dawn on me, I was about to start the next chapter in my student life—a Ph.D.

The first few semesters were a blur of classes; statistics, sociology, summer seminars. Every so often I would look over my shoulder to see if someone was running towards me to inform me that they had made a mistake and I shouldn't be in the program. Sometimes I still look over my shoulder. Everyone seemed to know the area of research that they were interested in. I couldn't decide. By chance I signed up to take a research class that was about to take my writing to places I didn't know I could go. We were required to write our research proposal by the end of the semester as our final assignment. Oh no! I still hadn't made up my mind. Should I drop the class? I told myself I would go to one more session and then I would drop it. The following week the professor seemed to read my thoughts and immediately put me at ease. She assured us that we would work a little bit at a time until we had come up with a proposal. What was I interested in? I knew I wanted to research gender in science education and maybe ethnicity. The literature was saturated with studies about gender inequality in science education but it kept coming short on studies with Latina women. A *woman of color* was the umbrella for women who were not White and these studies were mostly done with African American women. It also seemed peculiar that studies of gender in science education lumped women in one category—White. I began

looking for myself in the science education literature and was not very successful. Why was my voice silenced in the literature? It started coming together that semester I had finally found an area of research that I was passionate about.

My excitement didn't last very long; the immensity of it all was now overwhelming. How would I collect data? No se. ¿Cuál es la mejor forma de escribir mi investigación? No se. ¿Quien va querer leer mi investigación? No se. Who would be interested in the lived experiences of a Latina scientist? No se. ¿Quién quiere escuchar mi voz? No se. Who will be able to use my findings? No se. How will I make sense of my findings? No se. Maybe I should let the participants tell their stories and I can write it as a joint narrative with my interactive voice interjecting in and out. No se.[60]

My journey became purposeful I now had a research proposal. Struggling with feminist methods I decided to venture to the Women's Studies building and took a course in feminist methodology. This course was pivotal in helping me envision the methodology that would give voice to my study. All the classes that I had taken up to this moment were finally coming together and making sense. My research interest was becoming alive and I could see how it all fit together under the science education umbrella.

The following semester I went through the process of completing the much dreaded IRB forms for my pilot study. I wanted my pilot study to inform my dissertation study but where would I find a Latina scientist? She seemed to have dropped from heaven. She was a Latina scientist that had transitioned into teaching science and was enrolled in the graduate

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[60] What is the best way of writing my research? I don't know. Who will want to read my research? I don't know. Who wants to hear my voice? I don't know.

program. While I waited for IRB approval, I gave birth to my second baby. As excited as I was about having a baby in my arms, I had a nagging feeling that I would not be able to do it all. Had I come this far only to now see all of it slip through my fingers? How was I going to manage it all?

To move forward I sign up to take Qualitative III the fall semester the baby was born in order to stay active in my research process. I simply had to take the baby to class a week after she was born. Would the guilt leave a permanent scar in my soul? This class gave me the venue to conduct my pilot study as one of the requirements was to conduct interviews and bring the transcripts to class. Perfect! I would be forced to conduct my pilot study. The first interview with my participant took place in an empty classroom at the university. The second interview took place on the floor in an empty hallway. For both interviews, I had to bring the baby since I was still nursing, which didn't seem to bother my participant. The first interview had a shaky start. I didn't know when to follow up with a question or what questions I thought I need to ask in order to obtain the right data. As the interview progressed and I allowed her to tell her story, it dawned at me that I was going about this the wrong way. Data were not supposed to fit my needs. It wasn't right or wrong. This was a person with a story who was willing to share it with me. What a privilege. As I learned to listen to her story the questions flowed naturally. She reminded me so much of myself, both of us trying to have it all. We were both consumed with guilt for wanting it all—family, higher education, and career.

I decided that my pilot study participant's voice needed to be heard in the dominant discourses of science education that had drowned non-dominant discourses. How would I convince my committee that there was value in conducting a study with only one

participant? I argued that I did not intend to generalize the findings; I even argued that other research fields had found merit in generating data from one participant. In the end my voice was heard. I knew that my participant had a story that needed to be told. Throughout the pilot study, it was apparent that Daria's lived experiences were intertwined with those of the women in her family; hence, the decision to broaden the study to include her mother's narrative in the study.

Comprehensive exams and prospectus defense behind me, my dissertation study was about to take me through the last bend of this journey. I arrived for my first interview with Daria. I was so nervous my hands wouldn't stop shaking. I couldn't let Daria see me this way. After all, I was supposed to be a confident researcher with the authority to conduct an investigation and make claims. Why didn't I feel like one? I don't think I heard a word during the first interview session with Daria. I spent the time convincing myself that I had a right to this space I had created. My fears were getting the best of me. Was I asking open-ended questions? How would I know if I had missed an opportunity to probe deeper? How many missed opportunities would I regret? How was I going to find themes? Would themes emerge from her narration naturally? Was she telling me what she thought I wanted to hear? Why would she even want to let me in to her story?

Slowly the narrative gave way to interpretable themes. Daria was a patient participant throughout the process. I shared the data with Daria throughout the process, and this sharing allowed her to clarify and add to the story that was unfolding. When I doubted my interpretation of the data in front of me, I contacted via electronic mail two experts in the field to confirm. Only then did I feel confident with my interpretation. Why did I need "experts" in the field to confirm my findings? I struggled to add my voice throughout the

process. When did I become an authority to make claims? Why was allowing the dominant discourses of science education drown my voice. In the end, I have come to realize that indeed I have a right to this space that I have created. My voice does have the authority to make claims after all I am a researcher with findings worthy of joining the discourse of science education research. I am starting to like the sound of my voice. I don't have to look over my shoulder any longer, for this is my space.

Many women scientists have found ways to compaginar sus mundos[61] while still working in science research. Like Daria, I found a way to compaginar mis mundos[62] by choosing a different career. The path I chose took me to teaching—a mommy friendly profession. I found the path that allowed me to have more time to be a mother while simultaneously fulfilling my need to use my science background. Despite the initiatives the science community has begun taking to level the field for women aspiring to become scientists, the Eurocentric/androcentric culture of science continues to exist. The science culture may never become inclusive of all knowledge systems. To women scientists struggling at the fork in the road, I hope you take the path that will allow you to compaginar tus mundos.[63]

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[61] Put their worlds together
[62] Put my worlds together
[63] Put your worlds together

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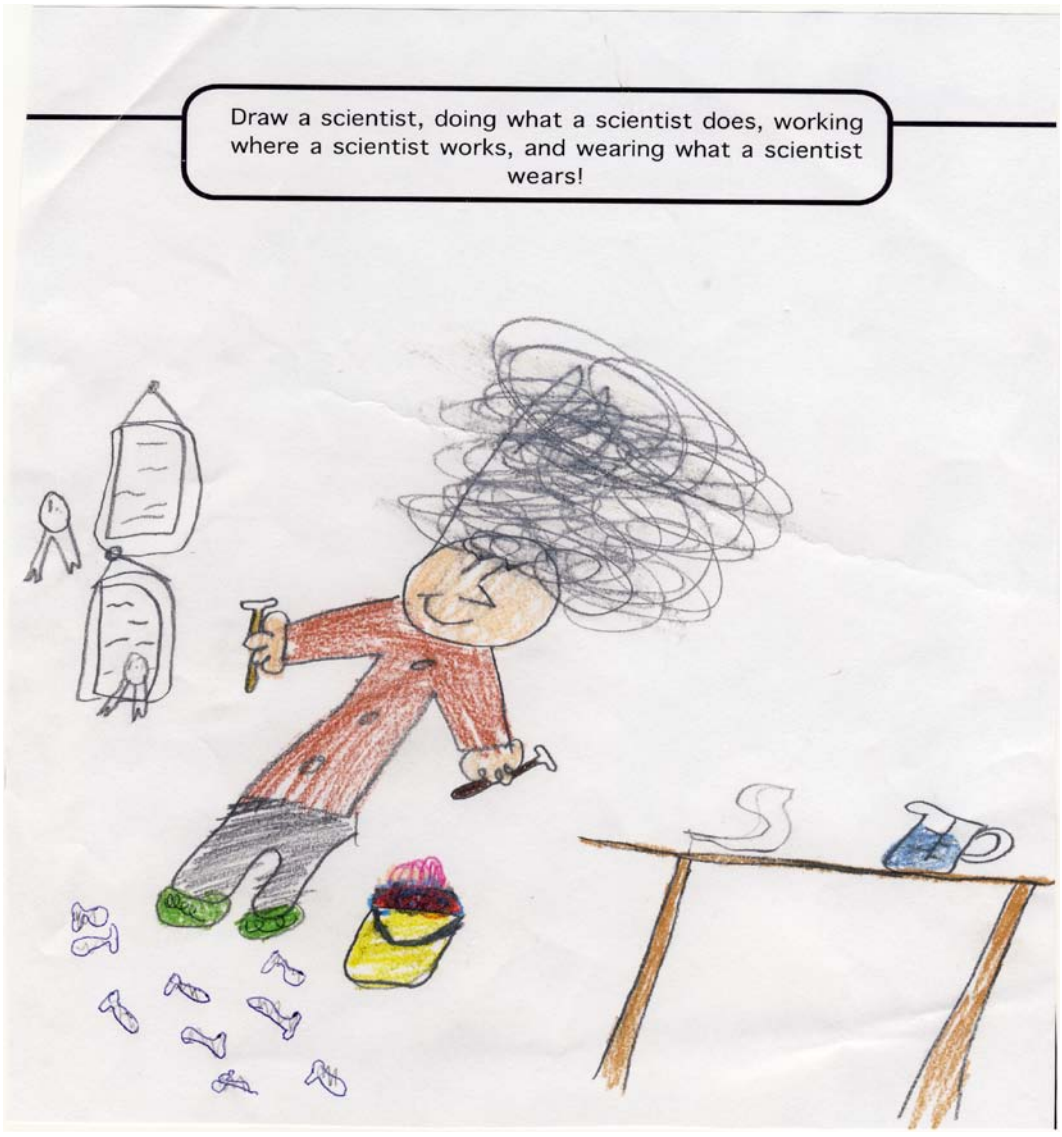
APPENDIXES

APPENDIX A



Sadie Hoy, age 8, second grade