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# The Effects of Gender-Aware Leadership-Development Training on the Leadership-Behavioral Competencies of Women Software Engineers in California's Silicon Valley

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The University of San Francisco

THE EFFECTS OF GENDER-AWARE LEADERSHIP-DEVELOPMENT TRAINING  
ON THE LEADERSHIP-BEHAVIORAL COMPETENCIES OF WOMEN  
SOFTWARE ENGINEERS IN CALIFORNIA'S  
SILICON VALLEY

A Dissertation Presented  
to  
The Faculty of the School of Education  
Learning and Instruction Department

In Partial Fulfillment  
of the Requirement for the Degree  
Doctor of Education

by  
Leann Pereira  
San Francisco  
May 2017

# THE UNIVERSITY OF SAN FRANCISCO

## Dissertation Abstract

### The Effects of Gender-Aware Leadership-Development Training on the Leadership-Behavioral Competencies of Women Software Engineers in California's Silicon Valley

This study was conducted to investigate the effects of a leadership-development training workshop on leadership behaviors among women software engineers in a California Silicon Valley engineering community with a two-phase, mixed-methods research design. The training workshop was developed using a framework for developing leadership-behavioral competencies among women (LBCW), which was congruent with theoretical principles for women's leadership development.

LBCW was comprised of four competencies: self-advocacy, social networking, psychological capital, and goal orientation. A pretest–posttest comparison-group design was used to assess the effects of the training on LCBW among 70 participants with four instruments: the Leadership Development and Activities Instrument, the State Hope Scale, the Authentic Leadership Questionnaire, and the Leadership Efficacy Questionnaire. Both treatment and comparison groups received the pretest, the treatment group received the training, and the comparison group did not. The treatment group also received a posttest. LBCW was assessed qualitatively through 14 hour-long interviews with women who attended the training.

Quantitative analyses indicated that women who attended 4 hours of leadership training had statistically significant higher scores for leadership efficacy, authentic leadership, and near-term goal orientation efficacy, but lower scores for resilience to

gender bias and self-directed leadership-development compared with those who did not attend training.

In interviews, women engineers reported an increase in social-networking activities, self-advocacy behaviors, and enhanced positive psychological states, but reported no increase in likelihood to identify as a potential entrepreneurial leader.

No statistically significant relationships were found between level of education or years of work experience and the measures of LBCW used in this study, which suggested that women software engineers may not be learning leadership competencies at work or in school.

It was concluded that knowledge on social-networking behaviors was readily assimilated into women's routines but that the training was insufficient to instill self-directed learning behaviors or cultivate interest in entrepreneurship as an alternative career path among the women.

More research is needed to understand why resilience to gender bias decreased in women who were trained and to investigate how to raise women's ability to address gender biases in the workplace without increasing their vulnerability to its effects.

This dissertation, written under the direction of the candidate's dissertation committee and approved by the members of the committee, has been presented to and accepted by the Faculty of the School of Education in partial fulfillment of the requirements for the degree of Doctor of Education. The content and research methodologies presented in this work represent the work of the candidate alone.

Leann Pereira April 25, 2017  
Candidate

Dissertation Committee

Dr. Patricia Busk April 25, 2017  
Chairperson

Dr. Robert Burns April 25, 2017

Dr. Gleb Nikitenko April 25, 2017

## **DEDICATION**

I dedicate this work to my son, Prayag, whom I have had the great gift of watching emerge from early childhood struggles into a beautiful and thriving vegetable-eating teenager with nice teeth, good grades, and robot-building skills, and to my partner John, without whom this work would never have been attempted.

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This work would not have been started without Justine Burt, and it would not have been completed without Dr. John Hogan. Thank you both for sharing your expertise in sustainability, your friendship, and your love.

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I am also grateful to Dr. Robert Burns for his mellow counsel that helped me to scope this research, as well as to Dr. Gleb Nikitenko for his mentorship in field-based entrepreneurial education.

Finally, I'd like to thank Dr. Patricia Busk who used every possible means and style available to an educator to bring this project to fruition; advisor, mentor, sponsor, coach, task-master, subject-matter expert, facilitator, friend, critic, editor, storyteller, administrator, sounding board, comedienne, etc., etc. ...

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## CHAPTER I

### STATEMENT OF THE PROBLEM

The results of recent reports published by two separate agencies found that women-owned businesses in the United States demonstrated job growth between the years 2007 and 2014 by adding approximately 274,000 jobs. Male-owned and equally owned (male and female) firms in the United States did not demonstrate comparable growth during that same time period (Pordeli & Wynkoop, 2009; Weeks, 2014). Between 1997 and 2002, women-owned firms in the United States grew twice as fast as all other groups combined (Pordeli & Wynkoop, 2009). According to a report published by Weeks (2014),

Most businesses in the U.S. economy—now and in years gone by—are small. Fully 82% of all firms, including 91% of women-owned firms, have no employees other than the business owner, and just 4% of all firms and 2% of women-owned firms have 10 or more employees—including less than 1% of each having 500 or more employees. However, as we know, larger firms—though small in number—account for the lion’s share of jobs. The 2% of women-owned firms with 10 or more employees accounts for 74% of all of the jobs provided by women-owned firms, while economy-wide, the 4% of firms with 10 or more workers supplies 90% of all jobs in the private sector, non-farm workforce. (p. 29)

Although women-owned firms in the United States have demonstrated strong growth overall, study results have revealed that there is stagnation in growth among women-owned firms who employ between five and nine employees and have suggested that this demographic be targeted for development projects (Weeks, 2014).

Technology-based firms established in California’s Silicon Valley have introduced new paths to entrepreneurship for men that defy traditional paths to entrepreneurial success. Human-capital theories have long suggested that level of education and years of experience are related positively to entrepreneurial success

(BarNir, 2012; Coleman, 2005; Fairlie & Robb, 2009). Nevertheless, new economy companies that focus on the development of software and technology-based innovations indicate otherwise. According to information gathered from Crunchbase, a Web-based database of technology-based companies and financial investors, four of the five top-ranked chief executive officers (CEO) on its index had no prior management experience running companies and no undergraduate degree. Table 1 shows that three of the four CEOs were computer science majors before dropping out of a four-year undergraduate program at a college or major university.

Table 1  
Crunchbase Top-Ranked Companies as of 9/19/2016

Crunchbase Rank	Company	Year Founded	Headquarters	CEO	Gender	School	Major	Status
1	Facebook	2004	Silicon Valley	Mark Zuckerberg	Male	Harvard	CS	Dropped out
2	Apple	1976	Silicon Valley	Steve Jobs	Male	Reed College	Unknown	Dropped out
3	Uber	2009	Silicon Valley	Travis Kalanick	Male	UCLA	CS	Dropped out
5	Twitter	2006	Silicon Valley	Jack Dorsey	Male	NYU	CS	Dropped out

Although there were no women CEOs ranked among Crunchbase's top five companies, out of the 27 women CEOs listed on the 2016 Standard and Poor's 500 index in 2016, 12 have engineering or science degrees (see Table 2). The question of whether women with science, technology, engineering, and mathematics (STEM) backgrounds have a professional development advantage in acquiring leadership roles over people without technology-based backgrounds arises. Leesa Mitchell (2011) stated that:

Many (though not all) high-growth firms are built around new science and technology. With more women than ever entering these fields, the upside potential for women's tech startups is huge. (p. 2)

Table 2

Twelve of the 27 Women CEOs of the S&amp;P 500 Hold Engineering or Scientific Degrees

Company	Headquarters	CEO	Alma Matter	Major	Status
General Motors	Michigan	Mary Barra	Kettering Institute	Electrical Engineering	Graduated BS
Xerox	Connecticut	Ursula Burns	Columbia University	Mechanical Engineering	Graduated MS
Duke Energy	North Carolina	Lynn Good	Miami University	Systems Analysis and Accounting	Graduated BS
Occidental Petroleum	Texas	Vicki Hollub	University of Alabama	Mineral Engineering	Graduated BS
Yahoo!	California – Silicon Valley	Marissa Mayer	Stanford University	Computer Science	Graduated MS
PepsiCo	New York	Indra Nooyi	Madras Christian College and Yale	Physics, Chemistry, Mathematics, and Management	Graduated BS, MA
CMS Energy	Michigan	Patricia Poppe	Purdue University	Industrial Engineering	Graduated MS
Sempra Energy	California, Southern Region	Debra Reed	University of Southern California	Civil Engineering	Graduated BS
IBM	New York	Virginia Rometty	Northwestern University	Computer Science Electrical Engineering	Graduated BS
Mondelez International	Illinois	Irene Rosenfeld	Cornell University	Statistics and Marketing	Graduated PhD
Alliant Energy	Wisconsin	Patricia Kampling	Swarthmore College	Engineering and Economics	Graduated BS, PE
American Water Works	New Jersey	Susan Story	Auburn University	Industrial Engineering	Graduated BS

Therefore, substantial social and economic opportunities should be made available to women who already possess computing and scientific backgrounds. Researchers can assist with this effort by better understanding how to adapt leadership and entrepreneurial

education and training (EET) programs to improve support for the growth of women-led software development or engineering firms in the United States.

The establishment of learning-based frameworks in business management and entrepreneurial education has opened up new and valuable directions in the development of research on sociocognitive factors, such as entrepreneurial growth intention and leadership self-efficacy, that are theorized to affect firm performance (Idrus, Pauzi, & Munir, 2014; Wilson, Kickul, & Marlino, 2007) among both male and female entrepreneurs (Valerio, Parton, & Robb, 2014). Researchers have found, however, that they are expressed differentially and conformed to gendered social-role expectations, resulting in women's underperformance relative to that of men (BarNir, Watson, & Hutchins, 2011; Bosak & Sczesny, 2008; Nwankwo, Kanu, Marire, Balogun, & Uhiara, 2012; Sturm, Taylor, Atwater, & Braddy, 2014). Researchers have suggested, therefore, that women do not identify with a leadership identity even though they have leadership roles and that leadership is associated more with masculine norms or gendered sociocultural expectations than with actual work experience or human capital (Bosak & Sczesny, 2008). As a result of differences found between genders on sociocognitive factors related to business performance (Cliff, 1998; Wilson et al., 2007), women's leadership is just beginning to emerge as a content requirement in the development of EET and management training. Current trends in sociocultural research on female entrepreneurship involves investigating developing gendered theories of leadership and entrepreneurial activity and advocate for gender-aware designs or women-only leadership and EET programs (Brush, Balachandra, & Greene, 2014; Bullough, de Luque, Abdelzaher, & Heim, 2015; Debebe, 2011; Debebe, Bilimoria, & Anderson, 2016; Ely,



Ibarra, & Kolb, 2011; Kark, Preser, & Zion-Waldoks, 2016; Vinnicombe & Singh, 2003) that have been linked to strong business growth (Brush et al., 2014). According to Ely et al. (2011), gender-aware pedagogy should focus on enhancing women's leadership identity by teaching women to understand their personal leadership aspirations, enhancing women's leadership self-efficacy, and educating women about second-generation gender biases that are less explicit than first-generation gender biases but damaging nonetheless. Combined, these approaches to management education increase women's social competencies and differentiate the social competencies needed for women entrepreneurs from those needed by men because, unlike men, women must develop additional skills and coping mechanisms that allow them to overcome gender-based negative perceptions of competence that they face in their entrepreneurial and leadership endeavors (Brush et al., 2014; Bullough et al., 2015; Cohoon, Wadhwa, & Mitchell, 2010; Ely et al., 2011; Groysberg, 2008; Patterson, Mavin, & Turner, 2012). The construct of social competence for women's leadership development is described further in the Theoretical Framework section of this chapter.

Lowered leadership identity among women in leadership, in all sectors of work, including science and technology, may be a factor in hindering greater participation by women and at higher levels in U.S. social and economic infrastructure development. Lower levels of leadership self-efficacy among women may be related to their lower entrepreneurial growth intentions that in turn may affect women's desire to start new firms or to grow existing firms through hiring, which cyclically reinforces negative leadership self-efficacy and inhibited growth intentions among aspiring and existing women entrepreneurs. Although the most recent developments in entrepreneurship and

gender scholarship have posed the possibility that a more robust leadership identity could be developed among women in corporate and entrepreneurial environments through women-only leadership-development programs (Bullough et al., 2015; Cullen-Lester, Woehler, & Willburn, 2016; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Sugiyama, Cavanagh, van Esch, Bilimoria, & Brown, 2016), there has been a paucity of studies based in the United States aimed at the effects of EET and leadership self-efficacy among women technologists, who arguably have a greater likelihood of establishing high-growth entrepreneurial firms, than among women nontechnologists. Currently, the discourse on U.S.-based EET programs intended to develop women leaders is largely theoretical only and without substantive data to confirm the models emerging from the results of international studies (Brush et al., 2014). More empirical research is needed to understand to what extent leadership self-efficacy among women can be cultivated through training designed to increase the behaviors that are associated with leadership identities. Through the use of these methods, women in science and computer software engineering can be taught to thrive in business leadership roles.

### **Purpose of the Study**

The purpose of the study was to investigate the effects of a leadership-development training workshop on leadership behaviors for participants of a California Silicon Valley women's software-engineering community using a pretest-posttest comparison group design. The training workshop was developed to test a framework for developing leadership behavioral competency among women (LBCW), which are congruent with theoretical gender-aware principles for women's leadership development (Bullough et al., 2015; Cullen-Lester et al., 2016; Debebe et al., 2016; Ely et al., 2011;

Sugiyama et al., 2016) and sustainable leadership-development principles, such as intentional change theory (ICT; Boyatzis, 2008; Boyatzis, Smith, & Blaize, 2006).

Quantitative data were collected through a pretest and a posttest. Training was the intervention and the independent variable. The training included a single 4-hour workshop, which was designed to build leadership competence among women data scientists and software engineers by increasing self-perceptions of leadership self-efficacy, creating awareness of second-generation or implicit gender bias, instructing women on how to develop and self-advocate for their personal vision and goals, instructing women on how to characterize and build social networks, providing women with a safe setting to network actively with prospective learning partners who would reinforce their emerging leader identities, and encouraging women to develop a leadership learning plan (Ancona, Malone, Orlikowski, & Senge, 2007; Boyatzis, 2008; Brush et al., 2014; Bullough et al., 2015; Ely et al., 2011; McKee, Boyatzis, & Johnston, 2008). The training was designed also to teach women to sustain their leadership efforts by leveraging positive psychological states that counteract negative self-efficacy and sex-role stereotypes, which are triggered among women who work in male-dominated environments (Boyatzis, 2008; Debebe et al., 2016; Eagly & Karau, 2002). A discussion of sex-role stereotypes that stem from perceptions of role incongruity is presented in Chapter II.

LBCW was the dependent variable that was assessed with four instruments: the Leadership Education and Development Activities Instrument (LEDA), the State Hope Scale (SHS), the Authentic Leadership Questionnaire (ALQ), and the Leadership

Efficacy Questionnaire (LEQ). These instruments are presented in Chapter III. A list of the acronyms used in this study is found in Appendix A.

Although the scope of the study was to measure the immediate and near-term effects of a training intervention designed to increase leadership behaviors among women software engineers in California's Silicon Valley, a potential longer-term outcome of this research is to increase the likelihood of entrepreneurship as a future expression of leadership and professional competency among the study participants in this community.

### **Background and Need for the Study**

An area of study emerging from the research on gendered business-performance differences is the need for gender-aware approaches to leadership development and EET for women-led firms. Although there has been debate among researchers about whether entrepreneurship can be taught and learned (Seeling, 2015) and what the value of EET is (Katz, 1990; Martin, McNally, & Kay, 2013), there has been little debate that education is related positively to business performance (Coleman, 2005) and that governments around the world, regardless of their political orientation and structure, recognize the value of entrepreneurship as a means of socioeconomic development and have sought to invest in EET to stimulate economic development (Aparicio, Urbano, & Audretsch, 2015; Schumpeter, 1942/2008; Shane & Venkataraman, 2000). Notwithstanding debates about firm size, performance, rates of growth, owner self-efficacy, and growth intentions (Fleck, Hegarty, & Neergaard, 2011; Reichborn-Kjennerud & Svare, 2014), it is becoming increasingly clear just how instrumental women entrepreneurs are to economic growth (Mitchell, 2011) both in the United States and abroad. Researchers have found that more women choose to start entrepreneurial firms than men do (DeMartino &

Barbato, 2003) and that this trend may be driven by the lifestyle needs of the family and the caregiving responsibilities that women often take responsibility for (Morris, Miyasaki, Watters, & Coombes, 2006). In the United States, nearly half of mothers experience being the sole caregiver for their children, and nearly one quarter of women with children are single parents with full-time care and breadwinning responsibilities (Casey & Maldonado, 2012; Slaughter, 2015).

Some researchers have noted lags in firm-growth intentions, self-efficacy, and economic performance among female entrepreneurs relative to that among their male peers. Female entrepreneurs have demonstrated lower growth intentions compared with male entrepreneurs and have been more likely than men to choose to forgo growth opportunities and remain small by operating as sole proprietors with few or no employees (BarNir, 2012; BarNir et al., 2011; Breen & Karanasios, 2010; Costin, 2012; Gundry & Welsch, 2001; Morris et al., 2006; Weeks, 2014). Researchers have attributed women's lowered growth intentions to less self-efficacy or confidence in their entrepreneurial abilities relative to that of men (BarNir et al., 2011; Koellinger, Minniti, & Schade, 2013; Langowitz & Minniti, 2007; Lerner & Almor, 2002; Nwankwo et al., 2012). BarNir et al. (2011) found that women's lack of entrepreneurial self-efficacy was related to entrepreneurial intention and that women were less likely to start a business when compared with men. They linked women's entrepreneurial self-efficacy to their access to agentic role models and linked women's lack of agency to feminine displays of communal behaviors that hinder business productivity. Nwankwo et al. (2012) suggested that entrepreneurial self-efficacy is related to the masculine stereotypes such as breadwinning. Fairlie and Robb (2009) found that women-owned businesses

underperform relative to men-owned businesses largely as a result of the lack of prior work experience in similar or family businesses and as a result of less start-up capital. Costin (2012) asserted that women business owners emphasized the quality of relationships and work product more than men did and posited that women's value orientation was less cost-effective and less profitable than that of other approaches to business management.

The results of other studies have shown that women's collaborative tendencies boost productivity and overall company performance (Bear & Woolley, 2011; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010), and even though there are persistent misconceptions about women's business management skills, women-owned firms are as profitable and as likely to grow as male-owned firms are (Coleman, 2005; Kalleberg & Leicht, 1991). The findings from a report developed by a venture capital (VC) firm in California's Silicon Valley over a 10-year period, spanning 2004 through 2014, found that venture-funded firms with at least one woman founding member outperformed firms without a woman founding member by 63% (First Round Ten Year Project, 2014).

Leadership-development training that introduces entrepreneurship as a career path among women in the field of computer science is a form of professional competency development that is particularly relevant to the engineering community in the San Francisco Bay Area. The San Francisco Bay Area spans the two main metropolitan regions of San Francisco and San Jose and areas in between. In 2012, the United States received 68.8% of all global VC investments (Florida & King, 2016). The San Francisco Bay Area led U.S.-based VC investments with approximately \$11 billion, or 25.3% of global venture investments in 2012, whereas Boston received 7.5% of global

investments; New York City received 5.0%; Los Angeles received 3.4%; San Diego received 3.3%; Washington, DC received 2.0%; and Seattle received 1.7% (Florida & King, 2016). It is reasonable to argue that professional competency in Silicon Valley includes the ability to start a company or to be a member of a start-up team that manages venture funding. In coupling awareness of gender bias with leadership-development training within the contexts of the start-up and venture capital communities where these women technologists work, one aim of this study was to understand how a field-based, leadership-development training for women workshop could contribute to entrepreneurial leadership readiness among women technologists in Silicon Valley by attempting to increase a study participant's leadership self-efficacy.

Since 1990, research and discourse on entrepreneurship have been drawn from economists such as Valerio, Parton, and Robb (2014) who have witnessed an expansion from economic and capital-based frameworks to include pedagogical and learning-based frameworks. The creation of learning-based frameworks in business settings implies that the process of learning contributes systematically to a firm's ability to create and sustain economic value for its shareholders. For example, Eric Ries in his work, *The Lean Startup* (2011), described several successful case studies in which entrepreneurs engaged in a structured learning process through which they created a formal hypothesis about the software product development process and the number of customers that they would acquire and tested them through experimentation.

Researchers have articulated further the psychological and socioemotional behaviors and skills related to learning in business settings. Amy Edmondson (1999) used the term "psychological safety" to describe the constellation of behaviors that allow

teams to perform at high levels. She described these behaviors as learning behaviors and identified them as “seeking feedback, sharing information, asking for help, talking about errors, and experimenting” (p. 351). Nembhard and Edmondson (2006) created the term “leader inclusiveness,” which focuses on the leader’s role in creating learning environments. Leader inclusiveness is defined as the “words and deeds exhibited by leaders that invite and appreciate others’ contributions” (p. 941). Luthans, Avolio, Avey, and Norman (2007) used the term “psychological capital” to describe the positive psychological foundation that effective leaders create as a result of their well-developed socioemotional skills. Luthans et al. (2007) defined psychological capital specifically as “individual motivational propensities that accrue through positive psychological constructs such as efficacy, optimism, hope, and resilience” (p. 542).

Others have characterized business leadership skills in more general terms such as “social competence,” which is defined as the skills and abilities that allow people to interact effectively with others across a variety of social contexts and hierarchical levels to advance their interests (Baron & Markman, 2003; Tocher, Oswald, Shook, & Adams, 2012). The ability to recruit competent team members has been linked directly to leadership self-efficacy (Adler, 2013; Ancona et al., 2007; Baron & Markman, 2000). Baron and Markman (2000) suggested that relationships and interactions that elicit positive emotions from participants increase the perceptions of credibility among them and lead to better entrepreneurial outcomes such as employee recruitment, customer acquisition, and employee performance.

Furthermore, the ability to build effective social networks is another behavioral competence associated with effective leadership. Social networking is the act of



establishing or maintaining relationships to advance personal or professional interests (Burt, 2010; Cullen-Lester et al., 2016; Ibarra, 2015; Ibarra & Hunter, 2007; Uzzi & Dunlap, 2005), such as employee or partner recruitment (Fernández-Aráoz, 2014a, 2014b). The construct of social networking differs from the construct of social competence in that social networking explores the structures and boundaries of social interactions and, exclusively, their outcomes. Ibarra and Hunter (2007) characterized three types of social-networking activities that they referred to as strategic networking, operational networking, and personal networking. Researchers have linked social-network characteristics to business success (Burt, 2010; Lin, 2001). According to Ancona et al. (2007), leaders who use social networks to recruit others whose skills supplement their own demonstrate stronger leadership skills than do those who do not. Groysberg (2008) found that women who built social networks with clients and colleagues outside of their place of work were more likely than men were to maintain high levels of productivity after a job change, whereas the work performance of their male counterparts fell in comparison with their previous levels.

Self-advocacy and the ability to claim a leadership identity is another facet of behavioral competence that has been found to be associated with effective leadership (Bowles, 2012; DeRue & Ashford, 2010; Tocher et al., 2012). Both Tocher et al. (2012) and Bowles (2012) found that the most successful leaders self-promote among gatekeepers of power who can assist in their career development, as well as self-promote among a network of peers who are supportive of their leadership identities to attain their desired outcomes. In a study based on grounded theory with 25 corporate and 25 entrepreneurial women leaders, Bowles (2012) found that successful women in

leadership roles self-advocated to bosses and other “gatekeepers” of power instrumental to their career development. She also observed that effective women leaders developed a strong personal-leadership narrative that they used to self-affirm their leader identities when external sources of validation were not present when they were faced with disappointment or when in the face of disconfirming evidence (Bowles, 2012).

Leadership theorists and advocates of women’s leadership-development theories have found that the array of behaviors that constitute a leadership identity are learned and developed with practice (Boyatzis et al., 2006; Ely et al., 2011; Tocher et al., 2012). The implications of these findings are that a negative leadership identity, not domain knowledge, talent, intelligence, or other material constraints, may be the salient factor hindering women in engineering to advancement in leadership roles.

The findings from international studies of EET among women entrepreneurs demonstrated positive outcomes for job creation and hiring when leadership-development topics were included in EET (Brush et al., 2014). Brush et al. (2014) reported that women-only EET programs that targeted underserved populations in developing nations such as Brazil, China, and Nigeria (called the “10,000 Women Initiative”) demonstrated positive business growth among start-up firms for outcomes such as job creation and hiring when the leadership-development content was included in training curriculum. Further details on the 10,000 Women Initiative are provided in Chapter II.

Recruitment and selection researchers consistently have found that recruitment is among the most effective strategies leaders can employ to realize their leadership aspirations and to enhance their company’s business performance (Ancona et al., 2007; Fernández-Aráoz, 2014a, 2014b; Lorence, 2014; Smart, 2005). Study findings have

shown that business leaders and entrepreneurs of both genders in the United States demonstrate a need to link training interventions with specific management competencies such as employee recruitment training (Adler, 2013; Sexton, 1997). In a study of 150 U.S. firms owned by men and women with annual sales in the \$5 to \$20 million range, Sexton (1997) found that entrepreneurs ranked hiring, training, and motivating for growth 5<sup>th</sup> out of 16 topics most important for growing their businesses. Outcomes from recent research on recruitment best practices link leadership efficacy with positive hiring outcomes (Adler, 2013; Ogunfowora, 2014). A visual representation of the relationship among LBCW, recruitment efficacy, and leader efficacy described in the literature on recruitment best practices is provided in Figure 1.



*Figure 1.* Diagram of the links between leadership behavioral competence among women and leader efficacy.

As demonstrated in the 10,000 Women Initiative (Brush et al., 2014), entrepreneurial growth through recruitment creates a de facto condition leadership (Adler, 2013). Nevertheless, the link between recruitment and measures of leader efficacy, such as psychological capital, has been reported only peripherally by researchers (Ogunfowora, 2014). For example, Ogunfowora (2014) found that candidates were more likely to demonstrate confidence in leadership by submitting an employment application to a company when they perceived the CEO as having both a positive and an ethical psychological profile. The relationship between perceptions of leader efficacy and psychological capital is presented in more detail in Chapter II.

Underperformance among female entrepreneurs relative to that among male entrepreneurs may be related directly to a lack of leadership training among women, not only to well-researched measures of human capital, such as years of experience or level of education. Although it is beyond the scope of this study to evaluate the effects of leadership training on employee recruitment directly, the fundamental argument of this study is that lowered leadership identity among women is a direct consequence of a lack gender-aware leadership behavioral competency training for women. Through this research, I intended to explore and articulate practical methods by which women enrolled in the study could develop the leadership behavior competencies required to identify as leaders and to initiate and sustain growth-oriented ventures.

### **Educational Significance**

The confluence of once disparate research domains provides new opportunities for business, education, and researchers of gender to collaborate across disciplines and provides opportunities to explore further the relationships among teaching methods, gender, and behavioral outcomes in business settings. More and more economic data suggest that small women-owned enterprises make comparable contributions to the U.S. economy as large corporations do in terms of job- and community-development activities (Pordeli & Wynkoop, 2009; Weeks, 2014); therefore, there is a greater need to support female entrepreneurial leadership and growth opportunities through gender-aware pedagogy. There also is a need to integrate existing knowledge from other management disciplines such as recruitment and selection into leadership and EET pedagogy to support future growth initiatives of potential women entrepreneurs.

The aim of this research was to contribute to existing sociocognitive and gender research on the effect of gender-aware pedagogy on leadership competency development for women. It may be possible that the lack of self-efficacy and lowered growth intentions reported among women entrepreneurs can be attributed to limitations of EET programs that have failed to recognize and address the cultural roles and socioemotional needs of women in their pedagogy (Bullough et al., 2015; Nagesh & Murthy, 2008; Patterson et al., 2012).

At this time, little research is available on leadership and EET programs designed for women entrepreneurs in the United States. Findings from non-U.S., women-only field EET programs reveal strong positive outcomes on sociocognitive measures, such as self-efficacy and leadership development, and strong positive economic outcomes, such as job growth and revenue, in countries where there is less pressure among entrepreneurs to grow businesses quickly (Brush et al., 2014; Nagesh & Murthy, 2008). Researchers who have studied extensively women in all settings including scientific communities have understood that motherhood (Williams & Ceci, 2012) or greater family- and community-care responsibilities moderate sociocognitive outcomes such as women's career growth intentions (Nwankwo et al., 2012). Nagesh and Murthy (2008) found positive relationships between EET and sociocognitive factors such as leadership self-efficacy among women entrepreneurs in India and suggested that high-quality pedagogy is developed, continually reviewed, and adapted to the lifestyles of women, including such adaptations as training for home-based businesses that leverage technology. Although researchers based in the United States have documented the need for support among women starting businesses (Shinnar, Giacomini, & Janssen, 2012), they have not

explored the relationship between gender-aware leadership and EET that includes instruction on home-based business, as well as program outcomes such as leadership self-efficacy and entrepreneurial growth intentions among potential women entrepreneurial leaders in the United States, because such programs do not exist. Current pedagogy separates leadership education from EET. For example, Valerio et al. (2014) conceptualized leadership theory as part of traditional management education, not as part of EET core curriculum.

Much of the current research base on women business leaders has been aimed at the postsecondary level among university students' intentions, not among practicing women entrepreneurs, per se. Study findings have revealed ample evidence of female students' lagging self-efficacy relative to that of male students in university settings (Karimi et al., 2013; Koellinger et al., 2013; Langowitz & Minniti, 2007; Shinnar, Hsu, & Powell, 2014). Researchers of women entrepreneurs have suggested that the differences in pedagogy and curriculum in university-based EET programs assume high-growth mindset tendencies across all populations or the "one-size-fits-all" approach with which women are not comfortable (Cliff, 1998; Wilson et al., 2007). The implications of this research are that women do not pursue entrepreneurship as a career path and thereby are shut out of wealth-creating opportunities (Mitchell, 2011). If future research can be aimed at demonstrating increases in leadership self-efficacy or growth intentions among potential women entrepreneurs as a result of gender-aware pedagogy at the university level, then more women can gain access to this knowledge and pursue entrepreneurship as a planned career path.

## Theoretical Framework

This section of the chapter provides a review of the theoretical foundations considered in the development of the LBCW framework. Figure 2 is a diagram of the concept of LBCW, which is presented as the theoretical framework for the design and delivery of the training intervention used in this study. Each box of the diagram represents a behavioral competence.

Leadership Behavioral Competency Theory for Women			
Self-Advocacy	Social Networking	Goal Orientation	Psychological Capital

*Figure 2.* Conceptual overview of leadership behavioral competency theory for women.

LBCW is a composite of the leadership behaviors drawn from ICT, social-network theory, learning-based theories, leadership theories, and women's leadership theory. LBCW is conceptualized as a construct that identifies four main competencies that effective women leaders in entrepreneurial and corporate business environments possess. They are self-advocacy, social networking, psychological capital, and goal orientation. Subcompetency categories of self-advocacy are the development of a personal vision and narrative and awareness of gender bias. Subcompetency categories for social networking are personal and external networking behaviors. Subcompetency categories for psychological capital development are the development of emotional buoyancy and the development of psychological safety. The subcompetency category for goal orientation is a learning and development process orientation.

LBCW draws on Bandura's (1993) self-efficacy theory, which is embedded within the conceptual model shown earlier in Figure 2 that links leadership behaviors to leadership identity and self-efficacy. Perceived self-efficacy was defined by Bandura

(1993) as a psychological function called a “belief” or identity attribution, which affects task performance and is influenced by “cognitive, motivational, affective, and selection processes” (p. 117). Although each process is independently operationalized and studied as a component of Bandura’s (1993) theoretical model, it is modeled to interact and influence simultaneously a person’s behavior, such as self-advocacy or social-network selection tasks.

Bandura (1993) emphasized the need for control and self-agency in the learning process. He wrote, “People create social systems, and the authorized rules and practices of social systems, in turn, influence human development and functioning” (p. 15). According to Bandura (1993), perceived controllability or modifiability of the social context is linked to perceptions of self-efficacy. A person with higher self-efficacy is likely to perceive the environment as malleable and will attempt to modify the environment to serve his or her purposes, whereas a person with lower self-efficacy is less likely to modify the environment to meet his or her goals and may be less likely to achieve goals (Bandura, 1993). Selecting participants into one’s social network is considered a mechanism by which a person modifies their environment, exercises control, and serves their own purposes. Therefore, a direct relationship exists between self-efficacy and social-networking behaviors, and the identity attributions that develop as a result of the selection processes.

The ability to affect the learning and performance outcomes of an environment by selecting its participants is also at the heart of recruitment and selection theory. In business settings, social-network selection is the process by which leaders manage their business performance (Ancona et al., 2007; Fernández-Aráoz, 2014). According to



organizational theorists, “the people make the place” (Schneider, 1987), such that the participants in the social system dictate the characteristics and outcomes of the system (O’Reilly, Chatman, & Caldwell, 1991; Strange & Banning, 2001). In business settings, social-network selection is the process by which leaders manage the process of developing their leader identities.

According to Ely et al. (2011), leadership development among women is best conceptualized as identity work. DeRue and Ashford (2010) construed leadership identity development as a transaction-based social interaction in which an identity claim of leadership is granted by prospective followers and vice versa:

For example, grants might include publicly referring to someone as a group’s leader or, in the case of a follower identity, explicitly indicating that a person should act in accordance with the direction of another.  
(p. 631)

The purpose of conceptualizing leadership identity as identity work is to manage and overcome gendered perceptions of role incongruity, a form of prejudice that hinders women’s career progress as they pursue leadership roles (Eagly & Karau, 2002; Patterson et al., 2012).

Education and training programs designed to develop women’s leadership identities should incorporate the following principles: “Situating topics and tools in an analysis of second-generation gender bias, create a holding environment to support women’s identity work, and anchor participants on their leadership purpose” (Ely et al., 2011, pp. 486-488). In doing so, women develop social competencies that allow them to redefine themselves in light of an emerging leadership narrative and to legitimize their claim to leadership positions (Bowles, 2012; Tocher et al., 2012). The details regarding

the effects and implications of social-role incongruity and gender are presented in Chapter II.

Researchers of women's leadership development also have indicated that the ability to build relationships that reinforce women's leadership identity is a form of social competence that women in business typically underdevelop even though there is a critical need to do so (Bullough et al., 2015; Ely et al., 2011). Social networking is a form of social competence that has been found to be related directly to entrepreneurial and leadership efficacy (Ely et al., 2011; Ibarra & Hunter, 2007; Uzzi & Dunlap, 2005). Uzzi and Dunlap (2005) defined social networking as "connecting disparate groups of people" (p. 53), and they found that the most effective social networks are constructed purposefully and comprise people of a variety of backgrounds and expertise who are related strategically. They found that most executives' networks were too insular to allow for professional-development opportunities because they comprised people of similar experience, worldview, and training (Uzzi & Dunlap, 2005). The insularity of networks may indicate a type of implicit gender bias, as defined as "the powerful yet often invisible barriers to women's advancement that arise from cultural beliefs about gender, as well as workplace structures, practices, and patterns of interaction that inadvertently favor men" (Ely et al., 2010, p. 475). Nonetheless, study findings show that similar to men, women limit diversity in their selection processes and favor specific forms of human and social capital when constructing businesses. Researchers have found that women entrepreneurs created an insular network when selecting business associates by selecting their spouses or other family members as cofounders (Cohoon et al., 2010; Surangi, 2016). These

findings suggest that social-networking behaviors should be taught explicitly in leadership and business management education programs.

Ibarra and Hunter (2007) found that there are three forms of social networking—operational, personal, and strategic—and that each has a purpose and ways to identify members. Operational networks exist to complete work efficiently, and members are identified by their ability to either support or inhibit work productivity within the organizational structure (Ibarra & Hunter, 2007). Personal networks enhance professional development through coaching and mentoring and by providing access to others with valuable skills and information (Groysberg, 2008; Ibarra & Hunter, 2007). Personal-network members are found through professional communities and hobbies or interest groups and usually are found outside of the current organizational structure (Groysberg, 2008; Uzzi & Dunlap, 2005). Strategic networks reach beyond an individual's personal control and provide an understanding of important future directions and initiatives (Ibarra & Hunter, 2007). Members of strategic networks are both inside and outside of the organizational structure and form important internal–external links that move an organization toward a strategic goal (Ibarra & Hunter, 2007). In light of these studies on the moderating effects of gender on social-network composition, the training treatment in this study emphasized women's need to form strong personal support networks outside of the boundaries of their current work environments.

The ability to self-advocate strategically within her social network counteracts implicit gender biases and is among the most critical skills aspiring women leaders use to advance their leadership opportunities (Baron & Markman, 2003; Bowles, 2012; Tocher et al., 2012) in work settings. Self-advocacy counteracts implicit gender bias by creating

awareness of women's accomplishments that may have been overlooked. Self-advocacy compels women to demonstrate behaviors that are not self-effacing or overly self-critical as is typically found among women who are uncomfortable with leadership positions (Sturm et al., 2014). A review of the literature that includes descriptions of studies on women's lowered leadership self-efficacy among women is presented in Chapter II. The findings from these studies have shown that social-network composition among business leaders differs on the basis of gender. Cohoon et al. (2010) found that successful women entrepreneurial leaders were more likely than men to develop personal networks that offered personal support. Groysberg (2008) found that high-performing executive women developed strong personal and professional networks outside of the workplace because professional acceptance and few mentoring opportunities existed for them within male-dominated environments. Groysberg (2008) also found that because women's networks were external to their workplace, their work performance did not diminish as men's did when women changed jobs. Together, the outcomes of these studies suggested that the ability to characterize and manage social relationships is tantamount to building leader self-efficacy among women, creates awareness of implicit gender bias, and supports the need for the revised model of the leadership-development training intervention developed for this study.

The training treatment used in this study also draws on ICT to address better the negative self-efficacy and burnout (Boyatzis et al., 2006) that women leaders experience in the workplace. Negative self-efficacy and burnout has been identified as the result of increased sociocognitive workload associated with confronting implicit gender biases that undermine women's leadership initiatives (Patterson et al., 2012), and researchers have

claimed that experiencing the positive emotions generated by supportive social relationships counteracts negative self-efficacy and burnout (Boyatzis et al., 2006).

This study used an ICT-based instructional method to teach emotional self-regulation techniques and social-network-development techniques to women leaders in the Silicon Valley technology community, which is male-dominated. Researchers of leadership development have long understood the psychological stresses involved in building leader self-efficacy among individuals (Boyatzis, 2008; Ibarra, 1999; Senge, 2006). The following section is focused on the relationship between leader efficacy and emotional buoyancy, and the need for the use of ICT as an instructional method for simultaneously developing both leader-efficacy and emotional self-regulation competencies among women entrepreneurs is presented.

***Using ICT to develop leadership behavioral competence among women in mixed-gender settings***

Study findings have shown that general and specific forms of social competence related to leader self-efficacy can be developed with education and training (Donnellon, Ollila, & Middleton, 2014; Ibarra, 1999; Ladegard & Gjerde, 2014), and they have suggested that leadership training teach participants the ability to self-regulate emotionally (Ladegard & Gjerde, 2014; Luthans & Peterson, 2003), manage stress (Goleman, Boyatzis, & McKee, 2004; Jack, Boyatzis, Khawaja, Passarelli, & Leckie, 2013), and enlist the support of others to sustain leadership capacity effectively (Boyatzis et al., 2006; Goleman et al., 2004). It has been established that the most effective and lasting training interventions among nascent entrepreneurs leverage emotional and social competencies because cognitive-only training is forgotten quickly (Lackeus, 2014; Specht & Sandlin, 1991).

According to Goleman, Boyatzis, and McKee (2002) and Boyatzis, Stubbs, and Taylor (2002), most leadership-development programs demonstrate a “honeymoon effect” in which program outcomes are somewhat short-lived, ranging from 1 to 2 years. In comparison, outcomes observed from leadership-development programs that incorporated ICT had stronger effects that lasted up to 7 years after the end of the Master’s in Business Administration (MBA) program. A large component of the ICT-based curriculum is the development of new social networks among people who both emotionally support the learner and reinforce the learner’s fragile and emerging leader identity (Boyatzis & McKee, 2005; Boyatzis et al., 2006; Goleman et al., 2004). Wheeler (2008) suggested that the number of social relationships a person leverages to support goal attainment, such as the development of a leader identity, is related to the ability to reach that goal as well as to the longevity of the outcomes related to that goal. The findings of studies like Wheeler’s suggest that effective EET methods for women entrepreneurs provide explicit instruction on why and how to build supportive social networks. The following section describes the benefits of supportive social networks in leadership-development programs for women.

### ***Negative emotional attractor and positive emotional attractor***

Research results have also shown that supportive social networks serve to maximize both learning and leadership potential among individuals by helping them to manage negative emotions such as power stress (Boyatzis & McKee, 2005; Boyatzis et al., 2006; Goleman et al., 2004; Grichnik, Smeja, & Welppe, 2010; Patzelt & Shepherd, 2011). Power stress is defined as the need or obligation to influence others. It is a de facto condition among leaders that is often experienced as a negative emotional state (Boyatzis,

2008; Boyatzis & McKee, 2005; Boyatzis et al., 2006; Jack et al., 2013). The feelings associated with power stress are depression, fear, disgust, and “unpleasant engagement” with the environment (Boyatzis et al., 2006). As this happens, neurochemicals such as epinephrine, norepinephrine, and cortisol are secreted (Jack et al., 2013). These neurochemicals serve to limit neurogenesis (brain cell growth) and to decrease immune-system functioning (Boyatzis et al., 2006). Neurogenesis is associated with learning new behaviors (Bloom, 1994) and has been shown to occur into adulthood (Eriksson et al., 1998). A common statement associated with this syndrome is “stress kills,” but research findings have shown that negative emotions make a person less able to learn than he or she would be under positive emotional circumstances (Bloom, 1994). Boyatzis et al. (2006) conceptualized and named the antecedent stimuli that invokes consequent stress activity as the “negative emotional attractor” (Boyatzis, 2008; Boyatzis & McKee, 2005; Boyatzis et al., 2006; Jack et al., 2013). The negative emotional attractor is the mentally constructed set of requirements, tasks, and responsibilities that serve to create feelings of stress, obligation, and burden within the mind of the imaginer.

Minimizing negative emotions is achieved through a coaching-type relationship rather than through an authoritative one, and it is referred to as “coaching with compassion” (Boyatzis, 2008). The term “coaching” is used because it best describes an optimal learning-oriented type of interaction that can be used effectively by a leader within a hierarchical setting (Boyatzis, 2008). According to ICT, power stress is moderated by the leader’s ability to create emotionally resonant relationships with others in the organization (Boyatzis, 2008). The feelings associated with the resonant relationships are positive emotions such as optimism, hope, caring, and compassion

(Boyatzis, 2008). As this happens, neurochemicals such as oxytocin and vasopressin are released and immune-system functioning increases (Boyatzis et al., 2006). When positivity is evoked, the leader is more likely to sustain leadership behaviors, which becomes more salient in leadership persistence in mixed-gender settings (Karelaia & Guillén, 2011, 2014). According to Boyatzis and McKee (2005):

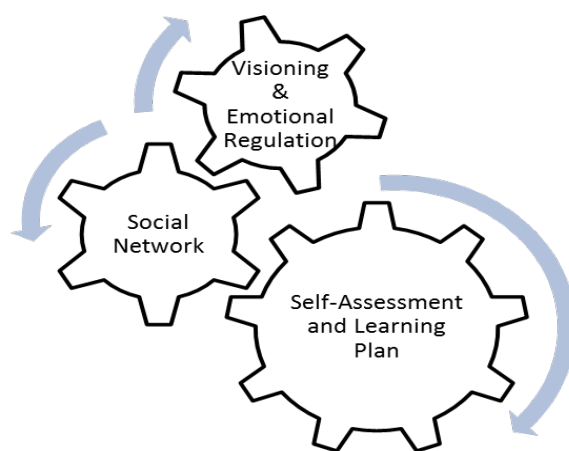
The power of the ideal self is not just emotional. It is physical in that it involves neuro-endocrine processes that allow the body to renew itself, while ameliorating the ravages caused by chronic stress. (p. 633)

The antecedent stimuli that invoke consequent positive neural-chemical activity comprise the “positive emotional attractor” (PEA; Boyatzis, 2008; Boyatzis & McKee, 2005; Boyatzis et al., 2006; Jack et al., 2013).

Intentional change theorists suggest that engaging the brain through emotional positivity can provide an individual leader with the psychological and physiological sustenance required to counterbalance the negative effects of power stress so that new outcomes can be realized (Jack et al., 2013). The physiological activation of the “happy brain” creates a sense of well-being in the learner and is thus conceptualized to enhance the learner’s ability to receive critical feedback from others and accurately self-assess (Boyatzis & McKee, 2005). The learner’s positive emotional state predisposes the learner to accept critical feedback rather than becoming defensive and rejecting critical feedback (Boyatzis & McKee, 2005). The ability to receive critical feedback triggers a virtuous learning cycle when feedback enhances the ability of learners to self-assess accurately their skills, which in turn allows them to adjust their behavior toward more favorable performance on future tasks (Zimmerman & Martinez-Pons, 1986). Accurate self-assessment lends itself to the formation of an effective plan (Kolb & Boyatzis, 1970;



Zimmerman, 2008) that the learner uses to reach his or her idealized vision (Boyatzis, 2008). Enhanced self-efficacy is the outcome of practicing for mastery in environments that support emotional buoyancy and optimism (Bandura, 2012; Boyatzis & McKee, 2005; Grant & Dweck, 2003). This theory is supported by research on one-on-one executive coaching programs that showed leader-efficacy improvement when follower feedback on leader-performance gaps was integrated into the coaching intervention (Smither, London, Flautt, Vargas, & Kucine, 2003). As the findings from studies previously presented have suggested, women are more likely to suffer from perceptions of negative leadership self-efficacy than men are in mixed-gender settings (Mueller & Dato-On, 2008; Nwankwo et al., 2012; Sturm et al., 2014), and therefore, an appropriate method of developing leadership self-efficacy among women should address stress-related dynamics, as ICT does, which is why it is being used in this study. The training treatment proposes to teach women to subvert negative self-efficacy and burnout with ICT. The fundamentals of ICT are depicted in Figure 3.



*Figure 3.* ICT-based leadership-development method adapted from Boyatzis (2008).

*The Five Discoveries* are exercises designed by the developers of ICT to maximize positive emotional states and, as a by-product of the activation, increase leadership self-efficacy (Boyatzis, 2008). The exercises address directly the skills required to build LBCW and are performed in the following sequence:

1. Discover the ideal self through visioning and invoking positive emotions (Boyatzis & Akrivou, 2006; Ely et al., 2011).
2. Understand the current self as perceived by others (Boyatzis, 2008; Zimmerman, 2002). Exercises also include a self-assessment of strengths that provide a sense of self-efficacy and of weaknesses that need to be developed to reach the desired future (Boyatzis, 2008; Zimmerman, 2002). Self-understanding may develop through the use of assessments (DeRue & Ashford, 2010), by asking others for honest feedback (Boyatzis, 2008), and in conversations with other women who can reflect and model similar experiences and behaviors (Debebe, 2011; Debebe et al. 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003).
3. Develop a learning agenda, or plan, describing the behaviors or skills that will enable movement toward the desired future (Boyatzis, 2008; Zimmerman, 2002).
4. Experiment with new behaviors among people who are supportive of the ideal vision (Boyatzis, 2008) and affirm the women's emerging leadership identity (Boyatzis, 2008; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003).
5. Continue to build emotionally and instrumentally supportive networks and environments (Ancona et al., 2007; Boyatzis, 2008; Cohoon et al., 2010; Debebe,

2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003).

LBCW combines ICT with women-only training (WOT). WOT for leadership self-efficacy is still in the early stages of development and adoption in the United States. Although some studies have been aimed at investigating the outcomes of WOT on leadership self-efficacy (Ancona et al., 2007; Bullough et al., 2015), only a few of these studies currently are available and have not included entrepreneurial firms, or have not been based in the United States. There is a need to reproduce the positive program outcomes for women-only leadership and EET programs in the United States that serve current and potential entrepreneurial women leaders. A discussion on how the five steps articulated earlier adhere to the design principles for LBCW for the population of women scientists and engineers studied in this research are presented in Chapter II. A review of studies that have included the features and outcomes of WOT in other countries are also presented in Chapter II.

### **Research Questions**

The purpose of the study was to investigate the effects of a leadership-development training workshop on self-perceptions of leadership behavioral competence among participants of a California Silicon Valley women's software engineering community using a pretest-posttest comparison group design. Leadership behaviors were defined by the LBCW theoretical framework and were assessed quantitatively with four instruments: the Leadership Education and Development Activities Instrument (LEDA), the State Hope Scale (SHS), the Authentic Leadership Questionnaire (ALQ), and the

Leader Efficacy Questionnaire (LEQ). The following research questions were investigated:

1. To what extent are there differences in the scores of the four measures of LBCW ( LEDA, SHS, ALQ, and LEQ) between the treatment and comparison groups at posttest?
2. To what extent are there differences between pretest and posttest LBCW ( LEDA, SHS, ALQ, and LEQ) scores within the treatment group?

### **Definition of Terms**

Several alternative definitions may be found in the research for the terms included in this study. For the purposes of identifying and measuring the variables in this research study, the following definitions are given:

*Agentic Behaviors*: Behaviors that pertaining to self-directed behaviors and serve to advance personal or professional development goals (Zimmerman, 2002).

*Early-Stage Venture*: An entrepreneurial idea, project, or company that is in the nascent stages of development or within the first several years of operations and that has not yet established a sustainable revenue stream to fund its functioning (Ries, 2011).

*Entrepreneurial Growth Behaviors (EGBs)*: Behaviors that lead to business growth.

Business-growth behaviors include the intention to hire and intention to change some aspect of the current business practice including partnering with other businesses, seeking professional advisors, and seeking funding (Costin, 2012; Gundry & Welsch, 2001).

*Gender-aware Pedagogy*: An approach to education and training that prepares women to address social and cultural biases that undermine women's leadership identity by

increasing their social competence and social-identity building skills (Bullough et al., 2015; Ely et al., 2011).

*Implicit Gender Bias:* Also referred to as second-generation gender bias (Ely et al., 2011), it is a set of assumptions, expectations of leadership, attributes, and behaviors that are exhibit consistently by men and assumed incorrectly to be normative for women.

*Intentional Change Theory (ICT):* A leadership-development training program that is based on a guided-inquiry process of visioning, positive emotional responses, and social reinforcement. ICT uses five exercises or five “processes of discovery” (Boyatzis et al., 2006). ICT is aligned conceptually with gender-aware pedagogy for women entrepreneurs (Ely et al., 2011) and, hence, is the basis for the training intervention.

*Leadership Behavioral Competency for Women (LBCW):* A measure of leadership competence that signifies the extent to which a woman practices or demonstrates the behaviors that have been linked in leadership development. The behavior competencies are self-advocacy, social networking, accumulation of psychological capital, and goal orientation. In this study, LBCW is a dynamic construct based on Bandura’s (1993) definition of perceived self-efficacy as it applies to leadership tasks and includes the purposeful development of a leadership identity while constructing a learning community (Boyatzis & Akrivou, 2006; Ely et al., 2011; Ibarra, 1999; Wenger, 2000). LBCW, in this study, was self-assessed with four instruments: the Leader Efficacy Questionnaire (LEQ; Hannah & Avolio, 2013), the Authentic Leadership Questionnaire (ALQ; Avolio, Gardner, & Walumbwa, 2007), the State Hope Scale (SHS; Snyder et al., 1996), and the Leadership Education and Development Activities Instrument (LEDA). The LEQ is a 22-item instrument with scoring that ranges from 0 to 100, representing *no confidence* and

*complete confidence*, respectively. The LEQ includes items related to the ability to focus, meet goals, and motivate others. The ALQ is a 16-item survey with scoring that ranges from 0 to 4 representing a range of choices, including *not at all* to *frequently, if not always*. The ALQ includes items related to core values, feedback-seeking behaviors, and emotional sensitivity. The SHS is a 6-item scale that measures agency for and pathways to goal attainment that is theorized to contribute to higher levels of hope. The scale is six items and ranges from 1 to 8 representing a range of choices, including *definitely false* to *definitely true*. The LEDA is a 65-item scale used to assess a person's attitudes and behaviors related to leadership education and development activities. The LEDA is a unique instrument because its focus is on women's professional and leadership development, in contrast to professional and leadership development that assumes normative items for all genders. The LEDA includes four subscales. They are developing and advocating for a vision of success, awareness of second-generation or implicit gender biases, social-network development, and planning. Responses for the LEDA are collected through a 6-point Likert scale ranging from *strongly disagree* to *strongly agree*.

*Negative Emotional Attractor*: A negative affective response to undesirable or threatening conditions that provoke avoidant behaviors (Boyatzis, 2008).

*Operational Networking*: A form of networking that serves to meet group-level functioning for immediate workload demands. Social contacts are prescribed based on job context and serve to build strong working relationships (Ibarra & Hunter, 2007).

*Personal Networking*: A form of networking that serves to enhance personal and professional development for future-oriented goals and interests. Social contacts are chosen based on quality and experience of the relationship that is emotionally or socially

nurturing (Cohoon et al., 2010; Groysberg, 2008). Personal networking also serves to enhance personal and professional opportunities through extending a person's access to others (Ibarra & Hunter, 2007).

*Positive Emotional Attractor:* A positive affective response to desirable conditions that provoke an approach response and sustain engagement (Boyatzis, 2008).

*Power Stress:* A condition of leadership roles that triggers negative psychological and physiological reactions in a person (Boyatzis, 2008).

*Psychological Capital:* The positive psychological effects of well-practiced socioemotional skills that include psychological safety, feelings of inclusion, hope, confidence, and resilience (Edmondson, 1999; Luthans et al., 2007; Nembhard & Edmondson, 2006).

*Role-incongruity Theory:* Eagly and Karau (2002) introduced a role congruity theory of prejudice against women leaders as a form of gender-role stereotyping that relegates women to traditional and idealized gender-based roles only, such as caregivers and nurturers, and creates perceptions of dissonance between women's gender identity and a leader identity. They noted that when a woman enacts agentic behaviors or any range of behaviors perceived to be incongruent with feminine-stereotyped behaviors, they are regarded negatively by others.

*Second-Generation Gender Bias:* See *Implicit Gender Bias*.

*Sex-role Stereotype:* A form of prejudice that links expectations of a man or woman's behaviors to idealized social roles (Eagly & Karau, 2002).

*Social Competence:* The skills and abilities developed through mentoring and other forms of learning that allow people to interact effectively with others across a variety of social

contexts and hierarchical levels to advance their interests (Baron & Markman, 2003; Tocher et al., 2012), including leadership and entrepreneurial contexts.

*Social Networking*: A form of social competence that includes the purposeful cultivation of interpersonal contacts for gain or advantage (Baron & Markman, 2003) that includes the three forms of networking defined by Ibarra and Hunter (2007) as operational, personal, and strategic.

*Strategic Networking*: A form of networking that serves to advance institutional initiatives beyond the immediate benefit of those involved. Strategic networking is used to lay social foundations for larger initiatives that may require multiple stakeholders and for outcomes that affect multiple stakeholders (Ibarra & Hunter, 2007).

*Woman Entrepreneur*: Defined here as a woman business owner, a self-employed woman, a woman who has cofounded an organization as part of a team, an independent consultant, a sole proprietor, or a founder or cofounder of a nonprofit venture, within the United States, who operates under unstable financial and structural conditions that result from the early nature of the enterprise (Ries, 2011).

### **Summary**

The aim of this research was to contribute to the development of female leadership in entrepreneurship and other U.S.-based business environments by studying the effects of gender-aware pedagogy in leadership-development training programs on the four measures of LBCW used in this study: the LEDA, SHS, ALQ, and LEQ.

Although the results of international studies of leadership and EET among women entrepreneurs have demonstrated successful entrepreneurial outcomes when leadership-development programs are included in EET (Brush et al., 2014), there is still concern



about the ability to reproduce these outcomes in the United States. This concern stems from the difference between emerging markets and developed ones; there are many unanswered questions regarding the relationship between leadership-development training and job creation in developed countries where labor market participants are culturally, gender, and knowledge diverse. This study comprised an LBCW-based methodology for the training curriculum that was congruent with research on women's leadership theory through the development of an emotionally supportive learning community, an emphasis on the development of a leadership identity, and an awareness of and remediations for second-generation or implicit gender biases in its program. The objective of this research was to enable women leaders to sustain their leadership and entrepreneurial initiatives and not to suffer the negative self-efficacy and burnout associated with being a woman in leadership roles. A review of research and content related to women-only women's leadership development programs is presented in Chapter II. Chapter III has the methods and techniques used in this study. Analyses of the findings are given in Chapter IV, and a discussion of the findings in light of current research is found in Chapter V.

## **CHAPTER II**

### **REVIEW OF THE LITERATURE**

The purpose of the study was to investigate the effects of a leadership-development training workshop on leadership behaviors for participants of a California Silicon Valley women's software-engineering community using a pretest-posttest comparison group design.

The training intervention used in this research was designed to prepare women technologists to contribute to the Silicon Valley business community as leaders. California's Silicon Valley is made up of entrepreneurial ventures as well as of established firms. It was hypothesized that leadership self-efficacy, not ability, has been the main barrier to leadership roles for women technologists in entrepreneurial firms as founders, as well as in large companies as executive leaders. The training was based on the theoretical model of behavioral leadership competency development for women (LBCW) presented in Chapter I that articulated both affective and behavioral components of women's leadership-development education and training.

This chapter opens with a presentation of the affective or psychological components of leadership development. In this study, LBCW was measured with four scales: the Authentic Leadership Questionnaire (ALQ), the State Hope Scale (SHS), the Leader Efficacy Questionnaire (LEQ), and the Leadership Education and Development Activities Instrument (LEDA). The research method documenting the links between each construct measured in the study and their relationship to measures of leader self-efficacy are presented here. The reliability and validity of the scales is presented in Chapter III.

Research results that indicate that gender is a differentiating factor in how leadership is interpreted and expressed among women in business settings are presented as well as a review of studies that identify the need for gender-aware training methods to enhance LBCW among women. Research findings on both effective and ineffective education and training interventions designed to increase LBCW among women leaders in entrepreneurial business settings also are reviewed. Furthermore, research outcomes demonstrating the effect of women-only training (WOT) in entrepreneurial settings are presented because the effects of training outcomes are more salient in small environments than they are in corporate settings. The review concludes with an overview of the topics and content used in the training intervention of this study.

### **Leadership Self-efficacy**

Positive psychology has been defined as a general psychological construct composed of subconstructs of efficacy, optimism, hope, resilience (Luthans, Avolio, Avey, & Norman, 2007), trust, transparency (Norman, Avolio, & Luthans, 2010), and authenticity (Rego, Sousa, Marques, & Pina e Cunha, 2014). Luthans et al. (2007) described positive psychology as a state-like condition that is open to development through training and education. In contrast, trait-like conditions, such as personalities, are stable and difficult to change (Luthans et al., 2007). Positive psychology as a composite factor has accounted for more variance in dependent variables such as worker performance and job satisfaction than each subfactor alone (Luthans et al., 2007). Hope has been defined as the belief in one's ability to both generate the will and the means to attain goals (Snyder et al., 1996), and authenticity has been defined as self-awareness, balanced processing, internalized moral perspective, and relational transparency (Rego et

al., 2014). Although described separately, most measures of positive psychology demonstrate shared variance with each other when measured within research studies (Hannah, Avolio, Walumbwa, & Chan, 2012).

Leader positivity has been linked to perceptions of leader efficacy. In an experimental study conducted by Norman et al. (2010), 304 participants, two thirds of whom were male and 90% of whom were in the United States, were assigned randomly to one of four treatment conditions that were high and low with respect to positive leader psychological capacities and leader transparency. Participants were shown several staged communications from a male chief executive officer (CEO) of a large Fortune 500 company and were asked to rate the effectiveness of the CEO's communication about a downsizing event. Leader effectiveness was measured with a 6-point Likert scale with four items that ranged from *strongly agree* to *strongly disagree*. Reliability for the scale was reported to be .92, strong reliability, and its purpose was to evaluate the effectiveness of leader communication, sensitivity to follower's needs, the leader's ability to address important issues, and the follower's willingness to recommend this leader to friends (which is an important factor in recruitment). Trust was assessed with a 6-point Likert scale with five items (Mayer & Gavin, 2005), which included items such as "I would tell this leader about mistakes I've made on the job, even if they could damage my reputation" (Norman et al., 2010, p. 355). Reliability for the scale was reported to be .88, good reliability. Positive psychological capacity was assessed with a 6-point Likert scale with 12 items titled the "Psychological Capital Questionnaire (PCQ)" that measured efficacy, hope, resilience, and optimism (Luthans et al., 2007). Reliability for the scale was reported to be .93, excellent. Trust in the leader and ratings of overall leader

effectiveness were statistically significant and strongly correlated ( $r = .78$ ). There was also a direct relationship between positive psychological capacity and transparency [ $F(1, 252) = 41.90$ , partial  $\eta^2 = .14$ , which is a large measure of practical importance]. In a study of police lieutenants and sergeants, Walumbwa, Peterson, Avolio, and Hartnell (2010) found that both lieutenants and sergeants were high in positivity relative to the comparison group. The researchers found that sergeant followers of highly positive lieutenants were more likely to rate their superior's performance favorably compared with that of the comparison group. In a study of aerospace engineers that compared high-positive and low-positive leadership conditions, Avey, Avolio, and Luthans (2011) found that engineers in high-positive leadership could solve more complex tasks than those in the comparison group.

These findings are relevant to this study because they provide background and justification for supporting women's leadership-development programs. Previous assumptions about effective leadership universally prescribed agentic behaviors for leadership development but served to alienate women leaders who demonstrated agentic leadership behaviors (Eagly & Karau, 2002; Karellaia & Guillén, 2011). Nevertheless, recent research findings demonstrate strong positive performance effects of psychological factors such as perceptions of safety and authenticity (Avey et al., 2011; Walumbwa et al., 2010), particularly among leaders involved with knowledge-based initiatives (Bear & Woolley, 2011; Edmondson, 1999; Nembhard & Edmondson, 2006). This research base supports a reconceptualization of the ideal leadership identity that is associated with a feminine-normative value system.

The results of research have shown that women, on the basis of gender alone, demonstrate many of the aforementioned competencies, traits, and characteristics associated with effective leadership positivity, and their organizations do realize performance benefits. Woolley et al. (2010) investigated the relationship among collective intelligence, group performance, and gender. Collective intelligence (CI) is a group-level intelligence factor that describes the group's general mental ability. As cognitive ability predicts performance in work settings (Huffcutt, 2011), the researchers sought to construct a group measure of CI. Woolley et al. (2010) randomly assigned 120 individuals to one of three groups and asked them to perform various cognitive tasks. An intelligence coefficient was developed twice for each participant, once at the individual level and once at the group level. Individual intelligence was assessed with Raven's Advanced Progressive Matrices. Individual personality, social sensitivity, group satisfaction, and motivation were assessed at the individual level. CI or group-level intelligence was assessed with several group tasks, including word completions, spatial problems, incomplete words, estimation problems, reproducing art, architectural design, and speaking-turn variance. The instruments used to measure these factors were varied in their complexity and sophistication. For example, the instrument used to assess "speaking-turn variance" was sociometric badge technology that calculated the number of times an individual spoke within the group as well as the individual's silence when others were speaking. Another example of a type of instrument used to assess a construct is the "Reading the Mind in the Eyes" test that was used to measure social sensitivity. For this test, individuals were shown 35 photographs and then asked to pick one of four words to describe best the sentiment of the person in the picture.

The CI factor was calculated to be five times greater than the average member intelligence factor. Woolley et al. (2010) concluded that intelligence measured at the group level, just as it is measured at the individual level, can predict task performance. They also found that gender was a statistically significant mediating factor in group performance ( $r = .23$ ), which meant that group intelligence correlated directly with the proportion of women in the group. The specific individual behaviors that related most closely to CI were “social sensitivity” and “speaking-turn variance.” Women were found to be higher in social sensitivity compared with men. These behaviors and other behaviors related to group facilitation are referred to as “group-process behaviors” (Bear & Woolley, 2011), which are related consistently to female membership and leadership (Helgesen, 2005).

When the observed effects of approaches to management that leverage positive psychology are considered, the findings observed by Norman et al. (2010), Walumbwa et al. (2010), Bear and Woolley (2011), and Avey et al. (2011) imply that because women typically demonstrate positive in-group behaviors on the basis of gender (Helgesen, 2005; Woolley et al., 2010), they are likely to consider themselves to be effective leaders. Yet research findings suggest otherwise. The following section provides evidence that gender negatively mediates leadership self-efficacy among women in typical mixed-gender work and educational settings.

***Mediating role of gender in self-efficacy among women in mixed-gender business settings***

In a global and historical context, women have traditionally been homemakers and responsible for childrearing and family caretaking (De Beauvoir, 1949/1972; Friedan, 1963; Mani, 2011) such that womanhood is synonymous with motherhood as a cultural

institution (Rich, 1995). These cultural models are used also in educational and work settings and often cast gender-role stereotyped expectations onto all women (Mueller & Dato-On, 2008; Nwankwo, Kanu, Marire, Balogun, & Uhiara, 2012; Sturm, Taylor, Atwater, & Braddy, 2014). Social pressure to meet gender-role expectations inhibit women's ability to engage fully in the dynamics of the work environment because behavioral expectations and social cues differ on the basis of gender and inhibit demonstration of leadership behaviors among women (Eagly & Karau, 2002).

Irrespective of a level of experience or education, gendered-role expectations trigger the enactment of gender-role stereotypes at the organizational level. Shapiro, Ingols, and Blake-Beard (2008) argued that women's behaviors in corporate environments were perceived to be deviations from the masculine norm, that language and constructs such as "mommy track" and "opting-out" reinforce negatively gendered stereotypes about all women, and Cummins (2005) reported that women in academia report being put on a less professionally demanding and rewarding "mommy track" even when they are not pregnant or do not have children.

It may be for these reasons that even though congruence between women's leadership styles and many of the traits associated with positive leadership outcomes (Helgesen, 1995), research findings have demonstrated consistently that women are less likely to score highly on measures of sociocognitive performance such as motivation, leadership, or other forms of self-efficacy in mixed-gender work and educational settings (Bosak & Sczesny, 2008; Sturm et al., 2014). Sturm et al. (2014) found that women do not assess accurately other's perceptions of their skills in mixed-gender business contexts and that they underrate other's perceptions of their skills. In their study, 194 working



adult master's in business administration (MBA) students, with an average age of 44 years, 50% of whom were women, and 80% European American, were assessed for transformational leader qualities with 16 items from Bass and Avolio's (1995) Multifactor Leadership Questionnaire (MLQ). The MLQ measures constructs such as *idealized influence* with items such as "I specify the importance of having a strong sense of purpose," *intellectual stimulation* with items such as "I suggest new ways of looking at how to complete assignments," *individualized consideration* with items such as "I treat others as individuals rather than just as members of the group," and *inspirational motivation* with items such as "I talk enthusiastically about what needs to be accomplished." Participants in Sturm et al.'s (2014) study were asked to self-rate by using a 5-point Likert scale that ranged from 1 to 5 representing *not at all* to *frequently, if not always*. Each participant's manager also compared participants' self-ratings with managers' ratings of participant performance. Independent-samples *t* tests were performed to reveal that leadership self-ratings did not differ between men ( $n = 98$ ,  $M = 4.17$ , standard deviation [ $SD$ ] = 0.44) and women ( $n = 97$ ,  $M = 4.04$ ,  $SD = 0.47$ ) or did bosses ratings for leadership efficacy differ between men ( $n = 97$ ,  $M = 4.12$ ,  $SD = 0.59$ ) and women ( $n = 97$ ,  $M = 4.19$ ,  $SD = 0.58$ ). Nevertheless, women's predictions of their boss's ratings ( $n = 87$ ,  $M = 3.93$ ,  $SD = 0.51$ ) were statistically significantly lower than men's predictions of their boss's ratings ( $n = 85$ ,  $M = 4.07$ ,  $SD = 0.51$ ), and they were lower than their boss's actual ratings of the leadership efficacy [ $n = 97$ ,  $M = 4.19$ ,  $SD = 0.58$ ],  $t(182) = 3.18$ ,  $\eta^2 = .05$ , which is moderate]. The researchers cited a lack of self-efficacy, a lack of high-quality feedback, and gender-role orientation as reasons for the

inaccuracy of women's professional self-assessments and postulated that organizations were less effective as a result of these gender disparities (Sturm et al., 2014).

Organizational and feminist theorists believe that professional identities are linked to gendered social roles and behavioral expectations and that these roles are enacted in business settings to create culture (Ely & Padavic, 2007). Masculine culture traits are defined as a preference for high work-pressure environments, competition, status, and high salary, whereas feminine traits are associated with peer cohesion (Helgesen, 1995), work-home balance, and a de-emphasis on status and salary (van Vianen & Fischer, 2002). Commonly known as gender-role stereotyping, research findings have shown that leadership and management roles in organizations are associated with characteristics generally associated with men and not with women (Schein, 1973) and that women who aspire to or occupy managerial and leadership roles prefer to behave in stereotypically masculine ways (Eagly & Johnson, 1990; van Vianen & Fischer, 2002). Van Vianen and Fischer (2002) found that among 480 employees, 245 of whom were in managerial or leadership positions, fewer women than men preferred to behave in stereotypically masculine ways and fewer women than men were interested in pursuing leadership positions.

Men are more likely than women to engage in collective impression-management (Reid, 2015). In a study conducted by Ellen Reid in 2015, almost three times as many men than women actively engaged in impression management techniques to demonstrate their agreeableness with company values and receive rewards for their behaviors. In contrast, twice as many women than men resisted company values, were considered to be deviants, and were penalized.

A case study of partner track candidates at professional services firm, Deloitte and Touche, provides an example of how retention and promotion are associated with gender-based incongruence. In 1985, for entry-level positions, the firm recruited men and women from college campuses at the same rate, 50% each. Nevertheless, 10 years later, only 10% of the candidates eligible for partners were women (Kanter & Roessner, 1999). In an interview published online in *The New York Times* on August 13, 2015, by Joanne Lipman, the head of PricewaterhouseCooper's British diversity and inclusion team, reported that:

In 2013, the grade just below partner was 30 percent female, yet only 16 percent of those promoted to partner were women. A year later, the percentage of women promoted to partner had more than doubled. ... Men who were passed over for partnership were routinely offered retention bonuses to keep them from quitting. (para. 12-13)

Lipman concluded that these bonuses were offered to men because they threatened to leave the firm but that women worked harder to secure a promotion during the next evaluation. These actions indicated that the firm rewarded negative behaviors by giving the partners retention bonuses if they threatened to leave. The manager's decision to leave the firm placed the relationship between the firm and the client at risk. Women managers who did not threaten to leave, but instead worked harder, were penalized financially for their behaviors by not being offered a retention bonus.

***Mediating role of gender on self-efficacy among women in mixed-gender education settings***

Tannen (1990, 1994) defined ways in which women linguistically differentiate feminine values from masculine values. According to Tannen (1990, 1994, 2009), women are more likely than men to engage in "symmetrical" conversational styles by adapting *framing* and *face* mechanisms to express social equity, reciprocity, and

intimacy. Social equity is indicated in conversations that serve to minimize status differences among participants or create equality in the statuses of the participants (Tannen, 1990, 1994). Vainapel, Shamir, Tenenbaum, and Gilam (2015) showed that the use of the *masculine generic* form in language, such as the standard use of “he,” or as in “all men are created equal,” was related directly to lower overall motivation for women in comparison with men on measures of self-efficacy and goal orientation. In the study, the masculine generic form was defined as “the common usage of the masculine form as generic for both women and man” (Vainapel et al., 2015, p. 1515). The researchers compared the use of a gender-neutral and a masculine-generic form of a questionnaire assessing motivation and goal orientation for 47 male and 43 female students, with a mean age of 25, and who were not associated with gender-stereotyped majors such as computer science. The questionnaire used 31 items to assess five constructs: intrinsic goal motivation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety, which was distributed randomly to 50 female and 50 male students. The researchers found a statistically significant interaction between participants’ gender and type of form in intrinsic goal orientation,  $F(1,86) = 4.33$ , partial  $\eta^2 = .05$ , moderate; task value,  $F(1, 86) = 4.2$ , partial  $\eta^2 = .05$ , moderate; and self-efficacy,  $F(1, 86) = 7.76$ , partial  $\eta^2 = .08$ , moderate, which showed that the type of form had different and moderate effects on women’s and men’s self-report for motivation.

It is possible that the use of masculine generics in mixed-gender settings creates a sense of social alienation because they do not enact the rules of social inclusion that are characteristic of women’s linguistic patterns. “[E]nvironments are transmitted through people, and the dominant features of a particular environment are particularly a function

of the collective characteristics of the individuals who inhabit it” (Strange & Banning, 2001, p. 35). The results of studies of academic environments reveal that the effects associated with campus cultures are so strong that:

Campuses dominated by one cultural, ethnic, or age-based group are inherently challenging, and therefore, are less likely to attract, satisfy, or retain any individual or group that does not share traits I common with the dominant group. (Strange & Banning, 2001, p. 36)

Vinnicombe and Singh (2003) found that MBA programs in the United Kingdom were predominantly attended by male students. Shinnar, Hsu, and Powell (2014) found that only male students increased entrepreneurial self-efficacy as a result of university-based entrepreneurial education and training (EET) programs. Wilson, Kickul, and Marlino (2007) found that women scored lower than their male counterparts on measures of entrepreneurial self-efficacy. The findings from these studies support Strange and Banning’s (2001) assertions and imply that EET programs are male dominated and assume a masculine norm reference because they have been attended mainly by men. By sustaining and reinforcing the cultural needs of the dominant population, these programs often do not meet women’s needs.

Field-based leadership and entrepreneurial programs have not demonstrated positive outcomes among women either. In a 2007 study, Tillmar reported outcomes related to a government-funded support and training organization called “Almi.” Almi launched a leadership-development program with the purpose of supporting entrepreneurs through coaching interventions. Coaches were allowed to select and recruit participant business clients. Tillmar (2007) found that the coaches selected male clients over women clients and that women clients reported being marginalized. Tillmar (2007) suggested that the role incongruity of leadership and women’s gender stereotypes occurs

in structural, behavioral, social, and affective dimensions wherein women are alienated and excluded from leadership development and education on the basis of gender despite having legitimate leadership roles.

The following section describes leader-identity conflict that women encounter in work settings.

### ***Leader identity***

Eagly and Karau (2002) introduced a role-congruity theory of prejudice against women leaders as a form of gender-role stereotyping that relegates women to traditional and idealized gender-based roles only, such as caregivers and nurturers, and creates perceptions of dissonance between women's gender identity and a leader identity. They noted that when a woman enacts agentic behaviors or any range of behaviors perceived to be incongruent with feminine-stereotyped behaviors, they are regarded negatively by others. As a result of negative perceptions from others, women are less likely to claim a leadership identity or demonstrate agentic behaviors when they perceive the environment to be threatening.

To develop this understanding of gender and leader dynamics further, Hoyt, Johnson, Murphy, and Skinnell (2010) found that when women leaders were faced with a single stereotype threat, gender or leader, that they could overcome effectively the threat and demonstrate positive affect and leadership behaviors. Nonetheless, when two stereotype threats were activated simultaneously, gender and leader, that the women demonstrated increases in anxiety and lowered leadership behaviors. The results of these studies demonstrate support for the development of women's leadership education curriculum by helping management educators understand how the composition of the

institutional environment can affect the professional development outcomes of the participants.

As a result of the findings of the study, Tillmar (2007) affirmed the presence of a male-norm reference for leadership roles among program participants and concluded that women-only groups would better serve women entrepreneur's interests:

Unconsciously, the recruitment of clients is likely to be biased due to the male norm and the male gender labeling of entrepreneurship and business ownership ... the need is different among women, and the exchange of experience is likely to be freer in a women-only group. (p. 94)

Researchers dedicated to the advancement of female leadership in corporate and entrepreneurial settings have begun to advocate for women-only leadership and EET programs that model success by using female norm-referenced behavior (Brush, Balachandra, & Greene, 2014; Brush, de Bruin, & Welter, 2009; Cullen-Lester, Woehler, & Willburn, 2016; Davis, 2012; Debebe, 2011; Debebe, Bilimoria, & Anderson, 2016; Ely, Ibarra, & Kolb, 2011; Tillmar, 2007; Valerio, Parton, & Robb, 2014, Vinnicombe & Singh, 2003). The purpose of women-only and gender-aware leadership development for women is to allow women the space to explore a leadership identity in settings that protect women against language and social cues that trigger traditional gender-role identities as they develop a leadership identity (Boyatzis, Smith, & Blaize, 2006; Bullough, de Luque, Abdelzaher, & Heim, 2015; Ely et al., 2011; Ibarra, 1999; Mueller & Dato-On, 2008) and provides support for the women-only intervention training proposed in this study. The next section presents the utility and effectiveness of women-only leadership-development training in addressing barriers to creating a leadership self-efficacy among women in business and entrepreneurial environments.

Karelaia and Guillén (2014) suggested that role incongruity between women's gender identity and leader identity was the root of lowered leadership self-efficacy among women. The researchers found direct relationships between positive gender identity and leadership self-efficacy among women executives in a series of three studies conducted among internationally based women alumni of a business school. Participants across the three studies ranged in age from 26 to 68 years of age, with (a) up to 90% having at least a Master's degree, (b) up to 69% married or living with a partner, (c) 33% to 35% having children, (d) an average 13–16 years of working experience across the sample, and (e) an average of 7 to 9 years of managerial experience. Structural equation modeling was used to identify relationships among positive gender identity, negative gender identity, gender- and leader-identity conflict, life satisfaction, stress, affective motivation to lead, and social-normative motivation to lead (defined as a social obligation). The researchers found that positive gender identity was indirectly related to gender and leader identity conflict ( $r = -.48$ , which indicates an indirect and moderate relationship; Cohen, 1992) and that the relationship between positive leader-identity and gender-identity leader conflict was not statistically significant. They also found that gender- and leader-identity conflict was related directly to stress ( $r = .35$ , which is a weak to moderate relationship) and indirectly to life satisfaction ( $r = -.28$ , which is an indirect and weak relationship). Additionally, positive leader identity was linked directly to positive gender identity ( $r = .31$ , which was a weak to moderate relationship) and directly to affective motivation to lead ( $r = .15$ , which is a weak relationship) and social-normative motivation to lead ( $r = .20$ , which is a weak relationship). The researchers concluded that:

    Holding a favorable regard for their gender identity may help women leaders to blend their gender and professional roles. In contrast, we found



that while positive leader identity may directly increase women's motivation to lead, it appears neither to reduce their identity conflict nor enhance their psychological well-being. (Karelaia & Guillén, 2014, p. 214)

Strange and Banning (2001) claimed that the demographic composition of an environment dictated its cultural norms; in support of this, Karelaia and Guillén (2011) found that the number of women in an organization mediated evaluations of women's self-perceptions of leader efficacy and psychological well-being.

The results of these studies show that mixed-gender settings demonstrate poor outcomes for women on dimensions of leadership self-efficacy. General leadership-development programs that do not address gender identity may not be instrumental in developing women to be future business and entrepreneurial leaders. The findings from these studies have shown that it is simple to trigger bias through generally accepted conversational patterns that emphasize competition over collaboration (Sugiyama, Cavanagh, van Esch, Bilimoria, & Brown, 2016) or to use masculine generic linguistic conventions (Vainapel et al., 2015), and they serve to alienate women leaders, even from themselves.

The need and benefits of women-only leadership development programs are described in the next session.

### ***Justification for women-only training (WOT)***

Research findings have shown that gender alone accounts for differences in the measures of leadership self-efficacy between men and women in business settings (Mueller & Dato-On, 2008; Nwankwo et al., 2012; Sturm et al., 2014), and researchers have sought ways to understand and characterize more concretely the interaction between gender and affective measures of leadership self-efficacy. Other research results have

demonstrated that the affective and behavioral components of social competence related to leader self-efficacy can be developed with education and training (Donnellon, Ollila, & Middleton, 2014; Ibarra, 1999; Ladegard & Gjerde, 2014) in both corporate and entrepreneurial environments, and researchers of leadership and entrepreneurship have suggested that leadership training teaches participants the ability to self-regulate emotionally (Ladegard & Gjerde, 2014; Luthans & Peterson, 2003), manage stress (Goleman, Boyatzis, & McKee, 2004; Jack, Boyatzis, Khawaja, Passarelli, & Leckie, 2013), and learn to build intentionally supportive relationships with social-network members through coaching planning in an effort to sustain their leadership efficacy (Boyatzis et al., 2006; Goleman et al., 2004).

Researchers of gender dynamics and women's leadership development also have identified the need to teach women skills related to constructing a leadership identity by developing personal leadership vision, identifying second-generation or implicit gender bias, and purposefully constructing a supportive social network (Boyatzis, 2008; Ely et al., 2011; Wheeler, 2008). The findings from the three subdomains of leadership research, general leadership development, entrepreneurial leadership development, and women's leadership development, indicate behavioral approaches to leadership education and training.

Researchers have concluded that women-only programs may be one of the only strategies available to organizations who wish to support women's leadership-development initiatives (Debebe, 2011; Ely et al., 2011, Vinnicombe & Singh, 2003). Women-only programs serve to normalize gender differences so that gender-role

identified behaviors and expectations are commonplace, readily accepted as part of the realities of work life, and supported by the organization.

In the most radical of interpretations, these findings suggest that women who have managed to build and run successful enterprises did so notwithstanding their education. The next section describes the outcomes of women-only and gender-aware leadership-development programs in entrepreneurial business settings.

### **Design Considerations and Outcomes of Women-only and Gender-aware Leadership-Development Programs in Entrepreneurial Business Settings**

Although there has been little research on the topic, the results of available studies have shown consistently that leadership-development and training programs are effective among women entrepreneurs and leaders when they are women only or gender aware (Brush et al., 2014; Ely et al., 2011; Nagesh & Murthy, 2008). Launched in 2008 by the Goldman Sachs Foundation, the 10,000 Women Initiative sought to educate and train women entrepreneurs in three developing countries: Brazil, China, and Nigeria. The curriculum for the 10,000 Women Initiative was standardized across the three countries and used wraparound services such as local mentoring and networking. The program was designed for women only by more than 800 university-level faculty some of whom also functioned as trainers, greater than 100 instructional case studies were developed for local program participants, and leading experts from academic, nonprofit, and economic development organizations were invited to speak during leadership-development sessions. The program ran 5 years, cost US\$100 million, and culminated in a certificate of completion after approximately 180 hours of classroom instruction ranging from 5 weeks to 6 months in duration. The distribution of hours per topic covered during the program, including 21.1 hours of “personal effectiveness and leadership training,” is

provided in Table 3. Increases in business and leader self-efficacy were reported among the most important outcomes of the program:

At baseline, 60.1% of participants rated their confidence in their decision-making abilities as effective or highly effective. Six months after graduation, this number had risen to 72.4%, and by 18 months it was 73.8%. This rise of more than 20% suggests that the attention to leadership development and practical business skill education makes a recognizable difference to the women participants. ... 90% of women who participated in the 10000 women program mentor other women as a result of the program. (Brush et al., 2014, pp. 19-20)

Most women did not receive outside funding to support their growth. The participant's level of education prior to the program made no difference in program outcomes within a 6-month period after graduation; nevertheless, at 18 months postgraduation, women without a college degree grew employment by 73.5% in comparison with those with some college education who grew employment by 185.9%. The gains realized by women with some college education relative to those without a college degree suggest that field-based training in combination with a traditional college education is an effective method of building women's entrepreneurial competencies and warrants further study.

The curriculum for the 10,000 Women Initiative (Table 3) allocated 33.7 hours of instructional time for social-competence training topics such as "personal effectiveness and leadership" and "women, gender, entrepreneurship, and business." Program outcomes were linked to the use of a gender-aware pedagogy; at the end of the program, there was an 18.1% increase in the number of women receiving mentoring services and a 29.6% increase in the number of women engaging in face-to-face networking, which are behaviors that are linked to leadership self-efficacy and business performance (Baron & Markman, 2003; Tocher, Oswald, Shook, & Adams, 2012). These behaviors were

supported by wraparound services. Wraparound services are defined as additional social-support services that are not related directly to the curriculum but support program participants in reaching their objectives, such as networking and mentoring (Valerio et al., 2014).

Table 3  
10,000 Women Curriculum and Hours

Average Number of Hours	Gender-Aware Curricular Components	Traditional Business Curriculum
26.8		Business Plan
25.7		Finance and Accounting
22.3		Marketing
21.1	Personal Effectiveness and Leadership	
15.0		Strategy
13.0		Technology for Business Advantage
13.0		Human Resource and Organizational Aspects
12.6	Women, Gender, Entrepreneurship, and Business	
11.6		Operations Management

*Note.* Adapted from Brush et al. (2014).

In a study of women entrepreneurs in India, Nagesh and Murthy (2008) found positive outcomes for field-based entrepreneurial training. The study was developed along with management-development institutes across India to assess the need and benefits of training practicing women entrepreneurs. The researchers evaluated program outcomes among 20% of women program graduates related to leadership and mindset measures, such as ability to inspire, creativity, innovation, and ability to have a vision for growth, as well as traditional management competencies, such as strategic planning, operations, marketing, and human resources (Nagesh & Murthy, 2008). These findings are the same as recommendations made by Brush et al. in 2009 that policy makers “spotlight” the role and influence of social structures, such as motherhood, on women entrepreneurs. Although home-based businesses have been researched in academia

(Breen & Karanasios, 2010), it is rare to find EET pedagogy and curriculum adapted to support home-based business development for women. Brush et al. (2009) suggested creating a “female norm” in contrast to the current “male norm.”

EET curriculum developers assume a masculine-dominant model of business leadership that assumes a linear career trajectory (Eagly & Carli, 2007) and a high-growth trajectory for entrepreneurial ventures. The male norm is characterized by more free time and fewer care responsibilities, greater access to information and opportunity, and high-growth expectations. Cho, Kalomba, Mobarak, and Orozco (2013) found that the women entrepreneurs in training settings made decisions under time and family constraints that men did not face. For example, Gundry and Welsch (2001) and DeMartino and Barbato (2003) found that women started companies to spend more time with their families. In the United States and abroad, entrepreneurship is used as a mechanism by which women created dynamic and flexible work structures to support both financial and familial-care responsibilities. Similarly, female entrepreneurs in developing nations such as Africa and parts of India often develop home-based and small businesses so that they can contribute substantively to household income (Aterido & Hallward-Driemeier, 2011; Kantor, 2005; Kariv, 2011). Davis (2012) stated that:

Relevant government agencies should regularly survey women entrepreneurs to identify their needs and challenges better and then formulate policy accordingly. Governments should have an agency for small business and/or an agency for women. (p. 23)

Davis (2012) did not mention care or mothering responsibilities as an area of differentiation among women entrepreneurs. Women entrepreneurial leaders chose to stay small to manage their capacity to meet their personal and professional responsibilities (Ahl, 2006; Breen & Karanasios, 2010; Kantor, 2005; Morris, Miyasaki,

Watters, & Coombes, 2006). Alternatives to a high-growth model, such as home-based businesses or small consultancies, should be proposed in women's entrepreneurial leadership-development programs as deferred or alternative growth strategies (Nagesh & Murthy, 2008).

Table 4  
Studies in Which Programmatic Attributes Developed Specifically for Women in Preparation for Leadership and Entrepreneurism Are Articulated

Studies	Pedagogy for Women's Leadership in Entrepreneurism						Wraparound Services (Networking Support)
	Leadership Identity	Self-Efficacy	Women Only	Care Needs of Others	Mentors	Field-Based	
Wilson et al., 2007		✓		✓			
Brush et al., 2014	✓	✓	✓	✓	✓	✓	✓
Davis, 2012			✓		✓	✓	✓
Nagesh & Murthy, 2008		✓	✓	✓	✓	✓	
Cho et al., 2013		✓		✓			
Bullough et al., 2015	✓	✓	✓	✓	✓	✓	✓
Brush et al., 2009	✓	✓	✓	✓			

Introducing an array of entrepreneurial business growth strategies and outcomes in EET curriculum in field-based and university settings would provide programming that is more congruent with traditional women's gender-role orientation. A visual summary of the programmatic attributes indicated by the research to be included in EET developed for women entrepreneurs is presented in Table 4. These programmatic attributes served as guidelines in the development of the training intervention used in this study.

Even though there are research-based recommendations for women-only programs (Bullough, 2013; Ely et al., 2011), it is not likely that all EET programs will be able to accommodate women-only groups, particularly in university settings and field-based settings, and therefore, women-only wraparound services are critical to women's leadership development.

The next section describes the components of the women leadership training used in this study and intended for use as a wraparound service for building leadership self-efficacy among women who work in mixed-gender or male-dominated environments, such as California's Silicon Valley women technologists who comprise the target sample in this study are detailed in the next section. The design of the training is supported by previous research, as well as by the results of studies that demonstrate the efficacy of specific interventions for developing social competence and leadership self-efficacy among women leaders in both entrepreneurial and corporate environments. The training design is based on ICT and was presented in the Theoretical Framework section in Chapter I. Comments on how these findings contribute to the development of the training intervention used in this study will be provided.

### **Women-Only Training Composition**

The following section provides an overview of the topics and content that constitutes the women-only training treatment used in this study. The topics are awareness of second-generation or implicit gender bias, creating a personal-leadership vision, personal narrative, self-advocacy, and relationship building through coaching, social networking and gender, coaching and relationship-building skills, and planning and goal setting.



### *Implicit or second-generation gender bias*

According to Debebe (2011), instructors who are not aware of gender biases cannot identify its presence and effects and do not understand their ramifications lack a critical understanding of how to develop women leaders. Proponents of women-only environments suggest that WOT requires skilled instructors to facilitate developmental sessions that elicit narratives that provide a communal experience and sense of normality among women participants (Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark, Preser, & Zion-Waldoks, 2016; Vinnicombe & Singh, 2003). These types of sessions have been described as “holding environments” (Debebe et al., 2016; Ely et al., 2011; Vinnicombe & Singh, 2003) and allow women to identify issues pertaining to their identities and responsibilities outside of the workplace that affect their work experiences. Such identities and responsibilities can include personal roles such as motherhood, romantic partner, and daughter, but they can also include work roles in which power dynamics are explored (Vinnicombe & Singh, 2003). By constructing personal narratives of a gendered experience, women explore others’ experience and recognize their own, which confers a sense of communal identity, enhanced personal awareness, and normality to their experiences (Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003). For these reasons, the training intervention in this study was women-only and incorporated open discussion on topics related to gender bias so that women could share their thoughts, perceptions, and experiences of being a woman in male-dominated environments.

### ***Creating a personal-leadership vision***

Management theory and research have resulted in emphasizing the need for personal-identity congruence between a person and his or her goals (Bhide, 1996; Boyatzis, 2008; Senge, 2006). The need to experience personal and professional goal alignment is especially salient for women, who also must reconcile gender biases in their professional environments (Karelaia & Guillén, 2011, 2014). Boyatzis (2008) incorporated research from neuroscience to model the relationship among positive emotions, physical brain chemistry, and leadership self-efficacy. Study findings have shown that ideation of an ideal self-image can stimulate positive emotions and compel change in different areas of a person's life (Boyatzis & Akrivou, 2006). The results of WOT studies have revealed that the use of symbols and artifacts provides a psychological anchor that advances learning among participants (Debebe, 2011). For these reasons, participants in the training intervention used in this study were asked to draw a picture of their ideal self and a desired future (McKee, Boyatzis, & Johnston, 2008).

### ***Personal narrative, self-advocacy, and relationship building through coaching***

Once a personal narrative and vision were constructed, participants practiced sharing their vision and narrative with others as a means of building self-advocacy skills. The ability of a professional to self-advocate strategically within his or her social network has been found to be among the most critical skills aspiring leaders use to enhance their leadership identities (Baron & Markman, 2003; Bowles, 2012; Tocher et al., 2012). In a study based on grounded theory with 25 corporate and 25 entrepreneurial women leaders, Bowles (2012) found that successful women in leadership roles self-advocated to bosses and to other "gatekeepers" of power instrumental to their career development. Effective

women leaders developed a strong personal-leadership narrative that they used to self-affirm their leader identities when external sources of validation were not present, when they were faced with disappointment, or when in the face of disconfirming evidence (Bowles, 2012). Therefore, participants in this study were asked to show their drawings and aspirations to other participants. Listeners then were asked to elicit more detail from the speaker and to encourage her visioning process by asking questions (Debebe, 2011; McKee et al., 2008).

### *Social networking and gender*

Management researchers suggest that the ability to control the environment by selecting appropriate participants is a key factor in leadership self-efficacy (Boyatzis & McKee, 2005; Ely et al., 2011; Fernández-Aráoz, 2014a, 2014b; Goleman et al., 2004; Valerio et al., 2014). Wheeler (2008) found that the number of social relationships a person leveraged to support goal attainment, such as the development of a leader identity, was related to the ability to reach that goal as well as to the longevity of the outcomes related to that goal.

Researchers have characterized the ability to select appropriately members of one's social network as a form of social competence, and they have indicated that the ability to build relationships that reinforced a leadership identity was a form of social competence (Baron & Markman, 2000; Ely et al., 2011) that women in business typically underdevelop (Bullough et al., 2015; Ely et al., 2011).

Researchers have indicated that the network composition for women business leaders differs from the network composition for men (Cohoon, Wadhwa, & Mitchell, 2010; Groysberg, 2008; Ibarra, 1992, 1997; Ibarra & Hunter, 2007). In both corporate

and entrepreneurial settings, women's leadership networks are more personal in nature than men's networks are. Study findings have shown that women maintain more personal social-network ties than men do (Cohoon et al., 2010; Groysberg, 2008; Ibarra, 1992, 1997). Cohoon et al. (2010) found that successful women entrepreneurial leaders were more likely than men to develop personal networks that offered emotional support. Groysberg (2008) found that high-performing executive women developed strong personal and professional networks outside of the workplace as a result of a lack of professional acceptance and few mentoring opportunities for them in male-dominated environments. The results of these studies suggest that women's leadership training must articulate how social-networking strategies for women leaders may differ from social-networking strategies for men and why. Some key reasons may include women's need to create a positive gender identity and to reinforce a leadership identity among others supportive of both their leader and gender identities (Cohoon et al., 2010; Cullen-Lester et al., 2016; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Groysberg, 2008; Karelaia & Guillén, 2011, 2014).

Social networking is a form of social competence that has been found to be related directly to entrepreneurial and leadership efficacy (Ely et al., 2011; Ibarra & Hunter, 2007; Uzzi & Dunlap, 2005). The results of a survey conducted with a sample of 262 largely U.S.-based professional participants revealed that networking strategies that advanced professional interests in one's current position included using online social networks, attending conferences, conventions and networking events, self-advocating for a vision of a desired future, setting up small-group activities, and asking for advice or resources. Strategies that advanced one's career included asking a connection to

recommend you for an opportunity at work and finding a mentor. Strategies that enabled strategic influence that may span networks included volunteering for a new project or committee, scheduling meetings with people, becoming a mentor, suggesting resources of interest, transitioning strategies such as referring people to someone else, declining a request, and avoiding specific contacts (Cullen-Lester et al., 2016, pp. 343-345). As developers of WOTs, Cullen-Lester et al. (2016) suggested the use of specific exercises designed to build awareness of social-network composition and dynamics. Exercises used in the training intervention in this study included “The Network Assessment Exercise” (Ibarra, 2015) and “How to Build Your Network” (Uzzi & Dunlap, 2005), which taught women how to understand and purposefully select members into their social networks for their professional development purposes.

### *Coaching and relationship-building skills*

Research results have shown that building supportive relationships within social networks serves to maximize both learning and leadership potential among individuals by helping them to manage negative emotions such as power stress (Boyatzis & McKee, 2005; Boyatzis et al., 2006; Goleman et al., 2004; Grichnik, Smeja, & Welp, 2010; Karelaia & Guillén, 2011, 2014; Patzelt & Shepherd, 2011).

Study findings have shown that coaching others toward their desired future vision is a technique leaders can use to build effective work relationships while managing the negative emotions associated with leadership such as power stress (Boyatzis, 2008; Boyatzis & McKee, 2005; Boyatzis et al., 2006). Power stress is defined as the need or obligation to influence others and is often experienced as a negative emotional state (Boyatzis, 2008; Boyatzis & McKee, 2005; Boyatzis et al., 2006; Jack et al., 2013).

Power stress leads to feelings associated with emotional fatigue such as depression, fear, disgust, and “unpleasant engagement” with the environment (Boyatzis et al., 2006).

Minimizing negative emotions is achieved through a coaching-type relationship rather than through an authoritative one, and it is referred to as “coaching with compassion” (Boyatzis, 2008). The term “coaching” is used because it best describes an optimal learning-oriented type of interaction that can be used effectively by a leader within a hierarchical setting to develop a positive emotional bond with a subordinate (Boyatzis, 2008). A coaching orientation to leadership development is perceived generally as being helpful in simultaneously developing relationships and achieving work objectives.

Luthans and Peterson (2003) found that coaching interventions that combined the use of a leader-performance feedback survey with coaching sessions focused on increasing self-awareness and that behavioral management resulted in lower turnover intention among employees and in higher employee satisfaction ratings. In a between-groups study, Smither, London, Flautt, Vargas, and Kucine (2003) found that the group who received both a leadership assessment and 5 hours of coaching were more likely to set specific rather than vague professional goals and were more likely to solicit developmental feedback from their managers when compared with the group that received only the leader assessment and no coaching.

According to ICT, power stress is moderated by the leader’s ability to create emotionally resonant relationships with others in the organization (Boyatzis, 2008). The feelings associated with the resonant relationships are positive emotions such as optimism, hope, caring, and compassion (Boyatzis, 2008). Women are more likely to suffer from perceptions of negative leadership self-efficacy than men are (Mueller &

Dato-On, 2008; Nwankwo et al., 2012; Sturm et al., 2014), and they are therefore at higher risk for psychological fatigue. An appropriate method of developing leadership self-efficacy among women not only should address emotional fatigue and stress-related dynamics, as ICT does, but also should be congruent with women's gender-based role behaviors to be an effective leadership-development strategy for women (Karelaia & Guillén, 2014). The use of ICT achieves gender-role congruence for women by using behaviors congruent with women's culture norms such as positivity and relationship building (Karelaia & Guillén, 2011, 2014). In the training intervention used in this study, participants were paired and instructed to coach each other toward their visions of their desired future by applying the curriculum developed by McKee et al. (2008).

### ***Planning and goal setting***

There is little research available on how instruction related to goal-setting and planning for a desired future vision affects goal attainment or other measures of performance when delivered in WOT sessions. Although Brush et al. (2014) demonstrated positive business performance outcomes after 15 hours of instructional time on business strategy, it is unclear what specific techniques were taught and what exercises were used to develop women's strategic planning capabilities. The training in this study applied the Zimmerman (2008) model of self-regulated learning as a method of teaching women to set goals because it is a learning-based orientation to goal setting. Participants were given worksheets with question prompts to help guide them through a three-stage process of forethought, performance, and self-reflection (Zimmerman, 2008).

## Summary

Education is universally regarded as one of the most effective interventions in creating desired change, but general business and entrepreneurial training programs have failed consistently to deliver strong outcomes for women business leaders. The findings from the literature reviewed in this chapter have revealed that although women leaders demonstrate similar leadership competencies as men (Norman et al., 2010; Rego et al., 2014), they do not self-identify as leaders (Bullough et al., 2015; Ely et al., 2011), underrate their performance in job settings (Sturm et al., 2014), and are likely to exclude themselves from future professional developmental and growth opportunities in leadership and entrepreneurship (BarNir et al., 2011; Breen & Karanasios, 2010; Fleck, Hegarty, & Neergaard, 2011; Manolova, Brush, Edelman, & Shaver, 2012; Reichborn-Kjennerud & Svare, 2014; Sturm et al., 2014). The findings from these studies indicate that although education and training interventions seek to increase women's leadership self-efficacy, many programs fail because of a lack of awareness and understanding of second-generation or implicit gender biases and gendered social norms that undermine educational objectives (Bullough et al., 2015; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003). Business and EET programs designed to increase growth among women leaders also may have failed to meet programmatic developmental and growth objectives because the lessons do not address effectively the sociocognitive and emotional management competencies required in entrepreneurial environments (Goleman et al., 2004; Ladegard & Gjerde, 2014; Luthans & Peterson, 2003) or because they have not understood the effects of the constraints associated with feminine gender roles (Cho et al., 2013; Nagesh & Murthy, 2008). Study



findings that have demonstrated direct effects for leadership development on entrepreneurial growth among women have not been based in the United States and have not articulated their curriculum so that researchers of management educators can attempt to reproduce their outcomes.

The educational research community is responsible for providing women business leaders with an education that delivers on that promise and helps them build effective skills for the future. The research conducted in this study involved an interdisciplinary approach to leadership development for women that combined explicit instruction on behavioral competencies associated with leadership self-efficacy in business and entrepreneurial settings such as self-advocacy and goal orientation (Baron & Markman, 2000; Boyatzis, 1993), social networking (Ancona, Malone, Orlikowski, & Senge, 2007; Groysberg, 2008; Ibarra & Hunter, 2007; Uzzi & Dunlap, 2005), and psychological capital (Boyatzis, 1998; Smither et al., 2003) in light of second-generation gender biases that women face (Brush et al., 2014; Bullough et al., 2015; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003) in an effort to create a training program for women business leaders that increases their capacity for growth.

The design of the study built on features of programs that have demonstrated strong effects on women's leadership development in corporate and entrepreneurial settings such as a women-only program that emphasized leadership identity development (Brush et al., 2014; Bullough et al., 2015; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003) by including the features articulated

in the LBCW framework into the training intervention. The method by which the study was implemented is detailed in Chapter III.

## **CHAPTER III**

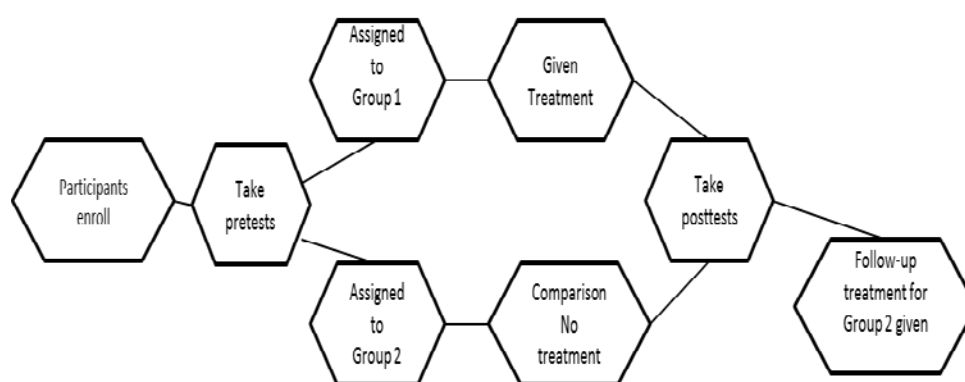
### **METHODOLOGY**

The purpose of the study was to investigate the effects of a leadership-development training workshop on leadership behaviors for participants of a California Silicon Valley women's software engineering community using a pretest-posttest comparison-group design. This chapter contains a description of the methodology, including the research design, a description of the study participants, protection of human subjects, qualifications of the researcher, instrumentation, the treatment description, the pilot study, the procedures for data collection, the research questions, and data analysis.

#### **Research Design**

This research originally proposed a quantitative study using a pretest–posttest comparison-group design with random assignment to understand the effects of training on leadership behaviors. Leadership behaviors were to be assessed with four measures that comprise of the leadership behavioral competency for women (LBCW) model that was presented in Chapter I. They are the Authentic Leadership Questionnaire (ALQ) instrument, the State Hope Scale (SHS), the Leadership Efficacy Questionnaire (LEQ), and the Leadership Education and Development Activities Instrument (LEDA). Training was the independent variable, and the four measures of LBCW were the dependent variables. In the original research design, the four measures of LBCW were to be administered to all participants as a pretest at the beginning of the study to establish a baseline for comparisons. Demographic data were also to be collected during the pretest phase. Participants were then to be assigned to one of two groups; the treatment group that was to be given the training treatment, or the comparison group that was not to

receive training until data on the posttest measures had been collected. After completion of the training for the treatment group only, both treatment and comparison groups were to be given again the ALQ, SHS, LEQ, and LEDA as a posttest. Once posttest data collection was completed, training for the comparison group was to begin so that all participants had equal access to the study treatments. Figure 4 illustrates the original research design.



*Figure 4.* Original research design.

The research design that was used in the study was modified from the original design, and a qualitative data-collection procedure was added. The modified research design was a mixed-methods pretest-posttest comparison group design with no random assignment component.

The original research design was modified for reasons pertaining to the inability to control the recruitment and retention of study participants and concerns about the robustness of the quantitative-only procedures that arose; several participants enrolled in the study and although some completed the pretest, some did not. A table of the distribution of participants and group composition is provided in Table 5.

Table 5  
Distribution of Participants and Groups ( $N = 86$ )

$n$	Pretest	Training	Posttest
50	Yes	No	No
20	Yes	Yes	Yes
16	No	Yes	Yes

Of the 70 who completed the pretest, only 20 attended the training. Of the 36 participants who attended the training, 16 did not complete the pretest. The lack of consistency in enrollment, pretest administration, and attendance made it impossible to predict the number of participants that would attend each training session and to assign participants randomly and evenly to either group, and so the original research design using random assignment to form groups was no longer plausible. A decision was made to conduct interviews of training participants after the training treatment in order to enhance the data-collection procedures and to address the lack of random assignment and the small group numbers. Figure 5 illustrates the modified research design.

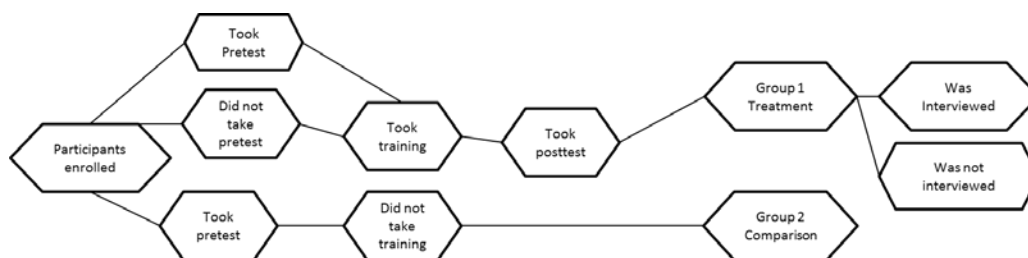


Figure 5. Modified research design.

By the end of the study, a treatment group of 36 participants was established and a comparison group of 50 participants was established by default because they completed the pretest and demographic questions but did not show up to the training and had no

opportunity to complete the posttest. Additionally, a third group of 16 participants was formed and consisted of those who had not taken the pretest but had enrolled in the study, participated in the training and completed the posttest.

Data were collected over a total of five 4-hour training sessions that were held on weekend afternoons over a period of 2.5 months, which started in September 2016 and ended in December 2016. Twenty-five people enrolled in the first session, but only 15 attended the training. Fifty-nine people enrolled in the second session, but only 19 attended and not all stayed until the end to complete the posttest. Twenty enrolled in the third session, but only eight attended. Thirty-two enrolled in the fourth session, but only six attended. Eleven people enrolled in the fifth session, but only three attended. At that point, it was determined that the population for the study was exhausted, no further trainings were held. A distribution of participants per training session is provided in Table 6.

Table 6  
Distribution of Participants and Groups ( $N = 86$ )

Session	Enrolled	Attended	%
1	25	15	60
2	59	19	32
3	20	8	40
4	36	6	17
5	11	3	27
Mean	30	10	33

Qualitative data were collected through participant interviews that occurred within a few weeks after the workshop. The purpose of the interviews was to investigate behavioral outcomes that may have occurred as a result of the workshop, such as increases in network-building and relationship-building activities, increases in public

speaking, increases in self-advocacy, and other acts that can be identified as acts of leadership or as precursors to an actualized leadership identity. Another aim of the interviews was to investigate changes in women's self-perceptions of leadership behavioral competencies that may not have been assessed by the instrumentation.

Based on the participants' scores of the four measures of LBCW, a set of interview questions was developed to gain additional insight into the meaning of the data and to investigate possible alternative interpretations of the data (Creswell, 2014).

I conducted 14 interviews, lasting for one hour each, with participants who attended the training. I employed a semistructured interview technique where each participant was asked the same set of questions by the researcher, but participants were allowed to respond as freely or as parsimoniously as they wished, and I was free to ask follow-up questions as a means of eliciting a more comprehensive response from the participant. The findings from both data-collection phases are presented in Chapter IV.

### **Participants**

Purposive samples were solicited from a women-only software engineering community called "Programming Women," which is based in California's Silicon Valley. Membership in the group is open to anyone who expresses interest and is accessible through self-service enrollment at a publicly available website called Meetup (<http://www.meetup.com>). The Silicon Valley chapter of Programming Women was chosen for this study for four main reasons. The first is because the group is women only, which adheres to the theoretical design principles used as the basis for this study (Debebe, 2011; Debebe, Bilimoria, & Anderson, 2016; Ely, Ibarra, & Kolb, 2011; Kark, Preser, & Zion-Waldoks, 2016; Vinnicombe & Singh, 2003). The second reason is

because the purpose of the group is to serve women's professional development in the field of software engineering, which is recognized widely as being male dominated. The third is because the group is located in Silicon Valley, a region that receives more entrepreneurial venture funding than any other in the world. The fourth reason is that the organization's chief executive officer (CEO) is a well-recognized entrepreneur and advocate for women's entrepreneurial leadership initiatives, which positions her as a role model for chief-level positions among community members.

Group membership was a requirement for holding training events. The researcher declared her research intent to conduct and deliver training and joined the group as a member. To recruit participants of the Programming Women group into the study, the researcher was given publishing access to the group's online community message board, where the training sessions were published, along with a link to the pretest and demographic survey. Once the training schedule was published, group members were free to enroll in the training and to take the pretest.

As of December 2016, approximately 3,000 women were members of the Silicon Valley chapter of Programming Women and had access to the online community message board. It is unclear what percentage of the community members were active. A total of 147 members (approximately 5% of the member population) enrolled in the training, and 202 members (approximately 7% of members) participated in the pretest and demographic surveys. Of the total attempted, 70 members (approximately 2% of the total member population or approximately 35% of the surveyed population) completed the pretest and the demographic survey (Table 7). Only completed surveys were used in the data analysis.



Table 7  
Demographic Characteristics of Participants in the Training and  
No-Training Condition at Pretest ( $N = 70$ )

Variable	No Training ( $n = 50$ )		Training ( $n = 20$ )		Total ( $N = 70$ )	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Employment						
Full time	31	62	9	45	40	57
Self-employed	4	8	3	15	7	10
Student	6	12	0	0	6	9
Other	9	18	8	40	17	24
Age						
>21	3	6	0	0	3	4
22–29	16	32	5	25	21	31
30–39	19	38	8	40	27	38
40–49	7	14	5	25	12	17
50+	4	8	2	10	6	9
Work Experience						
0	2	4	1	5	3	4
1–5	18	36	8	40	26	37
6–10	15	30	5	25	20	29
11–15	6	12	1	5	7	10
16–20	6	12	3	15	9	13
21+	3	6	2	10	5	7
Education						
GED	1	2	0	0	1	1
HS diploma	4	8	0	0	4	7
Bachelor's	18	36	6	30	24	34
Master's	24	48	9	45	33	47
Doctoral	3	6	5	25	8	11
Founder						
Yes	7	14	2	10	9	13
No	43	86	18	90	61	87
LeadTrain						
Yes	20	40	8	40	28	40
No	30	60	12	60	42	60
LeadPlan						
Yes	14	28	6	30	20	29
No	36	72	14	70	40	71

*Note.* GED = General Educational Development; HS = high school.

The proportion of the population represented in the training and no training condition were similar across many demographic categories. Exceptions were in the employment category, which included the self-employed and the unemployed; a greater percentage of self-employed and unemployed women attended the training than

Table 8  
Demographic Characteristics of Interview Participants Who Also  
Attended Training ( $n = 10$ ,  $N = 36$ )

Variable	<i>f</i>	%
Employment		
Full time	2	6
Self-employed	3	8
Student	0	0
Other	5	14
Age		
>21	0	0
22–29	1	3
30–39	5	14
40–49	2	6
50+	2	6
Work Experience		
0	0	0
1–5	4	11
6–10	3	8
11–15	0	0
16–20	1	3
21+	2	6
Education	0	
GED	0	0
HS diploma	0	0
Bachelor's	5	14
Master's	4	11
Doctoral	1	3
Is currently a founder or co-founder		
Yes	3	8
No	7	19
Attended leadership or professional development training in last year		
Yes	6	17
No	4	11
Constructed a leadership or professional development plan in last year		
Yes	2	6
No	8	22

*Note.* GED = General Educational Development; HS = high school.

did not. Their attendance may be explained by the possibility that women who were employed full time or students were not as likely as self-employed or unemployed women to spend their free weekend time in a voluntary training session. Age was an exception; a greater proportion of women older than 30 years old attended the training

than did not. Education was an exception; four times as many women with doctoral degrees attended the training than did not.

Training-session attendees were invited to be interviewed about their perceptions of their career paths as a result of the training and 14 of the 36 women who attended training volunteered to be interviewed about their experience. Ten of the 14 completed the demographic questionnaire (Table 8), which was administered during registration and prior to the training.

### **Protection of Human Subjects**

In accordance with Standard 8: Research and Publication (American Psychological Association, 2012) and the University of San Francisco Institutional Review Board for the Protection of Human Subjects, all information obtained during the course of this study remained confidential and only group-level scores and means were reported in the data analysis. No real names and identifying information were used when reporting qualitative data.

Informed consent was constituted as follows: Participants were aware of the purpose of the study, participants were aware that they might withdraw from the study at any time without penalty, all participant information was confidential, no known risks were associated with participating in the study, and participants received the benefit of leadership training and assessments for their participation in the study. Informed consent was obtained from each participant through completion of the pretest, by obtaining her signature on a form at the time of the training, and by obtaining her signature on a form at the time of the interview. A letter of invitation providing participants with details regarding informed consent and their participation in the study was provided to each

participant at the time of the training. See Appendix B for a copy of the informed consent form.

Data were collected with a secure, password-protected, Web-based system and kept confidential. Reports that are published with these data will not include any information that makes it possible to identify an individual participant. All collected responses were coded, and identifying information was removed from the analysis. Data downloaded from the Web system for analysis were kept on a password-protected desktop and laptop computer hard drives to ensure its security. Only the researcher had access to the response data, and any lists generated from the data-collection process, including a master list of participants, were kept separately from the rest of the research data as a security precaution. All records containing signatures were kept in a locked file cabinet. Identifiable data will be destroyed 3 years after the completion of the research project.

### **Qualifications of the Researcher**

I am a human-resources and organization-development practitioner with more than 20 years of work experience in business and nonprofit settings. I earned a Master of Science degree in organization development from the University of San Francisco, an undergraduate degree in women's studies from Rutgers University, and a certificate in human resources management from Cornell University.

### **Instrumentation**

In total, this study used five separate instruments: four to assess LBCW and one survey to collect demographic information. LBCW was assessed with the use of the following four instruments: LEDA (developed by the researcher for this study), LEQ

(developed by Hannah & Avolio, 2013), ALQ (developed by Avolio, Gardner, & Walumbwa, 2007), and SHS (developed by Snyder et al., 1996). The LEDA inventory is found in Appendix C.

The LEQ and the ALQ are published by Mind Garden, Inc. (Menlo Park, CA) and are available commercially. Permission to alter the LEQ was obtained by the researcher from the publisher. The term “my superiors” or “my leaders” in items 9, 11, and 12 was altered to “my colleagues.” The researcher agreed to adjust the copyright language on the survey to add: “Altered by Leann Pereira from the original by permission of the publisher.” Publisher’s rights prohibit the reproduction of the full LEQ and ALQ instruments in this document.

### *Leader Efficacy Questionnaire*

The LEQ is a 22-item survey that is used to measure a person’s confidence in performing leadership tasks such as “develop agreements with followers to enhance their participation,” “coach others to assume greater responsibilities for leadership,” and “inspire others to go beyond their self-interests for the greater good.”

The LEQ contains three subscales for leader action efficacy, leader means efficacy, and leader self-regulation efficacy. The first two subscales are composed of seven items each, and the third subscale has eight items. Correlations between LEQ subscales were high and ranged from .85 to .90 for a sample of 303 working adults (Hannah, Avolio, Walumbwa, & Chan, 2012); therefore, the responses were analyzed with the entire scale only. Scoring for the LEQ scale is calculated in percentages that range from 0, which represents no confidence or 0% confidence, to 100, which represents

complete confidence or 100% confidence. A score of 50 or 50% represents moderate confidence.

Cronbach's coefficient alpha for the LEQ on pretest scores for 70 participants in the current study was .96. Hannah et al. (2012) found that internal consistency reliability for the LEQ ranged from .77 to .94 for each of the main factors across three studies. Four main factors were extracted from the samples through a confirmatory factor analysis and were described as leader self and means, leader state hope, leader self-esteem, and general self-efficacy. The samples for each of the three studies consisted of 303 working adults, 53% of whom were women with a mean age of 25.42 years ( $SD = 3.71$ ) in Study 1; 265 military officers, 70% of whom were men with a mean age of 32.45 years ( $SD = 5.01$ ) in Study 2; and 219 working adults, 55% of whom were men with a mean age of 24.60 years ( $SD = 3.10$ ) in Study 3. Mean factor scores for men and women were not reported separately.

The content and construct validity for the LEQ were presented in a paper documenting five studies where leader self and means efficacy discriminated between subscales measuring self-esteem and other preexisting leadership constructs (Hannah et al., 2012). Hannah et al. (2012) attributed the nomological validity of the leader self and means construct to its statistically significant correlation with such related constructs as learning goal orientation ( $r = .46$ ) and meta-cognitive ability ( $r = .47$ ; Hannah et al., 2012), as was presented in the results of Study 4.

### ***Authentic Leadership Questionnaire***

The ALQ is a 16-item questionnaire that is used to measure how authentic or psychologically comfortable people feel performing leadership tasks. Items from the

scale include “I say exactly what I mean,” “I admit mistakes when they are made,” and “I display emotions exactly in line with feelings.” Scoring for the ALQ is 1 to 5 and represents a range of choices, including *not at all* to *frequently, if not always*.

The ALQ contains four 4-item subscales: transparency, moral and ethical, balanced processing, and self-awareness. In previous study results, correlations between ALQ subscales were high and ranged from .72 to .92 (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008); therefore, the responses were analyzed with the entire scale only. Scores for the scale were calculated by dividing the total score by the number of items.

Cronbach’s coefficient alpha for the ALQ on pretest scores for 70 participants in the current study was .89. In previous studies, internal consistency reliability for the ALQ was assessed by researchers with data collected from 224 full-time employees at a manufacturing company in the northeastern United States. All respondents held a university degree, and 80% were men with a mean age of 44.80 years ( $SD = 8.75$ ) and a mean work experience of 15.03 years ( $SD = 8.56$ ). Cronbach’s coefficient alpha was reported for four factors: .92 for self-awareness, .81 for balanced processing, .76 for internalized moral processing, and .87 for relational transparency (Walumbwa et al., 2008). In a separate study, the reliability coefficient for the ALQ was .88 in a study of 304 participants in the United States, 69% of whom were male and 31% of whom were female (Norman, Avey, Avolio, & Peterson, 2010).

The content validity for the ALQ was established by subject-matter experts comprising faculty members and doctoral students at the research university where the studies were developed who reviewed the instrument (Walumbwa et al., 2008). The

predictive validity for the ALQ was demonstrated in a study that used the five items from the ALQ's transparency subscale to link positively leader communication transparency and perceptions of leader effectiveness that accounted for 7% of the score variance (Norman et al., 2010). High and low levels of transparency were related directly to higher (mean = 4.17, SD = 1.04) and lower (mean = 3.71, SD = 1.09) ratings for perceptions of leader effectiveness, respectively, for a sample of 304 working adults, 69% male, 31% female, 90% from the United States, 89.5% European American, with a mean age of 47 years and a mean work experience of approximately 26 years (Normal et al., 2010).

### *State Hope Scale*

The SHS (Snyder et al., 1996) is a six-item questionnaire that is used to measure how emotionally buoyant or hopeful a person is about her or his ability to overcome obstacles and meet her or his goals. The SHS scale contains two subscales for agency and pathways, each with three items. A correlational coefficient between subscales was not computed, and responses were analyzed by using the entire scale only because of the small number of items in the entire scale and because the previous scales were analyzed in this manner. The scores for the scale were calculated by dividing the total score by the number of items. A high score on the SHS indicates high confidence in one's ability to achieve goals, and a low score indicates low confidence.

Cronbach's coefficient alpha for the SHS on pretest scores for 70 participants in the current study was .86. In previous studies, internal consistency reliability for the SHS ranged from .83 to .95 with a median of .95 for the entire scale (Snyder et al., 1996). Snyder et al. (1996) performed daily assessments of 444 students from the University of Kansas during a 30-day period. The gender distribution of the population was



approximately equal. Cronbach's coefficient alpha for subscale reliabilities ranged from .62 to .92 for agency and from .53 to .88 for pathways. In a study among retail-sales managers, 68% of whom were women with a mean age of 27.0 years ( $SD = 2.2$ ) and approximately 56% of whom held at least an undergraduate degree, Cronbach's coefficient alpha for the SHS was reported as .91 (Rego, Sousa, Marques, & Pina e Cunha, 2014).

The discriminant validity for the SHS was established in 2014 study by Rego et al. (2014), where hope was identified as one of four distinct factors. The researchers performed a confirmatory factor analyses to examine the distinctiveness of each variable of "hope," "positive affect," "authentic leadership," and "creativity" (pp. 202-204). Prior to declaring the four factors, one and two factors were extracted in succession in an attempt to merge the variables and examine common source effects. The four-factor model best supported the data analysis (Rego et al., 2014). The SHS demonstrated predictive validity in a study where scores for the SHS correlated positively ( $r = .27$ ) with the number of correct responses on a complex verbal learning task (Snyder et al., 1996), thereby lending empirical support for intentional change theory (ICT) learning approaches that leverage positive emotional states to anchor learning processes (Boyatzis, 2008).

### ***Leadership Education and Development Instrument***

The Leadership Education and Development Activities Instrument (LEDA) is a 39-item scale that was developed for this study to understand women's perceptions and behaviors related to learning and practicing leadership. Responses were collected with a 6-point, Likert scale that ranges from *strongly disagree* to *strongly agree*. High scores on

the LEDA indicate that a person is likely to believe that leadership and professional development are the outcomes of deliberate effort and persistence and are available to him or her. A low score on the LEDA indicates that a person is likely to be confused or uncertain about his or her advancement opportunities and may not persist in professional development activities. The LEDA includes four subscales. They are developing and advocating for a vision of success, awareness of second-generation gender biases, social-network development, and planning. The scores for the LEDA and subscales were calculated by dividing the total score by the number of items.

### ***LEDA subscales***

A summary and explanation of each LEDA subscale is presented in this section. An analysis of instrument and subscale reliability is presented in this section. A correlational analysis of the LEDA subscales and an analysis of instrument validity with White and Simon's Survey Validation Rubric for Expert Panel (VREP; White & Simon, 2014) are presented as well.

*Developing a vision of a desired future (DF).* Management theory and the findings from research emphasize the need for personal identity congruence between a person and his or her goals (Bhide, 1996; Boyatzis, 2008; Senge, 2006), especially for women leaders (Karelaia & Guillén, 2011, 2014). Study findings have shown that ideation of an ideal self-image can compel a change in different areas of a person's life (Boyatzis & Akrivou, 2006). The LEDA's developing a desired future subscale contains seven items and was designed to understand the extent to which women perceive they have the ability to envision a compelling vision of their futures.

A high score on the LEDA desired-future subscale (LEDA DF) indicates an ability to envision an engaging and compelling future for oneself. A low score indicates a sense of confusion or anxiety about the future.

*Resilience to gender bias (GB).* The LEDA gender-bias resilience subscale (LEDA GB) was designed to assess the degree of awareness and resilience a woman may have in a male-dominated environment to of gender-role stereotypes. It was developed in accordance with the design principles of women's leadership-development programs that were described in Chapters I and II. The LEDA GB subscale contains 11 items and obtains data on factors that may influence women's susceptibility to gender bias and can be correlated with other scales for research and assessment purposes.

High scores on the LEDA GB indicated higher resilience to implicit gender-bias and sex-role stereotypes that occur in the workplace. High scores also indicated a greater ability to manage potential negative effects of gender-role stereotypes. Low scores on the LEDA GB indicated that a woman may be experiencing a sense of alienation or frustration at work as a result of exposure to gender-role stereotypes.

*Social-network support (SNS).* The LEDA subscale for social-network support (LEDA SNS) contained nine items and was designed to understand the extent of social-network support available to women across three types of networks: operations, personal, and strategic (Ibarra & Hunter, 2007). Other existing instruments such as the Lubben Social Network Scale (Gabrielson & Holston, 2014) assessed the robustness of an individual's social networks for care-related support services, such as elder care, and their social and emotional support needs (Hong, Casado, & Harrington, 2011). Nevertheless, the items for the SNS subscale were based upon work done by Ibarra and Hunter (2007)

and were created for women in business settings to help them understand the relationship between their social-networking activities and their professional or leadership-development goals.

High scores on the LEDA SNS indicate that a person reports she has sufficient resources available to her as a result of her social-network relations. Low scores on the LEDA SNS indicate a need to enhance social-network relations.

*Learning plans (LP).* The LEDA learning-plans subscale (LEDA LP) contains 12 items and is included in the LEDA to enable researchers to collect data on women's self-regulating learning behaviors (Zimmerman, 2008). The establishment of learning-based frameworks in business management and entrepreneurial education has opened up new and valuable directions in the development of research on sociocognitive factors, such as entrepreneurial growth intention and leadership self-efficacy, that are theorized to affect firm performance (Idrus, Pauzi, & Munir, 2014; Wilson, Kickul, & Marlino, 2007). Little research is available, however, on how instruction related to goal-setting and planning for a desired future vision affects goal attainment or other measures of performance when delivered in women-only training sessions.

High scores on the LEDA LP indicate that a woman has a strong ability to develop purposefully learning goals and a supporting learning agenda for herself. It also indicates that a woman can control her environment to reach her goals. Low scores on the LEDA LP indicate that a woman may not value planning as a strategy for professional development or may not understand how to plan.

### ***Reliability of the LEDA***

Internal consistency reliability scores for the LEDA are presented in Table 9. The overall reliability for the DF subscale was good, acceptable for the SNS and LP subscales, and low for the GB subscale. In computing the reliability coefficient for the LP subscale, item number 6 was dropped as a result of a negative point-biserial correlation coefficient, which indicated that the item accidentally may not have been reversed during the analysis phase.

Table 9  
Reliability for LEDA and Subscales

Scale	Item Numbers	Cronbach's Coefficient Alpha
LEDA	1–39	.85
DF Subscale	1–7	.85
GB Subscale	8–18	.61
SNS Subscale	19–27	.72
LP Subscale	28–39	.75

### ***Validity of the LEDA***

An expert panel was assembled to review the LEDA. Reviewers were asked to use the Validation Rubric for Expert Panel<sup>®</sup> (VREP<sup>®</sup>) to provide structured feedback to the test developer. The VREP<sup>®</sup> is found in Appendix D.

Reviewer comments ranged from suggestions about rewriting statements for clarity and considering the tenses of verbs to commenting on how the items would be interpreted by women who work in engineering roles. For example, an item that initially read “I am afraid that others will perceive me as being incompetent if I don’t achieve my goals” was reconstructed to read “I am afraid to admit mistakes or if I don’t know something.” In another example, a reviewer suggested rewording the item “I have a clear

vision of what I want the future to look like for me” To “I have a clear vision of what a desirable future looks like for me.”

Some comments were received after the pretest was administered and will be included in the next iteration of the LEDA instrument. For example, one reviewer suggested that “the item about needing psychological support from friends and peers in order to perform my job well” can be interpreted negatively as a weakness and should be rewritten.

The original draft of the LEDA comprised 65 items. Reviewers suggested omitting some items as a result of redundancy. The revised LEDA used in this study, therefore, comprised 39 items.

### *Demographic items*

Items for demographic data were developed from research on factors affecting business performance for women entrepreneurs and women leaders (Brush, Carter, Gatewood, Greene, & Hart, 2001; Coleman, 2005; DeMartino & Barbato, 2003; Huarng, Mas-Tur, & Yu, 2012; Kickul, Wilson, Marlino, & Barbosa, 2008) and are defined as level of education, prior self-employment or founder experience, and prior leadership or management training. A correlational analysis was conducted with Kendall’s Tau-b to investigate whether a statistically significant relationship existed between any demographic items and measures of LBCW; none were found when the overall error rate was controlled at the .05 level by using the Bonferroni correction. Demographic questions are provided in Appendix E.

### Qualitative Interview Questions

Qualitative interview questions were developed after an initial analysis of the quantitative results obtained from the measures of LBCW (Creswell, 2014). The objective of the qualitative analyses was to understand whether the difference in scores reflected a meaningful effect on a participant's leadership or entrepreneurial aspirations within 2 weeks of the training.

The interview questions were intended to explore the relationship between a woman-only leadership-training experience, the constructs and subconstructs of the LBCW framework, and women's thoughts about leadership and entrepreneurship as a planned career path. General and open-ended questions were asked to gain an understanding of how women perceived the effectiveness of the training on their daily work routines and their career aspirations. To gain a better understanding about how women interpret the nascent stages of entrepreneurship, questions were developed in accordance with models of nascent entrepreneurial behaviors (Costin, 2012; Delmar & Davidsson, 2000; Gundry & Welsch, 2001; Reynolds, 1997). Questions about leadership identity also were developed in accordance with previous models of leadership and identity development (Ely et al., 2011; Ibarra, 2003). As a result, the following questions were asked:

1. Did you notice any changes in your work habits as a result of the training?
2. Did you notice a change in your perceptions of your desired career path as a result of the training? (Did you discuss the training with anyone?)
3. If I give you a list of early stage entrepreneurial activities, will you tell me to what extent you have done these things or hope to do them in the future?

- a) Conceptualize new initiative
  - b) Seek facilities
  - c) Allocate financial resources
  - d) Invest own money
  - e) Assemble start-up team
  - f) Write a business plan
  - g) Purchase equipment
  - h) Seek external funding
  - i) Apply for license or patents
  - j) Develop a model or prototype
  - k) Generate revenue from sales
  - l) Invest time in business
  - m) Receive other forms of financial support
  - n) Rent equipment
  - o) Create a legal entity
  - p) Hire employees to work for wages
  - q) Engage in other start-up behaviors (such as develop partnerships)
4. What are your thoughts about leadership or entrepreneurship as a career path as a result of the training?
5. Are you practicing any leadership behaviors as a result of the training (such as networking, self-advocacy, or planning)?
6. Are you more likely to see yourself as a leader or as an entrepreneur as a result of the training?



7. The topic of cultural limitations to leadership as a career for women emerged in one of the sessions. Do you have any comments on that topic?
8. Did you develop any social contacts as a result of the training?
  - a) Did you follow-up with or meet with any of the contacts you made at the training?
  - b) If so, can you tell me about it?
  - c) Do you plan to meet again?

The interview consent form is presented in Appendix F.

### **Treatment Description**

The training treatment in this study is an extension of LBCW, which was presented in the theoretical framework section of Chapter I. The training comprised materials and curricula that adhere to the educational framework for developing women leaders as advocated by women's leadership-development scholars (Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003) as well an ICT instructional curriculum (McKee, Boyatzis, & Johnston, 2008), which were presented in the theoretical framework section of Chapter I.

The training covered six topics that relate directly to the LBCW model. The topics covered in the training are “awareness of second-generation gender bias;” “creating a personal leadership vision;” “personal narrative, self-advocacy, and relationship-building through coaching;” “social-networking and gender;” “coaching and relationship-building skills;” and “planning and goal-setting.” Each topic was presented to participants through the use of a projector and Microsoft PowerPoint® software. Subsequent to the presentation of each topic, participants engaged in planned exercises to help them

experience the topic within the classroom setting. Exercises for each topic ranged from drawing a desired vision, to pairing and sharing the constructed vision, to group-based discussions on how gender bias is experienced at work, to social-network assessment exercises, and to worksheet exercises for planning. A complete description of the training content was provided in Chapter II. A copy of the lesson plan is presented in Appendix G.

The purpose and learning outcomes of the women's leadership-development training was to construct a desired future vision of their professional development, to identify gender biases at work that may affect negatively their ability to advance, to understand the different types of social networks and how to leverage them for professional development purposes, and to understand the components of a professional learning and development plan.

No research on entrepreneurship or firm creation was included in the training as the intention of this study was to isolate leadership identity as a primary factor in entrepreneurial ideation. Lesson plans and training materials were reviewed by instructors at the University of San Francisco's School of Management for appropriateness and relevance.

### **Procedures for Data Collection**

The training treatment and data collection for this study ran from August 2016 to January 2017. Data were collected in two phases. Phase I of the study, which involved the collection of quantitative data and training, began in September 2016 and ended in December 2016. Phase II of the study, which consisted of 14 interviews, began at the end of November 2016 and ended in January 2017.

The recruitment phase began one month prior to the first training date. Participants were asked to enroll in the study through a posting on an online community message board (see Appendix H for a copy of the posting). The posting provided details on the topic of the training and a link to the pretest and demographic questions. Once the posting was placed on the online board, all community members could access the registration, the pretest, and demographic-data questionnaire. The pretest and demographic-data questionnaire were linked to an independent online survey system called Qualtrics<sup>®</sup>. Qualtrics<sup>®</sup> is a password-protected system supplied by the University. Participants were asked to provide their e-mail addresses only if they wished to receive the results of their pretest assessments. Participant names and e-mail addresses were not available through the community message board. Reminders containing the anonymous link to the pretest and demographic questionnaire were sent to participants in 72-hour intervals prior to each training session through the online board.

At the time of the registration, all participants were asked to complete the pretest. Those who attended the training were asked to complete a posttest after the 4 hours of instructional time but before they left the training facility. The link to the posttest survey was made available only to training attendees after the training session through the community message board. Participants were asked to use their mobile devices to access the online survey link. Once the link was clicked, the survey appeared in the respondent's Web browser and responses were collected. Participants were asked to use the same identifier for both the pretest and the posttest. Pretest and posttest scores were linked through the participant's e-mail address. Some respondents asked to complete a paper-and-pencil version of the posttest because there were issues with their mobile devices or

Internet access at the training facility. A handful of participants left the facility without completing the posttest but later completed the posttest within a week of the training.

At the end of the training session, participants were asked whether they wished to be interviewed for the study. Those who were interested provided their contact information for scheduling purposes. Interviewees were contacted by the researcher through e-mail and scheduled for one-hour interview sessions. Interviewees were asked to sign a consent form prior to the interview. In some cases, interviews were not audio recorded because the interviewee indicated a level of discomfort with a recording procedure. In such cases, the researcher made handwritten notes of the interview. All interviews were later transcribed into an electronic format and sent to the interviewee for review. All audio files were destroyed after the transcription was made.

### **Revised Research Questions**

Two additional research questions were added to the study in response to the modified research design. The following research questions were investigated through quantitative methods:

1. To what extent are there differences between pretest scores for the comparison group and posttest scores for the treatment group on all four measures of LBCW (LEDA, SHS, ALQ, and LEQ)?
2. To what extent are there differences between pretest and posttest LBCW (LEDA, SHS, ALQ, and LEQ) scores within the treatment group?
3. What is the relationship between the LEDA and its subscales and the SHS, ALQ, and the LEQ at pretest?

LBCW was assessed qualitatively by interviewing study participants for one-hour within 2 weeks of the training in order to answer the following research question: to what extent did training contribute to the development of LBCW?

### **Data Analysis**

Quantitative and qualitative data-analytic techniques were employed to analyze the data. A pretest–posttest comparison-group design was used in the quantitative phase of the study. A pretest was used to collect data on the four measures of LBCW. A posttest was administered to participants immediately after the training. The posttest consisted of the same instruments that were administered at the pretest, except for the demographic survey. The following tests were conducted:

1. An independent-samples *t* test was conducted on all four measures of LBCW (LEDA, SHS, ALQ, and LEQ) to compare pretest scores for the comparison group to posttest scores for the treatment group for research question one.
2. A dependent-sample *t* test was conducted on all four measures of LBCW (LEDA, SHS, ALQ, and LEQ) to compare pretest and posttest scores for participants who completed both tests and attended the training for research question two.
3. A correlational analysis was conducted on all pretest scores for the four measures of LBCW (LEDA, SHS, ALQ, and LEQ), and the LEDA subscales (DF, GB, SNS, and LP).

During the second phase of the study, semistructured interviews were conducted to understand the quantitative data better. Subsequent to transcription of the recorded interviews and notes, each interviewee was sent an electronic copy of her interview transcription and asked to review it for accuracy to ensure the validity of the data.

Interviewees also were invited to make additions or omissions if they thought them to be appropriate. Once transcripts were verified, the process of coding the data began.

Coding of the qualitative data occurred in a two-stage process: the first stage involved coding for emerging narrative themes and the second stage involved coding according to the theoretical model of LBCW, which was presented in Chapter I.

In the first stage of the coding process, the researcher read each transcript and identified emerging narrative themes (Creswell, 2014).

In the second stage of the coding process, the transcriptions were coded according to the LBCW model. As stated, the purpose and learning outcomes of the women's leadership-development training were linked directly to the LBCW model. To this end, narrative themes that emerged in the first stage of the coding process were coded in the second stage to reflect one of the four constructs and subconstructs of the LBCW model. Each narrative theme was coded to one construct and subconstruct only.

### ***Reliability***

An initial level of interrater reliability for the interview coding process was established to be 92% among two reviewers for 20% of the qualitative data collected; on average, one coding discrepancy in 12 items was observed between two coders. A second research scientist served as a second coder and reviewed, classified, and coded participants' responses to each interview question by using the two-stage process described in the previous section. The few discrepancies that arose between the two coders were discussed until a single coding structure was agreed to. The reliability for each instrument was presented in the Instrumentation section of this chapter.

### *Validity*

A process of “constant comparison” helped to ensure the validity of the qualitative data analysis (Glaser & Strauss, 1999). The validity of the quantitative data is established in Chapter IV with an effect size for statistically significant results. The validity of the qualitative and quantitative analysis is also established in Chapters IV and V to the extent that the qualitative data analysis is convergent with the quantitative data analysis (Patton, 2002).

## CHAPTER IV

### DATA ANALYSES

The purpose of the study was to investigate the effects of a leadership-development training workshop on leadership behaviors for participants of a California Silicon Valley women's software-engineering community using a pretest-posttest comparison group design.

Data analyses for this study were performed in two phases and correspond to the two methods of data collection used in this study: quantitative and qualitative. The analyses served to answer the revised research questions posed in Chapter III. An additional analysis was conducted to explore the relationship between the Leadership Education and Development Activities Instrument (LEDA) subscales Desired Future (DF), Gender Bias (GB), Social-network Support (SNS), and Learning Plans (LP), and to explore the relationship between items in the LEDA GB subscale.

#### **Phase I: Quantitative Analyses**

Independent-samples  $t$  tests were used to answer research question one. "To what extent are there differences between pretest scores for the comparison group and posttest scores for the treatment group on all four measures of leadership behavioral competencies for women (LBCW; LEDA, SHS, ALQ, and LEQ)?" To ensure confidence in the outcomes of an independent-samples  $t$  test, certain assumptions about the data must be met. The assumptions for the independent-samples  $t$  test are as follows:

1. A normal distribution. The sample sizes for each group are larger than 30; therefore, the Central Limit Theorem indicates that the tests are robust and the likelihood of a Type I error is reduced.



2. Independence of observations within and between groups. Participants who took the surveys were identified through their e-mail addresses, and duplicate cases were removed.
3. Independence of observations between groups. Only participants who attended the training were given access to the posttest survey, which was used to compare the treatment and comparison groups. As another measure of security, e-mail addresses were scanned to ensure that no cases were duplicated between groups.
4. Homogeneity of population variances. The equality of population variances were tested using Levene's test of homogeneity of variances. In all cases with the exception of the LEDA gender-bias subscale (LEDA GB), the data indicated Levene's test was not statistically significant, and so the Welch–Aspin test was used in place of the independent-samples  $t$  test for the LEDA GB.

Dependent-sample  $t$  tests were used to answer research question two, “To what extent are there differences between pretest and posttest LBCW (LEDA, SHS, ALQ, and LEQ) scores within the treatment group?” To ensure confidence in the outcomes of a dependent-sample  $t$  test, certain assumptions about the data must be met. The assumptions for the dependent-sample  $t$  test are as follows:

1. A normal distribution. The Kolmogorov–Smirnov test was used to determine whether the data for each group was normally distributed. Test statistics indicated a nonnormal distribution was found for the LEDA, the LEDA desired-future subscale (LEDA DF), and the LEDA subscale for social-network support (LEDA SNS), which could result in a Type I error.
2. Independence of observations within groups. Precautions were taken to match

pairs of tests with the use of a unique identifier so that samples were equal in size, data were not duplicated from pretest to posttest, and unmatched scores were not included. Only pairs that matched on their unique identifiers were included in this analysis.

A correlational analysis was used to answer research question three, which explored the relationships between the instrument developed for this study, the LEDA, its subscales DF, GB, SNS, and LP, and the other measures of LBCW used in the study, the ALQ, SHS, and LEQ, by using the Pearson product-moment correlation.

The assumptions for using the Pearson product-moment correlation are continuous data, a linear relationship between the variables, homoscedasticity of the distribution around the regression line, normality of the distribution, no outliers, and no truncation of the data. To investigate assumptions, boxplots and scatterplots with a regression line of best fit were generated. Although outliers were found in the data, they were few. To investigate the effects of the outliers on the correlation coefficient, Spearman's rank-order coefficient was compared with Pearson's product-moment correlation, and few differences between the coefficients were found. Of the differences that were found, the results obtained from using Pearson's product-moment correlation were explained easily with the theoretical models used in this research, and so it was selected as the method for obtaining a measure of relationship. Inspection of the scatterplots revealed no truncation, and variances along the line of best fit were somewhat homogenous. Skewness and kurtosis were used to test normality, and the values were found to range between  $-1$  and  $1$  for skewness, and between  $-2$  and  $2$  for Kurtosis, which was considered normal (George & Mallery, 2010; Gravetter & Wallnau, 2014; Trochim

& Donnelly, 2006).

### ***Research question 1***

*To what extent are there differences between pretest scores for the comparison group and posttest scores for the treatment group on all four measures of LBCW (LEDA, SHS, ALQ, and LEQ)?*

As mentioned in Chapter III, although the original research design was to assign participants randomly to a treatment and comparison group during the recruitment phase, this procedure was modified. After completing the pretests, participants were in one of two mutually exclusive categories: those who attended the training and those who did not. Pretest scores between the two groups were analyzed with an independent-samples *t* test, and no statistically differences were found between the treatment or comparison groups on any of the pretest measures. As no differences were found on the pretest measures, the two groups were considered not to be different.

Only those who attended the training were given the posttest, which included the same measures as the pretest but without the demographic questionnaire. To compare the differences between the two groups, the posttest scores for the treatment group and pretest scores for the comparison group were used. The independent variable was the training, and the dependent variables were the measures of LBCW, which are the LEDA, SHS, ALQ, and LEQ. The treatment group received 4 hours of training, and either a pretest and a posttest or a posttest only. The comparison group received a pretest only and no training or posttest, therefore, posttest scores of the treatment group were compared with pretest scores of the comparison group. Means, standard deviations, and effect-size calculations for statistically significant differences are presented in Table 10.

With the exception of the LEDA, the means for the treatment group were higher than the means for the comparison group, which indicated that leadership self-efficacy scores were higher for those who attended training than for those who did not.

Demographic items such as education, years of work experience, or age were neither directly nor indirectly related to any of the four measures of LBCW.

Table 10

Means, Standard Deviations, Independent-Samples *t*-Test Results, and Effect Sizes for Measures of LBCW

Variable	Treatment ( <i>n</i> = 36)		Comparison ( <i>n</i> = 50)		<i>t</i> ( <i>df</i> = 84)	<i>ES</i>
	Mean	SD	Mean	SD		
SHS	5.76	1.27	5.16	1.42	2.04*	.44
ALQ	3.99	0.57	3.65	0.60	2.63*	.58
LEQ	69.63	13.25	62.49	16.48	2.15*	.47
LEDA	2.50	0.41	2.73	0.51	-2.77*	-.49
Subscales						
LEDADF <sup>a</sup>	2.40	0.81	2.33	0.61	0.41	
LEDAGB	2.56	0.65	2.97	0.61	-3.30*	-.66
LEDASNS <sup>a</sup>	2.88	0.58	3.32	0.85	-2.88*	-.59
LEDALP	2.19	0.63	2.51	0.83	-1.88	

<sup>a</sup>As a result of unequal variances, the Welch–Aspin test was used and the degrees of freedom are 59.08.

\*Statistically significant at the .05 level.

Statistically significant differences between the treatment and comparison groups were found for the SHS. The SHS was used as a measure of a person’s present feelings of self-efficacy or self-confidence as they reflect on near-term- or current-work-related challenges. The scale ranged from 1 to 8, with 1 representing a state of “no confidence” in their ability to meet current challenges and 8 representing “total confidence.” For both groups, scores clustered around the center of the scale but did not reach a score of 6, which indicated low confidence for both groups. The mean of the SHS treatment group was 5.76, which was 7% higher than the mean of the comparison group and indicated a

an enhancement in confidence as a result of the training. The effect size for the SHS is .44, which is a moderate effect (Cohen, 1992). Because the independent-samples  $t$  test demonstrated both statistical significance and a moderate effect size, a Type I error was unlikely. A graphical representation of the difference between treatment and comparison groups scores on the SHS is found in Figure 6.

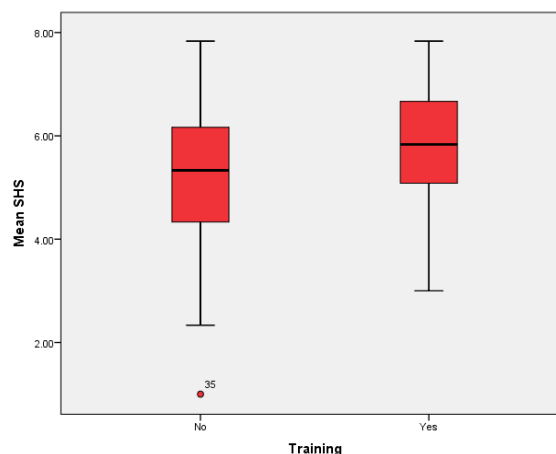


Figure 6. Effect of training on SHS scores.

The ALQ was used as a measure of the frequency of how psychologically comfortable and authentic women were in their social interactions at work when they acted in a leadership capacity. Scores for the ALQ comparison group ranged from 1 to 5, with 1 indicating that women experienced psychological discomfort in their leadership role and 5 indicating that women experienced a great deal of comfort with their leadership role. Statistically significant differences were found between the treatment and comparison groups for the ALQ. The treatment group reported that they felt authentic “fairly often” in their role as leaders, which was 80% of the time, in contrast to the comparison group who reported that they felt authentic approximating “sometimes” or 73% of the time. The effect size for the ALQ was .58, which is a moderate effect (Cohen, 1992). Because the independent-samples  $t$  test demonstrated both statistical significance

and a moderate effect size, a Type I error is unlikely. A graphical representation of the difference between treatment and comparison group scores on the ALQ is found in Figure 7.

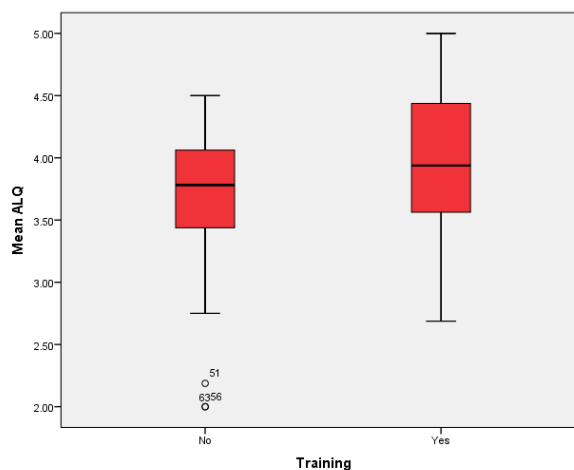


Figure 7. Effect of training on ALQ scores.

The LEQ was used as a measure of how confident or effective women were as they performed leadership tasks. Scores for the LEQ ranged from 0 to 100; 0 represented “not at all confident,” 50 represented “somewhat confident,” and 100 represented “totally confident.” An example of some of the items of the LEQ are “Energize my followers to achieve their best,” “Get my followers to identify with the central focus of our mission,” and “Count on my colleagues or mentors to support high standards of ethical conduct.” A statistically significant difference between treatment and comparison groups was found for the LEQ. The effect size for the LEQ was .47, which is a moderate effect (Cohen, 1992). The mean for the LEQ treatment group indicated that women felt 70% confident or effective in their ability to perform leadership tasks, whereas the comparison-group mean indicated that women felt 63% confident in their ability to perform leadership tasks. Because the independent-samples *t* test demonstrated both statistical significance and a moderate effect size for the LEQ, a Type I error is unlikely. A graphical representation of

the difference between treatment and comparison group scores on the LEQ is found in Figure 8.

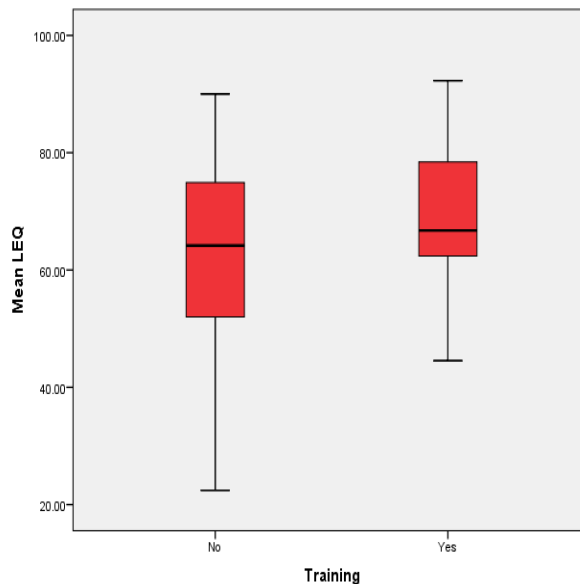


Figure 8. Effect of training on LEQ scores.

The LEDA was used as a measure of women's perceptions and behaviors related to learning and practicing leadership in a self-directed way. The full scale is constructed of four subscales in which women were asked to self-assess their ability to envision a desired future, maneuver gender bias concerns, construct relationships with others in order to advance their careers, and develop and manage their career plans. Scores for the LEDA ranged from 1 to 6, and the higher the score the more one agreed she was engaged in a self-directed career progression toward leadership roles; 1 represented *strongly disagree*, and 6 represented *strongly agree*. A statistically significant difference between groups was found for the full LEDA; the mean for the LEDA treatment group was lower than that of the comparison group and the effect size for the LEDA was  $-.49$ , which is a negative and moderate effect (Cohen, 1992). Means for both groups fell below 3, the

middle value of the scale, and indicated that women felt unprepared for self-directed leadership development and that women who attended 4-hours of training perceived themselves to be less capable to direct their careers toward leadership roles than those who did not attend training.

Scores and values for the LEDA subscales were consistent with those of the LEDA and represented a lowered reported ability for self-directed career progression toward leadership roles for women who attended training in comparison with those who did not attend the training. A statistically significant difference was found for the LEDA GB and LEDA SNS subscales.

The LEDA SNS subscale measured the extent that women agreed they were supported by those around them as they pursued their goals. The means of the comparison and SNS treatment groups both represented *weakly disagree* and meant that both groups were supported insufficiently by those around them to reach their leadership goals and aspirations.

The LEDA GB subscale measured the extent that women agreed they were resilient to implicit gender bias in the workplace, and the means for both groups represented weakly disagree and meant that women were more vulnerable than resilient to implicit gender bias in the workplace.

The effect size for the LEDA GB was  $-.66$ , and the effect size for the LEDA SNS was  $-.59$ , which were moderate effects (Cohen, 1992). Because the independent-samples *t* test demonstrated both statistical significance and a moderate effect size, a Type I error is unlikely. A graphical representation of the difference between treatment and



comparison groups scores on the LEDA GB and the LEDA SNS subscales are presented in Figures 9 and 10, respectively.

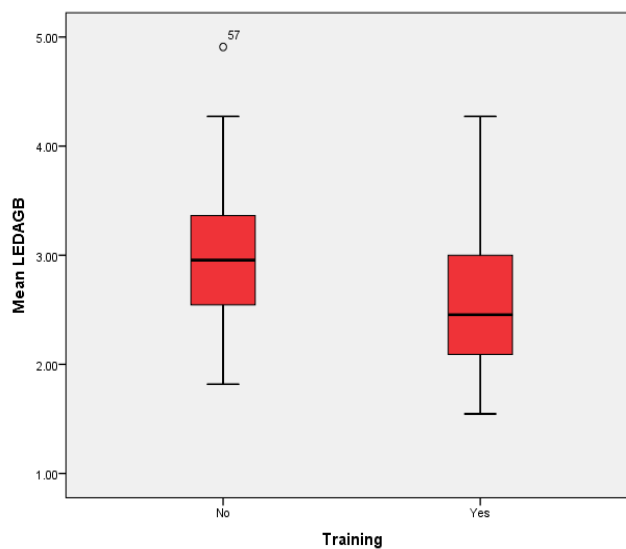


Figure 9. Effect of training on LEDA GB subscale scores.

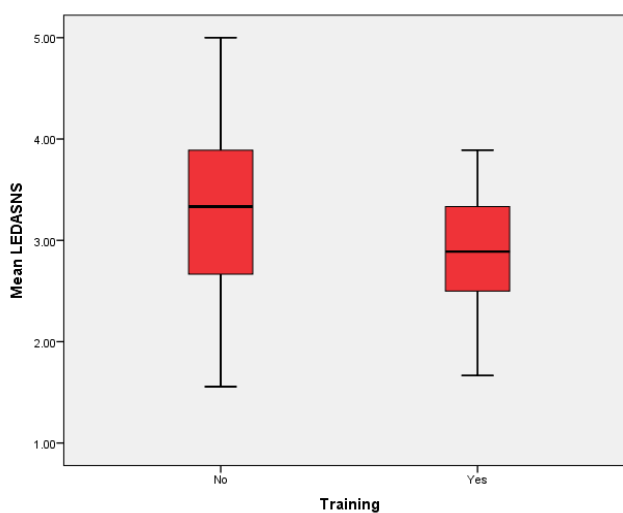
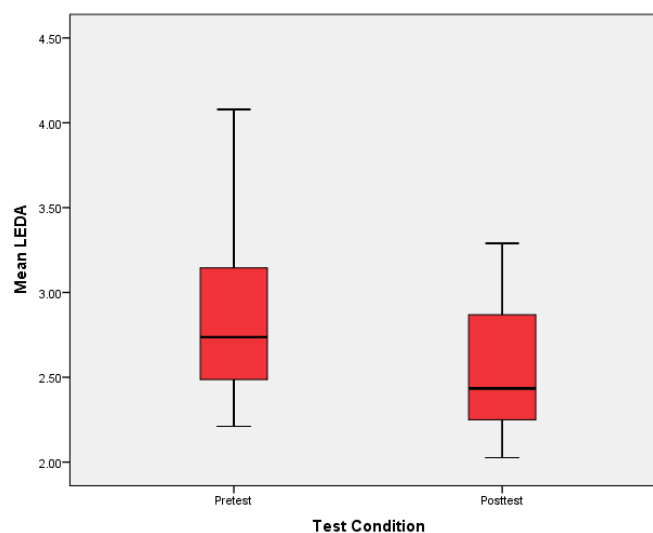


Figure 10. Effect of training on LEDA SNS subscale scores.

### **Research question 2**

*To what extent are there differences between pretest and posttest LBCW (LEDA, SHS, ALQ, and LEQ) scores within the treatment group?*

Dependent-sample  $t$  tests were performed to analyze differences for the LEDA, SHS, ALQ, and LEQ. The direction and magnitude of the differences in average scores at pretest and posttest for the treatment group were consistent for the SHS, ALQ, and LEQ, and generally demonstrated little meaningful change on each of these scales. Average scores for the LEDA pretest and posttest are presented in Figure 11 and the outcomes of the dependent-sample  $t$  tests are displayed in Table 11.



*Figure 11.* Effect of training on LEDA average scores from pretest to posttest.

SHS average scores increased by .17 only and can be interpreted the same way, that is, after the training, women responded the same as they did before the training: slightly positive or slightly hopeful about outcomes related to their work. ALQ average scores increased by .08 and represented that women felt psychologically comfortable and authentic fairly often at work when they performed leadership tasks. LEQ average scores increased by approximately 4% and represented a moderate level of self-confidence in their leadership capabilities. Statistically significant differences were found for the LEDA only (Table 11).

Table 11

Pre- and Posttest Means, Standard Deviations, Dependent -Sample *t* Test Results, and Effect Sizes for Measures of LBCW

Variable	Pretest ( <i>n</i> = 20)		Posttest ( <i>n</i> = 20)		<i>t</i> ( <i>df</i> = 19)	<i>ES</i>
	Mean	SD	Mean	SD		
SHS	5.22	1.35	5.39	1.15	1.23	
ALQ	3.78	0.56	3.87	0.59	1.47	
LEQ	61.69	20.05	65.63	13.58	1.46	
LEDA	2.86	0.50	2.55	0.40	-3.80*	-.87
Subscales						
LEDADF	2.64	0.77	2.50	0.77	-1.05	
LEDAGB	3.01	0.56	2.69	0.64	-2.19*	-.67
LEDASNS	3.16	0.90	2.81	0.50	-2.10	
LEDALP	2.59	0.58	2.24	0.62	-2.72*	-.63

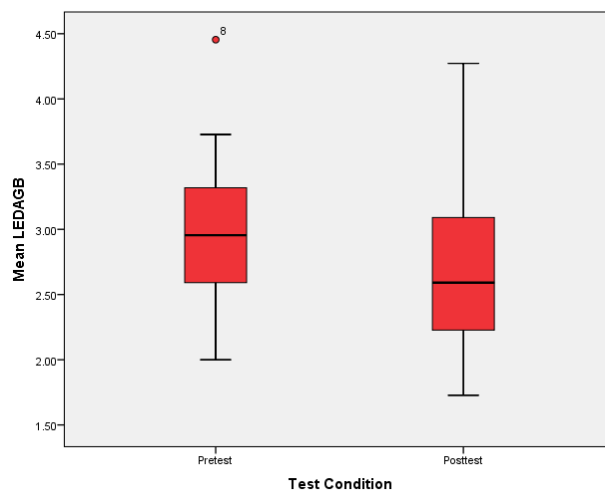
\*Statistically significant at the .05 level.

The effect size was for the full LEDA is  $-.87$ , which is a negative and large effect (Cohen, 1992) and consistent with the previous test. Similar to the treatment- and comparison-group test results, these results indicated that women left the training feeling less prepared to self-direct their careers toward leadership than they did when they entered the training.

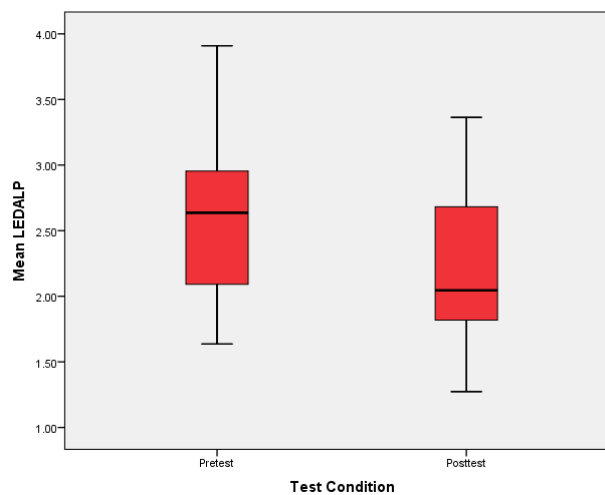
Although all subscale means decreased between pretest and posttest for the treatment group, the LEDA GB and LEDA LP subscales accounted for most of the change. Statistically significant differences between pretest and posttest scores were found for the GB and LP subscales; the effect size for LEDA GB was  $-.67$ , and the effect size for LEDA LP was  $-.63$ , which are moderate and negative effects. Women rated themselves less resilient to gender biases and less able to plan for their professional development than they did before they took the training.

Because the dependent-sample *t* test demonstrated both statistical significance and a moderate effect size, a Type I error is unlikely. Average scores for the GB subscale

pretest and posttest are presented in Figure 12, and average scores for the LP pretest and posttest are presented in Figure 13.



*Figure 12.* Effect of training on LEDA GB subscale average scores from pretest to posttest.



*Figure 13.* Effect of training on LEDA LP subscale average scores from pretest to posttest.

### ***Research question 3***

*What is the relationship between the LEDA and its subscales and the SHS, ALQ, and the LEQ?*

Several statistically significant relationships were found between the LEDA and its subscales, the SHS, and the LEQ, but not the ALQ, when the level of significance for

the test was adjusted so that  $\alpha = .05$  by using the Bonferroni correction. Correlation coefficients are found in Table 12. In sum, scales with factors related to proximal (SHS) and distal goal-orientation strategies (SHS and LEQ) correlated with the LEDA but not with those for emotional transparency (ALQ).

Table 12  
Pearson Product-Moment Correlations for LEDA, LEDA Subscales,  
and Other LBCW Measures at Pretest ( $N = 70$ )

Variable	LEDA	SHS	ALQ	LEQ
LEDA		-.70*	-.28	-.52*
LEDADF	.81*	-.62*	-.26	-.54*
LEDAGB	.64*	-.46*	-.22	-.29
LEDASNS	.76*	-.59*	-.10	-.28
LEDALP	.69*	-.36*	-.25	-.41*

\*Statistically significant when the overall error rate is controlled at the .05 level.

The LEDA was indirectly related to the LEQ and the SHS, but not to the ALQ, and the strength of the relationships ranged from weak to strong. The SHS was a measure of a person's self-reported ability to meet well-defined and immediate performance goals; the data indicated that there was an indirect and a strong relationship between the LEDA and the SHS. This relationship may have indicated that women in the study approached planning for future achievement much differently than they approached meeting current goals.

The data reflected an indirect and moderate relationship between the LEDA and the LEQ. This relationship is interpreted in a manner consistent with the previous interpretation and indicated that self-directed leadership development and leader effectiveness were related but temporally incongruent; leader effectiveness (as measured with the LEQ) may be a more immediate construct than leadership development (LEDA).

There was no statistically significant relationship found between the LEDA and its subscales and the ALQ, which was interpreted to mean that there was no relationship between self-directed leadership development activities and the ability to be emotionally or intellectually transparent with others for this population.

An analysis of the LEDA and LEDA subscale correlations reveal moderate-to-strong and direct relationships between the full LEDA and its subscales. The relationship between the DF subscale, which was a measure of a person's ability to construct forward-looking, long-range goals, correlated strongly and directly with the LEDA, as did the SNS subscale, which was a measure of the level of social support a person had. Taken together, these relationships indicated that the ability to construct a self-directed leadership plan was influenced heavily by the ability to create a desired vision of the future and by having the support of others.

Although the relationships are somewhat weaker, the LP subscale, which measured engagement with planning activities directed toward longer term goal attainment, and the GB subscale, which ascertained the degree of resilience women had toward gender-related career blockers, are moderate and indicated that both gender-bias resilience and learning-plan construction contributed to the concept of self-directed leadership development for the women in the study.

## **Phase II: Qualitative Analyses**

*To what extent did training contribute to the development of LBCW?*

Within approximately 2 weeks of the training, 14 interviews were conducted among participants who attended the training to understand how the training may have contributed to the development of LBCW for them. The qualitative analysis served as a

way to contextualize the quantitative findings in light of the women's experiences and daily lives. The interview questions also provided some insight into the delayed effects of the training because the quantitative posttest measures were administered immediately after the training.

The data in Table 13 show that as a result of the training, all but one respondent interviewed indicated social networking was most effected by the training. Least effected by the training was goal orientation. A little more than half increased psychological capital and self-advocacy.

Table 13

Table of Participant Response Themes and Corresponding Emotional Valence ( $n = 14$ )

Theoretical Construct and Subconstruct	Emotional Valence	Number of Comments	Number of Respondents Commenting on Topic	%
Psychological Capital	Positive	10	8	57
Emotional buoyancy	Positive	2		
Psychological safety	Positive	8		
Social Networking	Positive	25	13	93
Increased social networking	Positive	12		
Mentored at training	Positive	2		
Relationship building, acquired new skills	Positive	4		
Awareness of gender bias <sup>a</sup>	Negative	7		
Self-advocacy	Mixed	10	9	64
Personal vision	Positive	6		
Leadership identity	Positive	4		
Goal Orientation	Mixed	6	3	21
More planning	Positive	3		
Sustain current leadership	Mixed	3		

<sup>a</sup>Gender bias did not align with the proposed theoretical construct of self-advocacy but with social networking.

Coding of the qualitative data occurred in a two-stage process: the first stage involved coding for emerging narrative themes and the second stage involved coding according to the theoretical model of LBCW, which was presented in Chapter I. The

details of the qualitative coding process are available in Chapter III. The purpose and learning outcomes of the women's leadership-development training were linked directly to the LBCW model. To this end, narrative themes that emerged in the first stage of the coding process were coded in the second stage to reflect a construct and a subconstruct of the LBCW model. Each narrative theme was coded to one construct and one subconstruct only.

Of the 11 narrative themes generated by the interviews, three pertained to self-advocacy, two pertained to psychological capital, three pertained to goal orientation, and three pertained to social networking. A visual summary of narrative themes, theoretical constructs and subconstructs, corresponding emotional valence, and the number and percentage of respondents commenting on each construct are presented in Table 13.

### *Self-advocacy*

The ability to self-advocate for a desired future has been found to be a critical skill aspiring leaders use to enhance their leadership identities (Baron & Markman, 2003; Bowles, 2012; Tocher, Oswald, Shook, & Adams, 2012). When asked whether they noticed any changes in their work habits or their perceptions of their desired career path as a result of the training, some participants remarked that the training affected their ability to create a more personal vision of the future for themselves. Two participants, Verena and Holly, responded that they were more likely to create a personal vision of the future that was more open-ended, creative, and less rigid than their previous notions of the future.

*Verena:* Until the workshop, I thought the vision of the future would need to be work-oriented ... the workshop suggested that my vision could be broader.



*Holly:* I can't say there was a seismic shift ... but I feel like there was a little bit of a nudge. ... Did the training change or alter your perception of leadership or the possibility of being a leader? Maybe I'm seeing it like doesn't mean you have to be a leader all of the time ... you could be a leader in one thing.

Two other participants, Olivia and Li, found that they were able to envision leadership possibilities for themselves because they saw them demonstrated by other participants at the training.

*Olivia:* [The training] provides me with vision—in that training, I saw other women, like Anna, who is very active in the leadership role. I think that is very inspiring. See the idea ... you know that there are other possibilities.

*Li:* I got more clear, especially its not directly influenced by the material itself—but Donna who has been in the tech industry—helps me establish what could I look forward to—men have an advantage—they have a lot of examples, they just pick one and go with it.

Karthika affirmed that the act of visualizing a future was empowering.

*Kartika:* The ideas that were presented ... they reinforced a lot ... gave me a lot of courage. ... Like thinking about a future ... like starting dreaming ... when you said draw your future, I loved that ... visualize where you want to be ... I loved that.

Li acknowledged that the training prompted her to self-identify as a leader.

*Li:* [I'm] more likely [to see myself as a leader as a result of the training].

The training gave me more confidence, the material and those interests research base —discussions were helpful as well.

### ***Psychological capital***

Emotions such as hope, optimism, and psychological safety have been linked to constructive leadership behaviors (Avey, Avolio, & Luthans, 2011; Norman, Avolio, & Luthans, 2010; Walumbwa, Peterson, Avolio, & Hartnell, 2010), particularly among knowledge-based initiatives (Bear & Woolley, 2011; Edmondson, 1999; Nembhard &

Edmondson, 2006), such as engineering. When asked whether they noticed any changes in their work habits or whether they are practicing leadership behaviors as a result of the training, some respondents said that they were able to manage their social anxieties at the training and experienced benefits as a result. Li had an uplifting emotional experience at the training, even though she normally has social anxiety in groups. In her statement, Li said that because she was free to express herself at the training, she was able to rebuild a troubled relationship at work.

*Li:* It was a safe environment. I have somewhat of a phobia when a group of women gets together[;] they can be somewhat mean and untruthful. So I don't know if it's a small size or also your coaching style as well, but I feel I could speak my mind. I feel more hopeful that I could express myself more authentically ... expressing my feminine side—instead of trying to suit up for a job. ... In this past week, I feel like I am starting a new way to network with my coworkers, like developing partnerships—it's a long term in the making. There is a teammate that I'm not fond of, but this past week we're starting to be friends and working together. I'm a believer of what you're thinking internally reflects externally, so maybe something is changing.

Rose suggested that because she was safe at the training, she was safe meeting and was willing to meet with a woman she met at the training in the upcoming week.

*Rose:* I can't say that I am practicing leadership. I did come out of the meetup very enthusiastic. It moved me; it opened up new ideas. One woman reached out and contacted me, and we are going to meet this week. I felt comfortable at the meetup; I liked that it was small. It felt like a safe environment. I worried about being too dominant.

Li and Rose's statements suggest that because they had practice building relationships in a safe space during the training, they were able to replicate these skills in other environments.

Although women responded that the training did not inspire them to pursue entrepreneurial leadership anew, the training did instill a sense of confidence for women who already were considering entrepreneurial leadership paths.

*Megna:* I would want to take more of a leadership position because that is what my tendency is. I'm an entrepreneur, and the training reminded me that I should be seeking leadership opportunities.

*Kendra:* I had thought of entrepreneurship [in the past]. The training was reinforcing my ideas. I was hearing the same things from other people in the group ... it was nurturing the seed, everyone reassured me that it was really ok, that it was feasible.

These data suggest that it is possible to build purposefully psychological capital in a women-only classroom setting.

### *Social networking*

When asked whether there were any changes in their work habits or which leadership behaviors they are practicing as a result of the training, 93% of the participants interviewed said that they intended to or are practicing more social-networking behaviors.

*Lauren:* [As a result of the training] I am working less and trying to meet with my friends more, trying to network more. I've been reading books. I learned two things from the training: that mentors are not necessarily above you and that you need strong mentors outside of work.

*Karthika:* Networking and talking to people [and] joining the meetups.

Monica, who became a professional coach after working as a corporate vice president of human resources for many years, said that the exercises used in training allowed her to understand social-networking behaviors in new ways and to reevaluate the importance of social-networking activities for women.

*Monica:* I think it reinforced how important networking was, because you went through women's networks that they needed to be outside of the company that you're in and that's what helped you to be successful—and I can think of a whole lot of examples of that.

Others, like Verena and Holly, became aware that they had not made efforts to help others expand their social networks by making introductions for them. Both cited “fear of failing to make a good match” as the reason for not introducing people to each

other.

*Verena:* [The Network Assessment Exercise] was a really interesting exercise because it occurred to me that I had not introduced that many people in our network, and I came away wanting to change that. It's a cop out that I haven't had the opportunity. In general, I have trouble introducing people deliberately—I've done it a couple of times, but it's never worked out that well. Nobody says that they want to be introduced ... I really enjoyed working with them, and I think they are really cool—building a relationship with them seems difficult.

Holly reported that that the training made her more intentional about introducing others and that she has made progress toward building her leadership skills.

*Holly:* The big realization is that there are so many different and diverse groups and I've been afraid to try and introduce people; like what if I try and make a bad match, and something like that. I started thinking about being more intentional about introducing people ... when I have not really introduced people, and I've taken the lead a little more on a couple of groups I'm in. I spoke and said let's schedule a meeting. We finally picked a day in another group for January so this is a win.

Another type of social-networking fear was the fear of asking for help finding a job. Here, Jane commented about a discussion in one session about how to ask for help finding a job.

*Jane:* What I got was that it's permissible to network with women. I go to all kinds of women's events—the conversation about how soon is too soon to send a resume—that spoke to me. I was skeptical about asking for things, like referrals, but the training helped me with that. And men are doing that all the time, so they assume that this is ok.

Jane's comment revealed that she experiences awkwardness while social networking for a job. She also believes that women are more constrained in their social-networking behaviors than men are. As a result of the conversation with Jane and others at the training, Megna sent her résumé to a few women who encouraged her to send her résumé to them.

*Megna:* Yes, I emailed with Olivia and another ... lady who was sitting next to me. I sent her my resume and she emailed me back.

During some sessions, the researcher noticed that participants circulated a sign-up sheet to stay in contact with each other. When asked whether they developed any social contacts as a result of the training, interviewees commented that they met with other participants after the workshop for dinner. Many participants expressed a desire for more woman-only workshops on topics such as conflict resolution and goal setting. Others have contacted the researchers directly for one-on-one meetings.

*Lauren:* I think people are interested because women need a stronger network outside of work. [Meeting with women from the workshop] is a good place to start. I haven't talked to them much. We met for dinner once in Palo Alto. They were from SF. That was a problem. So far, I've met with two women from the seminar. Gail messaged me, but she can only meet for lunch. She works in SF, and she has kids, maybe she lives close to the city. I'd like to do a monthly thing; more than a month seems too long. We talked about work issues, career aspirations, if they had issues if they had suggestions or perspectives.

*Jordyn:* Yes, I created an email list of attendees, and I plan to reach out to one of the women on the list soon.

*Olivia:* Yes, Susan. I added several LinkedIn connections. I tried to forward [a person's] resume to the managers.

*Francine:* Yes, once. I met up with two ladies for dinner, initiated by one of them. We talked about work and conflict resolution for one girl's situation. It was nice to be exposed to people in different fields from me. We [planned to meet again] but we haven't yet.

These comments show that participants self-organized meetings without direct instruction to do so, and they demonstrate that women engineers might find social networking an easy and accessible leadership-development activity when seeded in a safe women-only environment.

### ***Social networks and gender bias***

Not all findings converged with the LBCW model presented in Chapter I. Awareness of gender bias was modeled initially as a subconstruct of self-advocacy;

nevertheless participants' responses linked awareness of gender bias to social networking, not to self-advocacy.

*Olivia:* Before this training, I was trying to network. ... I was recently at the Grace Hopper Conference, and it was a great inspiration for me. I got inspired a lot, and it really raises my awareness of gender biases. It started with GHC. It's sometimes shocking that I realize that I myself have a bit of a bias. When someone mentions a machine-learning engineer, I unconsciously think [those positions are] taken by male engineers. The training planted seeds.

Monica's comment suggested that gender bias prohibits women from networking with men.

*Monica:* The one thing so far I am noticing in gender bias—its not the same with guys—not the same networking vibe. They are not as supportive. Some yes, but some not at all. Its about business ... like what do you do and let me judge whether or not you are worthy of me talking to you. The guys are like—what do you do—is it useful to me? ... unapologetically, which is why they are where they are. The women float more.

Li said that her boss, or her operational network, actively reinforced gender discrimination at work. She told a story about how her boss' gender-stereotyped expectations of women affected her career development negatively.

*Li:* I do not feel that way although early on in my career there was something that shook my confidence. It was my 3rd or 4th year and there was a co-worker who is equally qualified. Because of that, the world is small. One year in the merit increase—I don't feel like an underperformer—I was only getting a 2% raise. I went to my manager for the first time to negotiate salary [and]asked ... in the next year ... expressed that 2% was low, and he almost didn't know what to say, he was Asian ... the way he manages is hierarchical. I don't think he had a bad intention. He said, "You're kind of pretty. Maybe one day you can find a rich husband that you can get married to." I came out of the meeting on the verge of tears.

Li pointed out that the gender discrimination she experienced at work was a chronic experience.

*Li:* When people are getting married, [the boss] would say, “for this round so and so will have to get more because he has a family now.” He feels women need to be helped. He gives women domestic gifts. Instead of a local souvenir.

Similar to Li, Amina and Karthika related their experience of how their personal networks placed gendered expectations on them and limited their professional aspirations. In Amina and Karthika’s cases, the gendered expectations and constraints to their professional advancement came from family members of the same culture, not from their bosses or outsiders.

*Amina:* I’m Punjabi, and I come from Northern India, first generation, and I have one female cousin, and she lives in San Francisco, and so while I was doing [coding] boot camp I lived with her ... and she got an arranged marriage ... her confidence is at an all-time low ... she told me that women who work think that they are so much better than stay at home moms ... the family she got married into just didn’t encourage her ... she let her emotions get the best of her, and she didn’t ... she went to medical school ... she got accepted to schools in Los Angeles ... she told me so many times that I am overconfident.

*Kendra:* A cousin of mine is a manager, and another is a program manager. I have seen women in managerial roles. I don’t think gender is a blocker. Your ability to do a managerial role depends on your support system at home. My sister was doing really great. She had to leave at home 7 a.m. and leave work at 5 p.m. Then after all of these things she felt that she could not spend any time with her child. She quit to just stay at home.

*Kendra:* For a girl, family is supposed to be her purpose or focus. I wanted to be a mechanical engineer [ME], then I switched to software engineering. A girl in mechanical engineering is very rare. A lot of girls in Indian families are ok with them doing an office job. It is considered very safe. I was in ME, in a shop floor in a factory. I would be dealing with workers & 100% of workers are men. If you go into IT classrooms in India, you find lots of girls who are taking up computers. The misconception is that you would also be able to have a family.

*Kendra:* In India, marriage is the ultimate thing, and your family goes around it. Forget my parents; random people would be telling me, “focus on your marriage, why do you want to go to school?” Then [the random woman] gave me the example of her three daughters. You should be ready

to quit your job after marriage if your family demands it. It is a better thing for women.

These findings suggest that for some women their professional advancement is governed by gender stereotyped social and cultural expectations and that self-advocacy alone is a small factor in light of these other forces.

***Social networks, culture, family, and entrepreneurial identity***

Kendra commented that family-based social networks also strongly influence entrepreneurial leadership initiative. Kendra intimated that lack of family-based social networks was a more influential factor than training or education, even for men.

*Kendra:* [If] you have no brother in the market, establishing yourself is very difficult, I think. You put your head down and work until you make contacts. I have seen people who are surrounded by business owners; they are surrounded. Everyone around me has been doing a job a lot of the time. My dad had a job, so I'm not an entrepreneurial person. The impressions are made by people around us. They were all doing MSs and PhDs. My colleague [from school] had a family business, so everyone [in his family had] some sort of business. He was getting a job, but eventually, he would leave to do his own business ... your environment influences you a lot.

The training design in this study did not address the role of culture and family-based social networks on women engineers' entrepreneurial leadership development in the Silicon Valley, which may explain why no one responded that she realized she wanted to be an entrepreneur or that she identified as an entrepreneur as a result of the training.

*Olivia:* Neutral [on entrepreneurial leadership]. I didn't see much influence there ... I didn't see much impact.

*Francine:* For me, the training didn't lead me to think about leadership or entrepreneurship, but how it's important to have a connected network for job growth and opportunities.



Lauren offered the suggestion that the training would have little bearing on immigrants' interest in entrepreneurial leadership as a result of the insecurity associated with entrepreneurship.

*Lauren:* Women are less likely to take entrepreneurial risks. I'm still not in a secure place. I think that the "immigrant" and "nonimmigrant" category is more relevant than gender. The basic immigrant mindset is "bear it until you get your greencard." I have a visa ... I need to feel secure.

During the interview, Lauren also revealed that her father is an engineer and her mother holds a Ph.D., lending support to the notion that both culture and family-based social-network support might play a role in the development of an entrepreneurial identity among women.

Participant's responses to question three support the contention that the training did not change women's entrepreneurial leadership identities or dispose them toward an entrepreneurial career path when they had not considered one already. Question three was asked to investigate the extent that women have experience performing incipient entrepreneurial tasks in their careers (Costin, 2012; Delmar & Davidsson, 2000; Gundry & Welsch, 2001; Reynolds, 1997) and to learn whether the training had an effect on their willingness to self-identify as an entrepreneurial leader. The responses to question three were tallied and are presented in Table 14.

Three interviewees identified as entrepreneurs during the pretest (see Chapter III, the demographic composition of the participants). According to researchers, those who identified as entrepreneurs performed an average of seven incipient entrepreneurial tasks (Reynolds, 1997), with a minimum of two. Among the women who were interviewed, 24% reported performing at least seven incipient entrepreneurial tasks, 50% reported performing at least four, and 87% report performing at least two. Unlike outcomes for a

corporate leadership identity, the training had no effect on women's desire to self-identify as an entrepreneurial leader even though they have the abilities to do so.

Table 14

Frequencies and Percentages of Respondents Who Reported Having Prior Experience in Performing 17 Tasks Associated With Firm Gestation from Interview Question Number 3 ( $n = 14$ )

Respondent	<i>f</i>	%
1	16	94
3	15	88
8	14	82
9	14	82
4	4	24
5	4	24
14	4	24
2	3	18
6	3	18
7	3	18
10	3	18
11	3	18
15	2	12
12	1	6
13	1	6

### *Goal orientation*

Goal orientation and planning were least cited in the interviews as outcomes from the training. Olivia said the content of the questionnaires indicated to her that planning was a factor in women's professional development, but she did not cite a specific goal that she was planning to attain. Olivia's comments reveal that she used planning strategies mostly as task management and visioning tools at this point.

*Olivia:* There are many actually. I took the survey before the training. It made me think. I thought about things like executable plans. I realized that I wasn't doing any planning. I am thinking long term. This morning I started to make a weekly plan. I used to do a daily plan, but now I decided to do a weekly plan to see how much I can achieve at the end of this week. Now I have some long-term plans. [I'm thinking of] what I want to do in 4 to 5 years, what kind of path. That survey became an inspiration.

Jordyn said she realized that planning might be linked to her ability to sustain her entrepreneurial leadership capacity but also stated that she was not able to complete a plan.

*Jordyn:* I was already initiating a new venture, so I was doing that ahead of the training. What I did learn was that I had to figure out how to get rewarded while doing the new venture because it becomes too overwhelming. [The training] gave me thoughts about how to sustain [my initiative as a leader]. I began writing out a plan and an inquiry, but life intervened.

Karthika's comments were specific and goal directed. She said that the training had inspired her to attain a corporate executive position at the vice president level, which is a goal she was not able to articulate before.

*Kartika:* Yes, you told me to visualize, so I want to keep visualizing until I get my goal. [There is a]change in [my] desired career path ... yes, I do want to be a VP ... I wasn't able to say that before the training.

The women's statements suggest that the training exercises may not have taught planning and goal orientation sufficiently to the same degree that social networking was taught or that more instruction is needed to enhance the women's planning and goal-orientation capacities than is need to improve their social-networking capabilities. These data also indicate that training does have a positive effect on a woman's ability to plan and set goals and that instruction should help women to distinguish among visioning, planning, and goal setting.

### **Additional Analyses**

As secondary analyses, a correlational analysis using Pearson's product moment correlation of the LEDA subscales was conducted to explore the interrelationships between the DF, GB, SNS and LP subscales. An interitem analysis of the LEDA GB

subscale using Kendall's Tau-b was conducted also to understand the relationships between the qualitative items of the LEDA GB subscale.

### *LEDA subscale correlations*

A correlational analysis comprising Pearson's product-moment correlation was performed to explore the relationships between the LEDA subscales: DF, GB, SNS, and LP. The level of significance for the test was adjusted to  $\alpha = .05$  by using the Bonferroni correction, and several statistically significant relationships were found between the subscales.

The GB subscale measured resilience to gender bias and was weakly and directly related to the SNS subscale that measured social-network support; this relationship suggested that the people a woman interacted with affected her ability to be resilient to gender bias. The DF subscale was moderately related to the LP subscale, which suggested that imagining a desired vision of the future for oneself and constructing a learning plan for oneself were related activities. The SNS subscale also was related moderately to the DF subscale and indicated a statistically significant relationship between the people a woman interacted with and her ability or willingness to construct a desired future vision for herself (Table 15).

Table 15  
Pearson Product-Moment Correlations and LEDA  
Subscales at Pretest ( $N = 70$ )

LEDA	DF	GB	SNS	LP
DF		.34	.47*	.61*
GB			.36*	.15
SNS				.28
LP				

\*Statistically significant when the overall error rate is controlled at the .05 level.

***Interitem correlational analysis of the LEDA***

The final analysis presented in this section is an interitem correlational analysis of the LEDAGB subscale using Kendall's Tau-b. The level of significance was adjusted with the Bonferroni correction, and several statistically significant relationships were found. The results in Table 16 show that all coefficients are positive; all those below .50 were weak relationships, and the remaining were moderate.

Table 16

Kendall's Tau-b Interitem Correlations for LEDA Gender Bias (GB) Subscale ( $N = 70$ )

GB	1	2	3	4	5	6	7	8	9	10	11
1		.37									
2	.37					.37					
3				.50							
4			.50								
5						.63				.38	
6		.37			.63					.44	
7											
8									.46		.36
9								.46			
10					.38	.44					
11								.36			

*Note.* The GB numbers are defined as follows: 1 = women mentors in the workplace, 2 = influential women at work, 3 = willing to ask for challenging assignments, 4 = willing to ask for pay increase or promotion, 5 = women speak at meetings, 6 = women listened to at meetings, 7 = masculine pronouns used, 8 = underrate abilities relative to men, 9 = work extra to gain confidence, 10 = ideas respected at work, and 11 = men are more competent than women in unstable circumstances.

\*Statistically significant when the overall error rate is controlled at the .05 level.

Social composition and dynamics of the workplace explain some but not all of the statistically significant relationships found related to gender-bias resilience for study participants. For example, having women available as mentors in the workplace was related weakly to the perception that women were influential; the perception of influence also was linked weakly to the behavior of being listened to. These items reflected the

social composition of the workplace and relationships between items were constructed and interpreted using gender-identity theories.

Surprisingly, however, items such as “women mentors in the workplace” was not related to “women’s willingness to ask for pay increases or promotions” or “women’s willingness to ask for challenging assignments.” The lack of statistically significant relationship between these items suggested that a different framework, such as a self-regulatory framework, might be a better explanation than social composition and dynamics for some of the other statistically significant relationships found in the data. For example, relationships between the items “women underrating their skills and abilities compared with male co-workers” and “willingness to ask for challenging assignments” may be better explained with self-regulated learning theory, and not with theories related to gender identity and social composition of the workplace.

### **Summary**

Several findings emerged from the data analyses. The first finding was that women who attended 4 hours of leadership training had statistically different scores on all quantitative measures of LBCW used in this study than those who did not; scores were higher, on average, for treatment-group participants on the SHS, the ALQ, the LEQ and lower for the LEDA. Second, statistically significant and, on average, lower scores were found for the LEDA only and were attributed to the GB and LP subscales only, for participants who attended the training and took both the pretest and the posttest. Third, statistically significant and indirect relationships were found between the LEDA and its subscales (DF, GB, SNS, and LP) and the SHS and the LEQ, but not the ALQ; the strength of the relationships ranged from weak to strong. Fourth, a correlational analysis

between the LEDA and its subscales indicated direct and significant relationships between the full scale LEDA and the subscales DF, GB, and LP, but not SNS; the strength of the relationships ranged from moderate to strong. Fifth, when interviewed approximately 2 weeks after the training, most participants expressed increased levels of hope and confidence, increased social-networking behaviors, and some reported a greater sense of clarity around their professional-development planning activities a result of the training, but no women reported any differences in an entrepreneurial leadership intent. Finally, demographic items such as education, years of work experience, or age were neither directly nor indirectly related to any of the four measures of LBCW.

## **CHAPTER V**

### **DISCUSSION, LIMITATIONS, IMPLICATIONS, AND RECOMMENDATIONS**

The purpose of the study was to investigate the effects of a leadership-development training workshop on leadership behaviors for participants of a California Silicon Valley women's software engineering community using a mixed-methods research design. The new research design was modified from the original design and presented in Chapter III.

The training workshop used as the intervention in this study was created to test a framework for developing leadership- behavioral competency among women (LBCW). It was constructed with research-based theoretical gender-aware principles for women's leadership development (Bullough, de Luque, Abdelzaher, & Heim, 2015; Cullen-Lester, Woehler, & Willburn, 2016; Debebe, Bilimoria, & Anderson, 2016; Ely, Ibarra, & Kolb, 2011; Sugiyama, Cavanagh, van Esch, Bilimoria, & Brown, 2016) and sustainable leadership-development principles, such as intentional change theory (ICT; Boyatzis, 2008; Boyatzis, Smith, & Blaize, 2006). This chapter provides a discussion of how the findings of this study relate to the current literature on women's leadership-development programs in corporate and entrepreneurial settings. The chapter includes a summary of the study, a review of the methods used and major findings, a discussion of the findings in light of recent research in the field, and an overview of the limitations of the study and the study's implications for theory and practice.

#### **Summary of the Study**

Education universally is regarded as one of the most effective interventions in creating desired change, but general business and entrepreneurial training programs



consistently have failed to deliver strong outcomes for women business leaders (BarNir, Watson, & Hutchins, 2011; Tillmar, 2007; Vinnicombe & Singh, 2003; Wilson, Kickul, & Marino, 2007). Researchers of women's leadership development have indicated that a leadership identity, not competence, is the main barrier to women's leadership in corporate and entrepreneurial business domains. Study findings have shown that, although women leaders demonstrate similar leadership competencies as men (Norman, Avolio, & Luthans, 2010; Rego, Sousa, Marques, & Pina e Cunha, 2014), they do not self-identify as leaders (Bullough et al., 2015; Ely et al., 2011), underrate their performance in job settings (Sturm, Taylor, Atwater, & Braddy, 2014), and are likely to exclude themselves from future professional development and growth opportunities in leadership and entrepreneurship (BarNir et al., 2011; Breen & Karanasios, 2010; Fleck, Hegarty, & Neergaard, 2011; Manolova, Brush, Edelman, & Shaver, 2012; Reichborn-Kjennerud & Svare, 2014; Sturm et al., 2014).

The findings from several studies indicate that although education and training interventions seek to increase women's leadership self-efficacy, many programs fail because of a lack of awareness and understanding of second-generation gender biases and gendered social norms that undermine educational objectives (Bullough et al., 2015; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark, Preser, & Zion-Waldoks, 2016; Vinnicombe & Singh, 2003). In light of the need to create gender equity in leadership roles, a model of leadership behavioral competencies for women (LBCW) was developed to define the behaviors that produce outcomes associated with a leadership identity and practice. LBCW identifies four main competencies that effective women leaders practice: self-advocacy, social networking, psychological capital, and goal

orientation. LBCW was assessed quantitatively with four instruments, the Leadership Education and Development Activities Instrument (LEDA), the State Hope Scale (SHS), the Authentic Leadership Questionnaire (ALQ), and the Leader Efficacy Questionnaire (LEQ).

A two-phase mixed-methods design was used in this study in accordance with Creswell (2014). Quantitative data were collected and analyzed in the first phase, and in the second phase, qualitative data were collected to improve understanding of the quantitative results (Creswell, 2014).

In Phase I, a pretest–posttest comparison-group design was used to collect quantitative data for the four measures of LBCW included in this study: the LEDA, the SHS, the ALQ, and the LEQ. Participants were asked to complete the pretest the time of enrollment, but not all did, and many who completed the pretest did not attend the training. In light of these unforeseen complications, the initial plan to assign randomly participants to a treatment and control group was discarded. The training treatment consisted of a total of five 4-hour training sessions that were held on weekend afternoons over a period of 2.5 months. The content of the training was developed in accordance with design principles for women’s leadership development (Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Kark et al., 2016; Vinnicombe & Singh, 2003) and ICT (Boyatzis, 2008). Training was the independent variable, and the four measures of LBCW were the dependent variables. Demographic information also was collected during the pretest phase.

A posttest was administered to participants immediately after the training. The posttest consisted of the same instruments that were administered at the pretest, except

the demographic survey. An independent-samples *t* test was used to compare average scores on each instrument between a group that received training and a group that did not. A dependent-sample *t* test was used to compare pretest and posttest scores for the group who received training.

After a preliminary analysis of the data, qualitative data-collection procedures for Phase II of the study were initiated. Based on the participants' scores on the four measures of LBCW, I developed a set of interview questions to gain additional insight into the meaning of the data and to investigate possible alternative interpretations of it (Creswell, 2014). Within 2 weeks of the end of Phase 1, I conducted one-hour-long interviews with the 14 participants who volunteered to be interviewed. I used a semistructured interview technique, and I asked each participant the same set of questions. Participants were encouraged to respond as freely or as parsimoniously as they wished, and I asked follow-up questions to elicit a more comprehensive response from each participant. Later, I transcribed the interviews.

I sent each interviewee an electronic copy of her interview transcription. To ensure the validity of the data, I invited interviewees to make additions or omissions if they thought them to be appropriate. Once transcripts were verified, the process of coding the data began. I read each transcript for themes and coded them using the theoretical model of LBCW for women presented in the Theoretical Framework section of Chapter I.

### **Summary of Major Findings**

The effects of the training, as they were assessed using four instruments, the LEDA, SHS, ALQ, and the LEQ, were statistically significant for all four measures when comparing women who received training with women who did not. Unexpectedly,

lowered gender bias resilience and a lowered ability to plan were found among women in the pretest and the posttest condition. During the interviews, the participants reported that the social-networking instructional materials were most easily understood and assimilated into their daily work practices compared with the other topics and that the experience of a women-only training session evoked positivity and optimism for them. Interview respondents also reported that they were not more likely to consider entrepreneurship as a career path as a result of the training, despite having the qualifications to do so. Finally, demographic items such as education, years of work experience, or age were neither directly nor indirectly related to any of the four measures of LBCW, which suggested that women software engineers may not be learning leadership competencies at work or as students at higher educational institutions.

### **Limitations of the Study**

The aim of this research was to extend domain-specific research on the effects of entrepreneurial education and training (EET) among women engineers in California's Silicon Valley in the United States. Robust training interventions that have sought to enhance leadership behaviors have been known to run from several months in field-based settings (Ballou, Bowers, Boyatzis, & Kolb, 1999; Ely et al., 2011) to years when participants are enrolled in graduate management programs (Boyatzis & Saatcioglu, 2008; Boyatzis, Stubbs, & Taylor, 2002). The training intervention used in this study provided only 4 hours of instructional time.

The training was limited in scope. Although questions were posed about a leadership and entrepreneurial identity, no explicit instruction on entrepreneurial-identity or entrepreneurial competency development was given.

The training modules in this study were not accompanied by online resources and tools that would enhance learner's ability to engage in SRL strategies for learning such as planning, tracking, and reflecting; such tools would provide the basis of a developmental portfolio for the learning process (Nguyen, 2013).

Finally, participant attrition during the course compromised my ability to generate large sample sizes. The research design of the current study was modified from the original plan. Initially, it was proposed that participants would be assigned randomly to the training treatment group or to the comparison group as they enrolled in the study. The initial plan was to administer the training to the treatment group during the study but to the comparison group only after the study had been completed. Several participants enrolled in the study and completed the pretest but failed to attend the training. The lack of consistency in enrollment and attendance made it impossible to assign participants to either group evenly or to predict the number of participants who would attend each training session. By the end of the study, a treatment group of 36 participants and a comparison group of 50 participants were established by default simply because the comparison group completed the pretests and demographic questions but did not attend the training and had no opportunity to complete the posttest. Additionally, a third group of 16 participants was formed and consisted of those who had not taken the pretest but had enrolled in the study and participated in the training and completed the posttest. The inability to generate sufficiently large sample sizes limits the generalizability of the study findings and effects statistical conclusion validity.

## Discussion of Results

The findings from this study contribute meaningfully to the research and practice of women's leadership development. Three focal areas of management research that are addressed in this study are leadership competencies for women, leadership-development education and training, and entrepreneurship. A central argument in this study was that leadership-development training must promote behaviors that constitute a leadership identity among women in order to be effective in advancing and sustaining women in leadership roles and entrepreneurship. Effective training for women highlight gendered differences in leadership attributions and include the introduction of entrepreneurial leadership as a form of professional development. Therefore, leadership identity in California's Silicon Valley included the competencies identified in the LBCW model, such as the ability to construct a leadership vision, awareness of gender bias, the ability to psychologically self-regulate, social-networking skills, and the ability to lead in an entrepreneurial setting. The findings of the study revealed that after 4 hours of training, women engineers experienced greater levels of hope, were more knowledgeable about how to engage in social-networking activities, and perceived themselves to be more effective leaders as a result of the training, but were less resilient to gender bias than they were before the training, and, in some cases, perceived their social network to be less supportive than they were before the training, and were less able to develop their own learning plans than they were before the training.

A discussion of how the findings of this study relate to current research and practice in the domain of leadership development for women is provided in this section.

### *Gender bias: Detection and resilience*

The results of previous studies found that women's self-ratings for leadership efficacy were lower than men's in work (Sturm et al., 2014) and educational settings (Shinnar, Hsu, & Powell, 2014; Vainapel, Shamir, Tenenbaum, & Gilam, 2015; Wilson et al., 2007), but until now, there were no studies that resulted in linking the empirical data of gender-bias perception by women to lowered self-efficacy self-ratings by women. The LEDA Gender Bias (GB) subscale was developed specifically to detect implicit gender bias and to measure resilience to it. Based upon their group and condition, participants demonstrated differential responses to the LEDA GB. It is, therefore, reasonable to conclude that perceptions of gender-bias resilience among women engineers can be detected empirically through the use of the LEDA instrument.

Correlational analysis of pretest scores demonstrated an indirect relationship between gender-bias resilience and measures of leadership self-efficacy and indicated the need for interventions that address issues related to gender bias against women software engineers at work. Surprisingly, when the training treatment was administered to raise awareness and knowledge of gender bias, outcomes demonstrated a vulnerability response among women; resilience to gender bias decreased after the training. According to a study conducted by Hoyt and Blascovich (2010), lowered levels of LSE after experiencing a gender-stereotype stimulus indicated that women internalized negative gender attributions. Findings from the current study imply that raising awareness of gender-bias among those with low levels of LSE may do more harm than good when such stimulus is not followed up with an intervention.

Alternatively, such an instant and negative response may be interpreted as a variation of the “inoculation effect” (Compton & Ivanov, 2012) as has been found in patients who became weaker for a short duration immediately after having received an inoculation against a virus but later develop a stronger resistance to it. In other words, after learning about gender biases during the training, participants may have reevaluated their resilience to gender biases and decided that they were less resilient to its effects than they thought they were; given time, they may be better equipped to deal with gender bias as a result of the exposure to training material.

### ***Gender bias enacted within social networks***

Theorists of women’s leadership development have suggested that leadership identity among women is mediated by gender bias (Shinnar et al., 2014; Sturm et al., 2014; Vainapel et al., 2015; Wilson et al., 2007), and the results of this research supported these findings empirically. The findings from this study linked gender bias with social-network interactions in both data-collection phases. In Phase I of the study, the correlational analysis of the LEDA subscales demonstrated a direct relationship between the gender-bias resilience and social-network support. In Phase II of the study, interview data showed that gender bias occurred mainly in social networks: in personal contexts such as in the family as family members advise women to leave their jobs to care for children and in operational contexts such as at work when bosses choose to offer promotions and raises to male engineers over their female colleagues. West and Zimmerman (1987) asserted that gender is an achievement and that achieving a gendered identity, similar to the achievement of any form of identity, requires an investment of



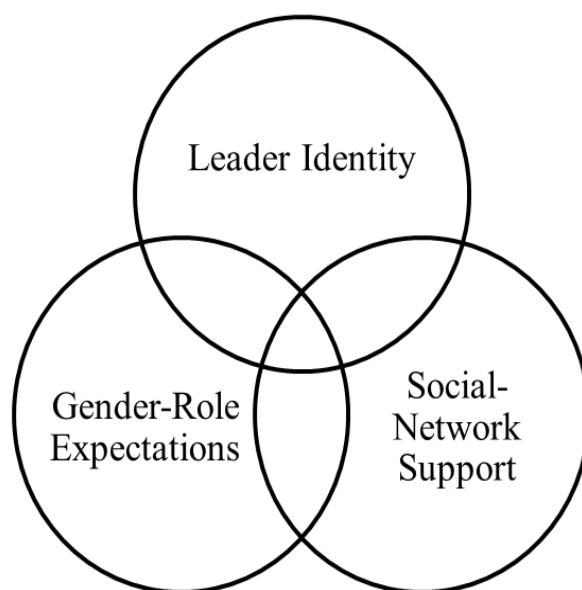
time, energy, and intentionality on the part of the individual and his or her social networks.

When we view gender as an accomplishment, an achieved property of situated conduct, our attention shifts from matters internal to the individual and focuses on interactional and, ultimately, institutional arenas. In one sense, of course, it is individuals who “do” gender. But it is a situated doing, carried out in the virtual or real presence of others who are presumed to be oriented to its production. Rather than as a property of individuals, we conceive of gender as an emergent feature of social situations: both as an outcome of and a rationale for various social arrangements as a means of legitimating one of the most fundamental divisions of society. (p. 126)

According to West and Zimmerman (1987),

“doing” gender involves a complex of socially guided perceptual, interactional, and micropolitical activities that cast particular pursuits [such as caring for children at home or earning raises and promotions at work] as expressions of masculine or feminine “natures.” (p. 126)

The symbiotic relationship of gender-role expectations, social-network support, and a leader identity among women that emerged from the interview data are modeled in Figure 14.



*Figure 14.* Relationship between gender bias, social-network support, and leader identity.

The findings of this study supported West and Zimmerman's (1987) contention that a gendered identity is a socially constructed one; many of the women interviewed reported stories of how the gendered social-role expectations they experienced in their social networks inhibited professional development expectations and opportunities for them, and, therefore, inhibited the development of a leader identity.

### *Learning to construct social networks*

Data from Phase I of the study showed a difference between group scores for women who received training on social-network support compared with women who did not; those who received training reported that they received less support from their social networks than women who did not receive training. These results suggested that women who were not aware of how to evaluate critically their social networks tended to rate the amount of support they received from their social networks higher than women who received the training. Therefore, women who received training became more aware of their social needs and were prepared to develop higher-performing social networks.

Interviews that were conducted during Phase II of the study revealed that all but one of the women purposefully increased their professional social-networking activities within 2-weeks of the training. Women's immediate actions indicated that social networking was something that they were willing and able to do and perhaps that they were more clear on what to expect from social-network development.

Women reported that social rejection was a primary barrier to social networking and that they avoided situations that may have resulted in social rejection. Women experienced social rejection during job searches when women they were not offered opportunities or indirectly from attempting to introduce people who are incompatible.

The training assuaged the anxieties women had about social networking by teaching them to encourage and support one other as a means of mitigating the stresses associated with social rejection. Some women said that they formed support groups and met with each other after the training.

These findings are consistent with previous research on leadership and learning that suggested that social networking is a leadership competency that can be taught and learned (Ibarra, 2015). The effectiveness of the training for increasing women's social-networking behaviors also support previous findings favoring women-only training as a means of protecting women from gender-role stereotyped expectations (Brush, Balachandra, & Greene, 2014; Brush, de Bruin, & Welter, 2009; Cullen-Lester et al., 2016; Davis, 2012; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011; Tillmar, 2007; Valerio, Parton, & Robb, 2014; Vinnicombe & Singh, 2003), which may have diminished the training's effects on their social-networking behaviors; as a result of the training, women purposefully created social networks.

### *Psychological capital*

In this study, training generally increased the psychological and emotional resources of women. Data from Phase I of the study indicated women in the training condition had higher levels confidence in their leadership skills than women who did not attend training. Data from Phase II of the study show that women experienced emotional bonding and social cohesion while at the training. These findings are congruent with previous research that found that leadership-development education is an effective means of building the psychological resources that contribute to leadership sustainability (Ballou et al., 1999), even in as little as 2 hours (Luthans, Avey, Avolio, & Peterson, 2010), and

that women-only environments are effective for building emotional well-being among participants (Cullen-Lester et al., 2016; Davis, 2012; Debebe, 2011; Debebe et al., 2016; Ely et al., 2011).

***Goal orientation: Proximal and distal***

In this study, the SHS, LEQ, and LEDA Desired Future (DF) and LEDA Learning Plans (LP) subscales were used as measures of goal orientation. The SHS measured the ability to meet defined and immediate or proximal goals, and the LEDA DF subscale measured the ability to formulate distal and nebulous goals.

Intentional change theory (ICT) was used to conceptualize the LEDA DF subscale (Chapter III). ICT posited that the ability to create a desired change for oneself and to lead others toward change began with the construction of a desired future vision (Boyatzis & Akrivou, 2006). Items for the DF subscale were constructed to reflect a person's ability to create a desired future for him- or herself. Scores for the LEDA DF remained unchanged in the two treatment conditions, pre and post, and in treatment and comparison, which suggested that the treatment was inadequate in helping participants to construct a desired vision of the future.

The LEDA LP subscale measured the ability to construct self-directed learning plans for distal, self-defined, goals. Self-regulated learning (SRL) theory was used to conceptualize the LEDA LP subscale (Chapter I). SRL suggests that purposeful learning occurs in a three-step cycle that includes a planning phase, a practice phase, and an evaluation phase (Zimmerman, 2002, 2008). The findings from Phase I of the study indicated that scores for self-regulated learning ability decreased after training was administered in both treatment conditions. A reasonable interpretation of these outcomes

is that the training created a critical awareness of the components of SRL strategies for purposeful learning for leadership-skills development, but 4 hours of training was not sufficient to teach women engineers to engage in SRL strategies.

The scores for the SHS and LEQ were higher in the treatment condition than in the comparison-group condition, which indicated that training altered positively the leadership self-efficacy scores on measures of near-term goal orientation among participants.

Indirect and moderate-to-strong relationships were found between the LEDA and the SHS. The direction of these relationships indicated that lower scores for purposeful leadership education and planning were correlated with higher scores for proximal goal attainment ability among participants at pretest. One interpretation of these findings was that women perceived that purposeful leadership education and planning was not required to attain immediate, near-term goals rather, that leadership was associated with a longer term vision, a lack of concrete definition, and high uncertainty, not necessarily with proximal-goal attainment.

Data from Phase II indicated that only a few participants engaged in planning activities within 2 weeks of the training, and only a few participants were more likely to articulate a distal and desired future as a result of the training.

Additional instructional time is required to teach SRL strategies for leadership development to women engineers. Demographic data gathered during the pretest indicated that 70% of study participants had no leadership-development training or planning within the last year. The results of previous studies have shown that achievement is linked to self-regulating strategies (Zimmerman & Martinez-Pons, 1986);

without more effective instruction on how to develop SRL strategies for leadership competencies, women are unlikely to use SRL methods to enhance their leadership competencies and, are, therefore, less likely to attain leadership roles.

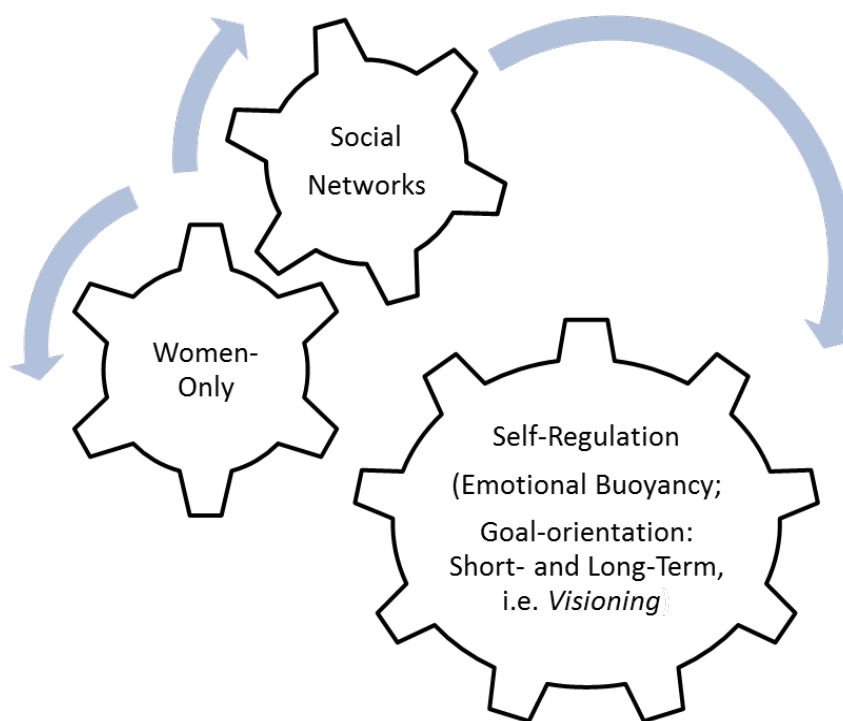
### *Entrepreneurism*

One aim of this study was to attempt to isolate leadership competence as a factor in entrepreneurial leadership self-efficacy among women. There was no evidence that leadership competence, as it was defined in this study, affected women's entrepreneurial leadership self-efficacy.

At pretest in Phase I, 13% of the population self-identified as founders. In Phase II interviews, 8% of the women self-identified as founders; although when interviewed, 24% of women reported that they had performed at least seven firm-gestation tasks that Reynolds (1997) defined as the mean for task performance among firm founders. Whereas the difference in proportions of women self-identifying as founders within and between the two different research phases is inconclusive, it indicates that women who are in a position to form technology start-ups may not identify readily as founders, even if they have the knowledge and skills associated with founder status. Furthermore, most respondents linked their lack of entrepreneurial leadership interest to a lack of family-based social networks. These findings suggest that women engineers might perceive family-based social-network support to be more valuable than other forms of social-network support in the pursuit of entrepreneurship. More research is needed to understand whether any other types of social-network support could serve as a proxy for family-based social-network support for women engineers to make entrepreneurial career paths as appealing as corporate career paths.

### Implications for Theory

In light of the findings from this study, the method based upon ICT for developing women's behavioral competencies that was presented in Chapter 1 is revised. Training contributed to the development of leadership self-efficacy, a greater awareness of gender-bias in the workplace and the need to develop social networks that include sponsors and advocates for women in leadership that are aware of gendered behaviors and dynamics.



*Figure 15.* Suggested women's leadership development modules for women's leadership education and training programs.

The change in the model was prompted by the results of the study that raised questions about how the construct "emotional buoyancy" related to other measures of leadership self-efficacy used in this study. Empirical evidence of a strong, although indirect, relationship between the constructs of "visioning for the future" (measured by

the LEDADF subscale) and “short-term goal-orientation efficacy” (measured by the SHS) was found, but no relationship between “visioning for the future” and “emotional transparency and authenticity” (measured by the ALQ) was found. As the LEDA DF subscale was constructed to measure visioning skills and the SHS measured short-term planning; it was concluded that the statistically significant relationship between the two scales indicated that they measured a common construct, planning, and differed only in terms of duration of time to goal, long versus short. In the revised model, visioning is a subset of self-regulation and linked to goal-orientation behaviors (Figure 15) and is not linked to emotional buoyancy. Although previous studies have suggested that emotional resonance and emotional intelligence are requisite features of management and leadership education (Goleman, Boyatzis, & McKee, 2004), this study demonstrated no link between emotional buoyancy (as measured with the ALQ) and visioning or long-term planning skills (as were measured by the LEDA DF subscale).

Findings from phase II of this study found that women experienced more gender-related stressors than leadership role-related stressors and suggested that emotional buoyancy was a self-regulatory mechanism that addressed social but not cognitive or ability-related challenges such as planning. As was found in previous studies (Hoyt, Johnson, Murphy, & Skinnell, 2010), stress and negative emotions among women were related to perceptions of gender-role stereotypes and social-role incongruities and not lack of cognitive ability to perform tasks associated with leadership roles. Therefore, theories of leadership development for women must conceptualize gender bias as a feature of the social dynamics of the environment and not a personal competency issue.



In doing so, all leaders within organizations, not just women, must develop an ability to identify and mitigate gender bias in order to promote and support women's leadership.

The results of this study also contribute to existing research on assessment for leadership competencies. In response to a call by DeRue and Ashford (2010) for more instruments that assist leaders in constructing leadership identities, the LEDA was constructed and introduced in this study as a gender-aware psychometric instrument to assess self-regulated learning skills for leadership-development, and it assessed effectively differences in self-reported leadership development behaviors between groups in the treatment and comparison conditions within this study.

The use of this instrument has produced key questions for women's leadership-development theory: Does the awareness of bias only, without the presence of instruction and training for leadership competencies, lead women to internalize and perpetuate gender bias? What does women's developmental trajectory look like as they begin to realize and internalize a leadership identity? Although the training had positive overall effects for leadership training that included awareness of gender bias, the findings from this study revealed that higher awareness of gender bias was related to lowered self-perceptions of leadership self-efficacy. The results of other studies of women in leadership have shown that women demonstrate a vulnerability response when threatened with both gender bias and work-performance criticism in a male-dominated environment (Hoyt et al., 2010). Do these findings indicate the need to assess readiness for a self-directed learning program prior to enrollment (Nikitenko, 2009) to safeguard against potential negative outcomes? A cohesive theory of women's leadership identity development would be useful in helping educators and business leaders to anticipate

problems and provide support for women who are navigating the transition from individual contributor roles to leadership roles.

### **Implications for Practice**

These results support previous research that advocated for women-only leadership (Ely et al., 2011) and are supported by research conducted by Buse (2012) who found that women persisted in engineering only with intentional effort directed toward retention and that men did not demonstrate similar social or psychological needs. Therefore, when providing leadership-development training to employees, companies should strive to create separate, psychologically safe spaces (Edmondson, 1999) for women that are led by a trained facilitator of women's leadership development (Sugiyama et al., 2016).

Women's leadership development is not a linear process. This study showed not only that women software engineers were less confident in their leadership ability as they became more aware of gender biases but also that a women-only leadership training session increased their sense of optimism and self-assurance, and inspired them to continue to practice leadership behaviors. Future training aimed at increasing women's awareness of gender-role stereotypes should use, at least in part, a prolonged women-only immersive component, as suggested by Ely et al. (2011), in an effort to counterbalance the negative self-efficacy that can arise in women in response to increased awareness of gender bias.

A fundamental challenge management educators face is making people aware of the effort they already expend on creating and perpetuating gender bias (West & Zimmerman, 1987). Helping people to modify their behaviors away from ones that reinforce gender bias to those that support and sustain women's leadership identity development requires training. These differences observed in pretest and posttest and

treatment- and comparison-group scores provided some support for the use of the LEDA as a gender-bias perception tool; its use can support organization-based efforts to understand how the current environment affects women's perceptions of advancement opportunities at work. The LEDA provides feedback to men and women about how they may be constructing gender bias at work. Factors such as "listening to women in meetings" and "making women leaders visible" can affect women's perceptions about their advancement opportunities in their workplace and consequently their willingness to pursue advancement. Companies can use the LEDA to identify and address the social interactions that perpetuate gender bias (West & Zimmerman, 1987) and, in doing so, advance women's leadership development (Cullen-Lester et al., 2016).

The effects of gender-bias awareness training for women were unclear and may be more complicated than originally thought. Organizations must help their employees to identify and confront gender-bias issues, but offering awareness-building training for women, alone, is unlikely to be sufficient in advancing women to leadership positions and inadvertently may produce negative self-efficacy among some participants. Gender-bias awareness training, should, therefore, be offered in conjunction with other women's leadership development initiatives and not as a stand-alone training module.

Another surprising finding of this study was that level of education, years of work experience, or age were neither directly nor indirectly related to any of the four measures of LBCW. The lack of relationship between these factors and LBCW measures may mean that leadership skills are neither taught explicitly nor learned in either educational or work settings or that women's leadership development programs, as they are currently designed and administered, in corporate and educational settings are not having the

effects that they could. A report published by McKinsey and Company (Huber & O'Rourke, 2017) found that women's board membership increased as a result of an explicit campaign among chief-level members to promote women's leadership and provides evidence that grassroots activism may not be the most advantageous path to leadership advancement for women. Graham, Belliveau, and Hotchkiss (2017) linked women's leadership attainment to the level of power and status of the person filing the federal Employer Information Report (EEO-1) on diversity and found that the higher the rank of the reporting official, the greater the number of women in leadership positions in the firm. Collectively these studies demonstrate that women benefit from leadership-development programs that are supported at the highest levels of the organization and are designed purposefully to advance women's leadership.

*Implications for entrepreneurial education and training for women*

Data from interview respondents showed that despite increases in some leadership behavioral competences women engineers were not more likely to report entrepreneurial intent as an outcome of the training, even among those who reported having entrepreneurial ability. These findings suggest that leadership development curriculum that does not include explicit training on entrepreneurship is not likely to be a successful means of stimulating entrepreneurial leadership intent among women in software engineering.

The outcomes of other studies, however, have linked a strong and positive gender identity among women entrepreneurs with higher entrepreneurial growth intentions in comparison with those without a strong positive gender identity (Morris, Miyasaki, Watters, & Coombes, 2006). The findings from this study demonstrated that training

produced positive outcomes for social-networking behaviors that have been shown to enhance the likelihood of entrepreneurial success for women (Studdard & Munchus, 2009). In sum, the findings suggest that women software engineers who have already expressed entrepreneurial intent would benefit from educational programs that explicitly develop leadership behavioral competencies in a women-only setting.

### **Directions for Future Research**

Findings from this study help to explain why women are not attaining leadership positions at the same rate that men are and support the need to develop women software engineers' leadership competencies through structured educational programs with measurable outcomes.

One area of interest that emerged during the study was the relationship between goal orientation and self-regulated learning for professional development. Goal orientation has been well defined in the research as a subcomponent of self-regulated learning theory (Zimmerman, 2002; 2008). Much research has been conducted on goal orientation, and the construct has been classified into at least two dimensions, performance-goal orientation and learning-goal orientation (Elliot & Dweck, 1988; Grant & Dweck, 2003). This study found an indirect and strong relationship between “visioning,” which is defined as the ability to construct distal and undefined goals and near-term goal-orientation efficacy. Future research should help to investigate the structural dimensions of “visioning” as a construct related to long-term goal-orientation, more specifically the relationship between visioning and performance goal orientation and visioning and a learning-goal orientation; such studies would investigate the

usefulness of pedagogy pertaining to goal-orientation as a method for developing visioning skills.

Future research should collect longitudinal data to assess the relationship between awareness of gender bias and leader identity among women when they attend a prolonged women-only leadership-development program. The results of this study raised questions about how to best handle the unanticipated negative effects of an increased awareness of gender bias among women when they attended a 4-hour training session. Some of the outcomes of this study were similar to those found in previous studies that linked gender-role stereotype threats with lowered performance efficacy among women leaders (Hoyt et al., 2010). At this point it is unclear how vulnerabilities to gender-bias awareness training can be mitigated and future research should seek to characterize women's psychological learning trajectory as they develop critical awareness of gendered dynamics in their work environments.

Future research should investigate the conditions under which awareness of gender bias can provoke effective defensive advocacy-type responses among women and their supporters (Hoyt & Blascovich, 2010). One response might be for women to request immediate support from a colleague, such as the use of "amplification," which was a technique used by White House staffers during the Obama administration:

Female staffers adopted a meeting strategy they called "amplification": When a woman made a key point, other women would repeat it, giving credit to its author. This forced the men in the room to recognize the contribution — and denied them the chance to claim the idea as their own. (Landsbaum, 2016, para. 5)

Future studies also might include an investigation of the conditions under which women can use awareness of gender bias to their advantage: Should women explicitly ask their male colleagues to act as gender-equity allies and if they do, how will male

colleagues respond to and interpret this request? Studies should seek also to understand if building alliances with male colleagues around diversity and inclusion initiatives can aid women in anticipating and subverting the negative effects of gender-bias awareness training on their leadership confidence that were observed in this study.

The training in this study did not include one-on-one coaching sessions, which have been found to be effective in leadership development (Ladegard & Gjerde, 2014; Luthans & Peterson, 2003) and may help to address the issues related to lowered self-efficacy that were linked to heightened awareness of gender biases in this study. Future research should incorporate the use of at least 5 hours of individual coaching into the program (Smither, London, Flautt, Vargas, & Kucine, 2003).

Future research should also investigate the use of a self-directed-learning readiness assessment (Nikitenko, 2009) in order to understand if there is a relationship between self-directed learning readiness and leadership self-efficacy in female participants who attend gender-bias awareness training.

The analysis in this study comprised self-reported data collected from the participants, only. This is not a limitation of the study because the intervention's purpose was to increase women's self-reports of their leadership competencies. Feedback from others could provide a useful comparison to women's self-report measures; future training modules should incorporate exercises wherein the participants solicit feedback from others in their roles as leaders and learn how to integrate feedback effectively into their leadership practice.

The LEDA instrument is a newly developed instrument and should be further tested for construct and discriminant validity in several successive studies. Subscales

should be further articulated and refined. The LEDA was developed by using classic test theory. Future studies of the LEDA could include item-response theory to ascertain the effects of differing test-construction methods on outcomes.

The results of the research revealed that 4 hours of instructional time was sufficient to help women develop social-networking skills but inadequate to enable the development of self-regulatory skills such as planning; therefore, in the future adequate instructional time should be allocated to developing planning skills for leadership-development specifically among women engineers.

***Future research on online leadership development and training for women***

More research is needed to understand how best to deliver leadership development content to women in software engineering communities. Future studies should be aimed at examining the influence of an Internet-based developmental portfolio on learning outcomes for women's leadership development. According to Boyd (2004), prior experience with online technology, motivation to learn, the ability to control the environment, and independent, conceptual learners performed well in studies of student achievement in distance-learning settings. These factors are similar to the ones that contribute to success in software engineering (Laakmann, 2010) and suggest that women who excel in software engineering careers would benefit from an online curriculum.

Online curriculum also enhances the accessibility of the material, and so women engineers whose companies do not offer access to leadership-development training may still participate through an online learning platform. Specifically, online formats may provide an accessible and easy-to-understand means through which materials for the planning and reflection phases of SRL methods are collected. Online tools such as



TrustedPeer<sup>®</sup> guide participants through mentoring interactions with the use of question prompts that structure their interactions toward productive outcomes. Participants in this study reported that they had little confidence in their ability to construct a learning plan for themselves. Future studies should investigate the usefulness of electronic mentoring software in guiding learners toward adopting self-regulated learning strategies to advance their professional development outcomes.

***Future research on entrepreneurial education and training for women***

There is a need for more research on the conditions that foster both leadership behaviors and entrepreneurial intent among women software engineers. There was no instruction on entrepreneurship or business management given during the training treatment used in this study. The training treatment included instruction on leadership-development topics that pertained to the LBCW model only, and although the results of this study indicated that women software engineers experienced an increase in many of the measures of leadership self-efficacy, they were not more likely to pursue entrepreneurship as a result of the leadership training, even though they have the expertise to do so. Future studies on women's leadership development for women software engineers should introduce content related to entrepreneurship and business-management and investigate its outcomes on participants' entrepreneurial leadership intentions.

Alternatively, in a future study, women's leadership development topics could be introduced to women who have enrolled in entrepreneurship and business management courses to investigate how explicit instruction on building leadership competencies effect their leadership self-efficacy.

## Conclusions

The findings of this study help to substantiate the need for identity-focused leadership education and development for women. In following Buse (2012), the outcomes of this research demonstrate that the challenges women faced in attaining leadership roles in technology environments differed from the challenges faced by men on the basis of gender alone, and, therefore, women need programs that address these differences directly. A main problem women in this study faced was leadership identity threat, which was perpetuated in social scripts that advance gendered identities for women and not leadership identities. Like other programs that supported women's leadership development, the women-only setting provided opportunities for women to create leadership claims and to have those claims granted by others (DeRue & Ashford, 2010) in an environment that controls for gender-based stereotype threats that undermine leadership-claim legitimacy among women (Debebe et al., 2016, Ely et al., 2011; Sugiyama et al., 2016) and enhanced positive gender-based identity (Karelaia & Guillén, 2014) and emotional buoyancy (Boyatzis, 2008). Although the results of this research also showed that women's leadership-development training sessions created positive outcomes for leadership behaviors after 4 hours, outcomes were mixed. In this case, training made a difference in both self-reports and empirical data by increasing women's ability to self-advocate, create social networks, and increase feelings of happiness and of belonging, but 4 hours of training may have decreased women's confidence in their ability to be resilient to gender-bias and to create their own long-term plans for personal and professional development; therefore, brief women-only immersion experiences may be a plausible method by which to cultivate women's leadership behaviors, but more training

is needed to increase women's capacities for planning and resilience to gender bias.

Finally, the findings from this research show that the LEDA is a useful tool in identifying resilience to gender bias among women.

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## **APPENDICES**

## **Appendix A**

### **List of Acronyms Used in This Study**

## LIST OF ACRONYMS USED IN THIS STUDY

The following is a list of acronyms used in this study.

*ALQ*: The Authentic Leadership Questionnaire

*EET*: Entrepreneurial Education and Training

*ICT*: Intentional Change Theory

*LBCW*: Leadership Behavioral Competencies for Women

*LE*: Leader Efficacy

*LEDA*: Leadership Education and Development Activities Instrument

*LEDADF*: LEDA Desired Future Subscale

*LEDAGB*: LEDA Gender Bias Resilience Subscale

*LEDALP*: LEDA Learning Plans Subscale

*LEDASNS*: LEDA Social Network Support Subscale

*LEQ*: The Leadership Efficacy Questionnaire

*LSE*: Leadership Self-Efficacy

*NEA*: The Negative Emotional Attractor

*PEA*: The Positive Emotional Attractor

*SHS*: The State Hope Scale

*SRL*: Self-Regulated Learning

*VC*: Venture Capital; Venture Capitalists

*WOT*: Women-Only Training

## **Appendix B**

### **Letter of Confirmation and Consent to Study Participants With Study Overview and IRB Notification**

## LETTER OF CONFIRMATION AND CONSENT TO PARTICIPATE IN A RESEARCH STUDY

### **Purpose and Background**

Leann Pereira, MS, is conducting a confidential study about the effects of training on leadership confidence and perceptions of the value leadership-development activities among women. This study is being conducted for the completion of her doctoral studies in the school of Education at University of San Francisco. Your participation will help inform researchers about how leadership education and training contributes to developing women for leadership roles in corporate and entrepreneurial settings.

### **Procedures**

This letter is a confirmation of your agreement to participate in this study. By agreeing to participate in this study, you will be asked to

- complete 2 two 7-10 minute online surveys at two different times. These surveys assess for things like leadership confidence and value of leadership-development activities
- attend one 3-4 hour training sessions on leadership development for women. These sessions will take place in public or donated spaces around the SF Bay Area. You will be notified through an internet posting about the times, dates, and locations and may choose among different sessions as your schedules allow.

### **Payment/Reimbursement**

There will be no cost to you for participating in this study, and there will be no compensation for participating in this research.

### **Risks and/or Discomforts**

We do not anticipate any risks or discomforts to you from participating in this research. If you wish, you may choose to withdraw your consent and discontinue your participation at any time during the study without penalty. Your identity will not be used in any reports or publications resulting from the study. Your survey responses will be collected through a web-based interface only.

### **Benefits**

For your participation in the study you will receive a report on the assessments you complete and free leadership training.

## Questions

If you have questions or comments about the study, first contact the researcher, Leann Pereira by emailing me at [ldaspereira@usfca.edu](mailto:ldaspereira@usfca.edu). If for some reason you do not wish to do so, you may contact the IRBPHS office at the University of San Francisco by sending an email to [IRBPHS@usfca.edu](mailto:IRBPHS@usfca.edu).

## Consent

You have been given a copy of this consent form to keep. **PARTICIPATION IN THIS RESEARCH IS VOLUNTARY.** You are free to decline to participate in this research study, or to withdraw your participation at any point, without penalty. Your decision whether or not to participate in this research study will have no influence on your present or future status.

\_\_\_\_\_ I agree to participate in this study.

\_\_\_\_\_ I do not agree to participate in this study

Signature \_\_\_\_\_ Date: \_\_\_\_\_ Research Participant

Signature \_\_\_\_\_ Date: \_\_\_\_\_ Researcher

Thank you,  
Leann Pereira, M.S.,  
Doctoral Candidate, University of San Francisco



**Appendix C**

**Leadership Education and Development Activities Instrument**

## LEADERSHIP EDUCATION AND DEVELOPMENT ACTIVITIES INSTRUMENT (LEDA)

The Leadership Education and Development Activities Instrument (LEDA) is a 39-item scale that has been developed to assess a person's attitudes and behaviors related to leadership education and development activities. The LEDA is a unique instrument because its focus is on women's professional and leadership development, in contrast to professional and leadership development that assumes normative items for all sexes. The LEDA was used to assess differences in population responses as a result of the training treatment.

The LEDA includes four subscales: developing and advocating for a vision of success, resilience to second-generation or implicit gender biases, social-network development, and planning.

\*Items are reverse scored.

Responses will be collected with a 6-point Likert-type scale used that ranges from *strongly disagree* to *strongly agree*:

1. Strongly Disagree
2. Moderately Disagree
3. Weakly Disagree
4. Weakly Agree
5. Moderately Agree
6. Strongly Agree

Subscale: Developing a vision of a desired future:

1. I have a clear vision of what I want the future to look like for me.
2. I feel positively toward my vision of the future.
3. I purposefully spend time envisioning a desirable future.
4. I feel compelled to engage others in the pursuit of a mission.
5. I have a passion that I wish to pursue through my work.
6. My interests are aligned with my practical needs in life.
7. People rely on me to help guide their efforts at work.

Subscale: Resilience to second-generation gender bias (implicit gender bias) in the workplace:

1. I can identify women who act as mentors for others.
2. Women are influential at my place of work.
3. I am willing to ask for challenging assignments at work.
4. I am willing to ask for a pay increase or promotion.
5. At work, women often speak in meetings.
6. When women speak in meetings, they are listened to by other participants.
7. At work, masculine pronouns such as "he," "him," "men," or "guys" are used in communication about people in general.\*

8. I tend to underrate my abilities relative to the skills of my male colleagues in similar positions.\*
9. When I meet someone new, I feel that I have to work extra hard to gain his or her confidence.\*
10. I feel that my ideas are respected at work.
11. In unstable or changing circumstances, I assume a man is more competent than a woman.\*

Subscale: Social-network support:

1. I receive the support I need from those around me so that I can accomplish my day-to-day responsibilities.
2. I am frustrated at work.\*
3. I have regular conversational partners with whom I discuss or plan future work-related projects.
4. I have missed, turned down, or did not pursue opportunities because of my family or care responsibilities.\*
5. I have someone I trust to talk to when I have a tough situation at work or at home.
6. I have someone to talk to about my professional hopes, dreams, and fears.
7. I receive the psychological support I need from my friends and peers so that I can perform my job well.
8. I believe that it is wrong to develop relationships with people I don't already know because I want something from them.\*
9. I find it difficult to ask for help from others because it seems unfair or wrong in some way.\*

Subscale: Learning plans: Construction, performance, and assessment

1. I believe that my ability to learn new behaviors is related to my ability to expand my network of relationships.
2. I believe my ability to learn is related to my ability to plan.
3. I understand what the components of a learning plan are.
4. I feel confident in my ability to create a learning plan for myself.
5. I am comfortable soliciting feedback about my performance from others as I pursue a goal.
6. I am afraid to admit mistakes or if I don't know how to do something.\*
7. I believe it is important to track and evaluate my progress as I pursue a plan.
8. I am confident in my ability to follow a learning plan.
9. I believe it is important to document my learning plan.
10. I know when to modify my plan.
11. I believe a personal learning plan is worth the time and effort to construct.
12. I intend to develop a learning plan for myself in the next six months.

## **Appendix D**

### **Survey Validation Rubric for Expert Panel—VREP©**

**Survey Validation Rubric for Expert Panel—VREP©**  
 By Marilyn K. Simon with input from Jacquelyn White (White & Simon, n.d.)  
 Letter of Request for Participation to Expert Panel for Survey Validation

Criteria	Operational Definitions	Score				Questions NOT meeting standard (List page and question number) and need to be revised. Please use the comments and suggestions section to recommend revisions.
		1=Not Acceptable (major modifications needed)	2=Below Expectations (some modifications needed)	3=Meets Expectations (no modifications needed but could be improved with minor changes)	4=Exceeds Expectations (no modifications needed)	
		1	2	3	4	
<b>Clarity</b>	<ul style="list-style-type: none"> <li>The questions are direct and specific.</li> <li>Only one question is asked at a time.</li> <li>The participants can understand what is being asked.</li> <li>There are no <i>double-barreled</i> questions (two questions in one).</li> </ul>					
<b>Wordiness</b>	<ul style="list-style-type: none"> <li>Questions are concise.</li> <li>There are no unnecessary words</li> </ul>					
<b>Negative Wording</b>	<ul style="list-style-type: none"> <li>Questions are asked using the affirmative (e.g., Instead of asking, “Which methods are not used?”, the researcher asks, “Which methods are used?”)</li> </ul>					
<b>Overlapping Responses</b>	<ul style="list-style-type: none"> <li>No response covers more than one choice.</li> <li>All possibilities are considered.</li> <li>There are no ambiguous questions.</li> </ul>					

<b>Balance</b>	<ul style="list-style-type: none"> <li>The questions are unbiased and do not lead the participants to a response. The questions are asked using a neutral tone.</li> </ul>					
<b>Use of Jargon</b>	<ul style="list-style-type: none"> <li>The terms used are understandable by the target population.</li> <li>There are no clichés or hyperbole in the wording of the questions.</li> </ul>					
<b>Appropriateness of Responses Listed</b>	<ul style="list-style-type: none"> <li>The choices listed allow participants to respond appropriately.</li> <li>The responses apply to all situations or offer a way for those to respond with unique situations.</li> </ul>					
<b>Use of Technical Language</b>	<ul style="list-style-type: none"> <li>The use of technical language is minimal and appropriate.</li> <li>All acronyms are defined.</li> </ul>					
<b>Application to Women Entrepreneurs</b>	<ul style="list-style-type: none"> <li>The questions asked relate to the daily practices or expertise of women entrepreneurs.</li> </ul>					
<b>Relationship to Problem</b>	<ul style="list-style-type: none"> <li>The questions are sufficient to resolve the problem in the study</li> <li>The questions are sufficient to answer the research questions.</li> <li>The questions are sufficient to obtain the purpose of the study.</li> </ul>					
<b>Measure of Construct: A: Social-networking</b>	<ul style="list-style-type: none"> <li>The survey adequately measures this construct. [The purposeful cultivation of interpersonal contacts for gain or advantage.]</li> </ul>					

<b>Measure of Construct: B: Operational Networking</b>	<ul style="list-style-type: none"> <li>The survey adequately measures this construct. [A form of networking that serves to meet group level functioning for immediate workload demands. Social contacts are prescribed based upon job context and serve to build strong working relationships.]</li> </ul>					
<b>Measure of Construct: C: Personal Networking</b>	<ul style="list-style-type: none"> <li>The survey adequately measures this construct. [A form of networking that serves to enhance personal and professional development for future-oriented goals and interests. Social contacts are chosen based upon quality and experience of the relationship which are often emotionally or socially nurturing. Personal networking also serves to enhance personal and professional opportunities through extending a person's access to others.]</li> </ul>					
<b>Measure of Construct: D: Strategic Networking</b>	<ul style="list-style-type: none"> <li>The survey adequately measures this construct. [A form of networking that serves to advance institutional initiatives beyond the immediate benefit of those involved. Strategic networking is used to lay social foundations for larger initiatives that may require multiple stakeholders and for outcomes that affect multiple stakeholders.]</li> </ul>					

<b>Measure of Construct:</b> <b>E:</b> <b>Entrepreneurial Growth Behaviors</b>	<ul style="list-style-type: none"> <li>The survey adequately measures this construct. [Behaviors that lead to business growth. Business growth behaviors include: intention to hire, intention to change some aspect of the current business practice including partnering with other businesses, seeking professional advisors, and seeking funding.]</li> </ul>					
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## **Appendix E**

### **Demographic Questions**

## DEMOGRAPHIC QUESTIONS

1. What is your gender?
  - 1 Male
  - 2 Female
  - 3 Transgender
  - 4 Prefer not to disclose
  - 5 Other
- 2 Which best describes your employment status?
  - 1 Full-time
  - 2 Part-time
  - 3 Self-employed
  - 4 Student
  - 5 Other
- 3 What is your age range?
  - 1 Under 21
  - 2 22-29
  - 3 30-39
  - 4 40-49
  - 5 50-59
  - 6 60-69
  - 7 70+
  - 8 Prefer not to disclose
- 4 How many years of total work experience do you have? (Exclude years in school if you were a full-time student.)
  - 1 0
  - 2 1-5
  - 3 6-10
  - 4 11-15
  - 5 16-20
  - 6 21-25
  - 7 26+
- 5 What is the highest level of education that you have completed?
  - 1 GED
  - 2 High School
  - 3 Undergraduate
  - 4 Graduate (MA, MS, MBA)
  - 5 Graduate (JD, MD, Ph.D.)

- 6 Are you currently a founder or co-founder of any type of organization? (For-profit, non-profit, educational, etc...)
  - 1 Yes
  - 2 No
- 7 How many years of total experience do you have leading an organization as a founder or co-founder?
  - 1 0
  - 2 1-5
  - 3 6-10
  - 4 11-15
  - 5 16-20
  - 6 21-25
  - 7 26+
- 8 How many complex projects have you conceptualized and/or initiated throughout your adult career? (A complex project is defined here as involving multiple stakeholders across different business units who are internal and external to the organization, and has sizable funding.)
  - 1 0
  - 2 1-5
  - 3 6-10
  - 4 11+
- 9 In the past year, have you had any leadership or professional development training of any kind?
  - 1 Yes
  - 2 No
- 10 In the past year, have you constructed a leadership or professional development plan for yourself?
  - 1 Yes
  - 2 No
- 11 In Which country do you reside?
  - 1 Drop down list.
- 12 Please select the state and county in which you currently reside
  - 1 Drop down list.

**Appendix F**

**Interview Consent Form**

## INTERVIEW CONSENT FORM

You have been asked to participate in an interview conducted by Leann Pereira, a graduate student in the Department of Learning and Instruction at the University of San Francisco. This project is toward the completion of my doctoral studies in education.

### WHAT IS THIS ABOUT

The purpose of this inquiry is to understand women engineers' attitudes and behaviors towards leadership development activities.

### WHAT YOU WILL BE ASKED TO DO

Specifically, you will be asked to 1) share your opinion about the Leadership Education and Development Activity instrument and/or share your opinion about the training, and 2) allow me to tape (audio and/or video) discussions in order to ensure the accuracy of my observations.

All information collected during the interview is confidential. While I may quote directly from statements made during the discussion, I will be attentive to protecting your confidentiality. No names will be used in this research; all comments will remain anonymous. Recordings and information developed during this focus group will be kept secure and stored in a password protected software system. There are no known psychological, financial, or other types of risk associated with your participation.

Participation in the interview group is entirely voluntary, and you may withdraw at any time during the discussion.

### QUESTIONS

If I have any questions or comments about participation in this study, please contact me through email at [XXX@usfca.edu](mailto:XXX@usfca.edu) or by phone at (XXX) XXX-XXXX. If for some reason you do not wish to do this, you may contact the IRBPHS at the University of San Francisco, which is concerned with the protection of participants in research projects. You may reach the IRBPHS office by e-mailing [IRBPHS@usfca.edu](mailto:IRBPHS@usfca.edu).

I appreciate very much your willingness to share your thoughts and experiences with me. I hope you will benefit from the discussion.

Sincerely, Leann Pereira, Researcher, Doctoral Candidate

## PARTICIPANT CONSENT

I \_\_\_\_\_ consent to participate in the interview. I have received information about my rights as a participant and I understand that I may withdraw without penalty at any time. I understand that Leann will be recording the session and that my participation in this group and my identity will remain confidential and anonymous. I have been given a copy of this consent form to keep for my own records.

Signature \_\_\_\_\_

Date \_\_\_\_\_

**Appendix G**

**Leadership Training Lesson Plan**

## LESSON PLAN I

**Course title:** Entrepreneurial and Corporate Leadership Development for Women Engineers

**Instructor:** Leann Pereira, MS

**Start/end date(s) and time(s):** Varies. Sessions are 3 hours in duration.

**Location:** Varies.

**Audience:** There will be 15 participants with varied experience in entrepreneurial leadership.

**Objective(s):** After this training participants will be able to:

- Create a desired vision of the future.
- Identify strategies to support their own leadership development program.
- Identify three forms of networking.
- Identify strategies to support social network development.

### **Purpose:**

Studies suggest that women's leadership styles differ from men's and that successful women entrepreneurs actively seek emotionally supportive relationships while developing their businesses, more than men do. This training module is for women only and highlights networking and leadership techniques that are consistent with expert recommendations for women's leadership development programs (Ely, Ibarra, & Kolb, 2011).

### **Materials:**

The overview of *Resonant Leadership* and theories of women's leadership will be presented by the instructor and will be drawn from the following materials:

- 1) *The Ideal Self as the Driver of Intentional Change* (Boyatzis & Akrivou, 2006).
- 2) *Developing Sustainable Leaders through Coaching and Compassion* (Boyatzis, Smith, & Blaize, 2006).
- 3) *Leadership Development from a Complexity Perspective* (Boyatzis, 2008).
- 4) *Taking Gender into Account: Theory and Design for Women's Leadership Development Programs* (Ely, Ibarra, & Kolb, 2011).



Articles for reading, discussion and activities:

- 1) *In Praise of the Incomplete Leader* (Ancona, Malone, Orlikowski, & Senge, 2007).
- 2) *Discovering Your Authentic Leadership* (George, Sims, McLean, & Mayer, 2008).
- 3) *How Leaders Create and Use Networks* (Ibarra & Hunter, 2007).
- 4) *How to Build Your Network* (Uzzi & Dunlap, 2005).

A workbook for exercises: *Becoming a Resonant Leader* (McKee, Boyatzis, & Johnston, 2008).

**Assessment strategies:** Participants will take an online leadership assessment after the completion of the modules.

**Participant engagement methods:** Participants will engage in group discussions about the readings and develop and share their leadership development plan with the group.

**Training outline:**

- 1) Introduction and welcome (3 min): Say, “Hi, my name is Leann and welcome to Leadership Development for Women Entrepreneurs. This training will last approximately three hours. Restrooms are down the hall. Please help yourself to refreshments. Please put your cell phones on silent and if you have an emergency that needs to be attended to, step into the hallway to take your call.
- 2) Icebreaker activity (5 min): Say, “Before we get started, let’s go around the room and take turns telling the group your name, the name of your company or your proposed idea, and how long you’ve been working on your venture.” Ask if there are any volunteers to go first or ask a person to start.
- 3) Objectives and purpose (2 min): Say, “Studies suggest that women’s leadership styles differ from men’s and that successful women entrepreneurs actively seek emotionally and socially supportive relationships while developing their businesses more than men do. This training module is for women only and highlights networking and leadership techniques that are consistent with expert recommendations for women’s leadership development programs. We will focus on our personal leadership style, our definitions of meaning and success, our identity as leaders, and finding the right type of social support to sustain our initiatives.”
- 4) Attention-grabber (15 min): Say, “Let’s begin with what this topic might mean to you. Let’s go around the room and when it is your turn, please share some of your thoughts on what a leader is and how a leader behaves.” Allow participants to share their thoughts with the entire group.
- 5) Instructor gives overview of the concept of resonant leadership and leadership development theories for women (20 min): Participants are asked to comment and ask questions.
- 6) Exercises in *Resonant Leader* (60 min):
  - a. (pp. 15-24) “Who and what do you lead”, (p. 22) “Best and Worst Leaders”, (p. 24) “The Truth about Resonant Leadership”. Discuss the myth of constant pressure and ask about how participants renew

- themselves. Key inquiries: When am I resonant? Who gives me positive feedback about my resonance? (20 min)
- b. (pp. 58-67) The Sacrifice Syndrome (20 min)
  - c. (pp. 71-108) Constructing the Ideal Self and the Personal Emotional Attractor (20 min)
- 7) Reading and reflection (30 min): Say, “Let’s see what the articles said about leadership.” Begin discussion with *Discovering Your Authentic Leadership*, then *In Praise...*, then *How Leaders...* Ask participants to talk about what was most meaningful to them in each article and why.
  - 8) Building our Social Web Activities (20 min):
    - a. *How to Build Your Network* mapping activity (p. 56). Catalogue the people that comprise our operational, personal, and strategic network. Identify those with whom you feel your PEA is activated. (Instructor provides handouts.)
  - 9) New Directions for Building Social Networks (15 min):
    - a. Instructor will ask participants to share their personal tips for networking success. Instructor will encourage participants to write down and investigate the tips.
  - 10) Closing (10 min):
    - a. Thank participants and send them email reminders to complete final assessment.
    - b. Hand out instructor evaluation forms. Leave room for 10 mins so that participants can fill them out.

**Participant evaluation:** Participants will be asked to complete an instructor evaluation form at the end of each session.

**Instructor reflection:** The instructor will record reflections of the training after each session.

## **Appendix H**

### **Online Community Message Board Posting**

## ONLINE COMMUNITY MESSAGE BOARD POSTING

Dec 3, 2016 · 1:00 PM

To what extent does your social network affect how you think about yourself and the actions you take on a daily basis? What are the three dominant types of social networks? How can you cultivate your social network to enable greater professional advancement? What effect does this have on your brain, and why does it matter? If you are in a career transition, wish to achieve more in your career, or are considering starting your own company, this workshop is for you. In this 4-hour workshop, we will go beyond social and emotional intelligence to understand how neuroscience and social science have evolved to help women more effectively navigate our professional lives and to gain a greater sense of well-being and accomplishment.

We'll discover

- The role of a personal leadership vision and the “Positive Emotional Attractor”.
- The neuroscience of resonant professional relationships and the value of psychological safety.
- The characteristics and effects of second-generation gender bias.
- The three types of social networks we encounter in our work.
- The utility of a professional development plan.

*\*Please fill out this instrument before attending the workshop.\**

[Link to Initial Survey](#)

During this workshop, you will begin to construct your professional development portfolio. All participants are eligible to receive free professional development assessments (valued at approximately \$300.00) after the successful completion of the workshop. Your personal profiles will be sent to you within 45 days of the workshop. This workshop is presented to you as part of a doctoral dissertation research study conducted at the University of San Francisco. Participants will be asked to complete assessments at sign-up, during the workshop, and to sign a consent form enabling these data to be used in the study. All data collected are and will remain forever confidential. Please contact Leann Pereira with any questions XXX@usfca.edu.