Mentoring Women: Identifying, Developing, and Retaining STEM Stars

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Dedication

I dedicate this dissertation to my parents, Yvonne Torres Viscosi and Pasquale Viscosi.

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Abstract

Mentoring Women: Identifying, Developing and Retaining STEM Stars

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Women have made significant strides towards gender equality, particularly in education completion and labor force participation rates. Women make up about half of the total population in the United States, receive 57% of the awarded undergraduate degree as of 2010, and are evenly represented in STEM education, earning 50% of STEM bachelor degrees in 2012 (*The World Bank Group*, 2014; *AAUW*, n.d.; *The National Science Foundation*, 2015). Nevertheless, when it comes to translating their STEM degrees to the workforce, women remain seriously under-represented in both jobs held, and in leadership positions. This raises interesting questions about the relationship between education and work-place practices that might be pushing women out of STEM fields, and those supporting women to stay. This study is a focus on the latter, particularly looking at the role of mentoring in professional stem fields. Drawing on literature from women in leadership, gender and STEM, and mentoring in the workplace, this study specifically asks what relationship formal mentoring has to women's career trajectory in STEM fields, and more specifically, how mentoring relationships are formed, how they change over time, how mentoring impacts career development and what significance these factors have on retention of women as STEM stars.

Chapter 1

Introduction

Through the years, women have made significant strides towards gender equality, particularly in education completion and labor force participation rates. Women make up about half of the total population in the United States, received 57% of the awarded undergraduate degree as of 2010, and are evenly represented in STEM education earning 50% of STEM bachelor degrees in 2012 (*The World Bank Group*, 2014; *AAUW*, n.d.; *The National Science Foundation*, 2015). Nevertheless, when it comes to translating their STEM degrees to the workforce, women remain seriously under-represented in the number of jobs held in STEM fields and in STEM leadership positions. This raises interesting questions about why education and presence in the workplace are not comparable or anticipated to be similar in the future. As of 2013, 29% of those who hold STEM job roles are women (*The National Science Foundation*, 2015). Women are leaving STEM careers shortly after entering the workforce or not entering STEM positions at all, leaving men to dominate these career fields. Persistent gender inequities are reflected in under-represented professional fields like science, technology, engineering, and math all across the United States.

STEM fields are categorized by science (biological sciences, chemistry, agricultural sciences, etc.), technology (computer sciences, etc.), engineering (chemical, mechanical, electrical, etc.), and mathematics (math and statistics, etc.) (Hill, Corbett, & St. Rose, 2010). Of those employed in 2013, 15% of all working women in the United States were in a STEM position compared to 32% of all working men. Even when women major in STEM fields, about half are still not making it to related careers though the need is present. Not only are there many vacant positions in STEM fields, but it is projected that STEM will grow another 17% by 2018 (DiMaria, 2013). Facilitating an increase of female representation in STEM will provide

diversity of perspective and aid the solution of many scientific questions (Blickenstaff, 2005). Scholars suggest that leveraging tools in the workplace will help to accelerate this movement.

Women represent half of the country's potential talent pool and empowering women can help highlight the important role they play in society and the economy (Yoo, 2015). How a country educates, supports, and guides half of their potential talent base is important to ensuring a nation's competitiveness (Yoo, 2015). The literature on women in STEM, specifically, is gaining national or arguably even global attention as the percentages of women in STEM careers begins to plateau. There is a growing body of research documenting discrimination and challenges of working women, which will be presented in chapter 2. This literature suggests there are many important steps that industry can take to address the gender gap and overcome challenges, including providing career growth, improving self-efficacy, and utilizing mentorships to develop talent (Berger & Berger, 2011; Milner, Horan, & Tracey, 2014; Shaugnessy, 2013). One important area of research that remains under-theorized is the role mentoring can play helping women to recognize, face and overcome this discrimination throughout their STEM careers.

This dissertation aims to fill this gap through an exploration of the role that mentors play for women in one particular STEM company, focusing on how women identify potential mentors, how they define successful mentoring relationships, and how these relationships are given meaning in the lives of women across the life course of their careers. By generating a foundation of a general understanding of mentoring in today's technical workplace, the researcher will be able to identify where and how modifications must be made to highlight the differences with women mentorships and how to bridge the mentorship gap. Findings will be of interest to gender and education scholars, STEM professionals and human development resource professionals interested in supporting and promoting gender equality in STEM workplaces.

Statement of the Problem

Mentoring has been studied as an indicator of how well a program excels and what affect it has for retention in a student population, however the impact mentoring has on career development has received little attention (Lunsford, 2014). Specifically, identifying what influence the ideal frequency to mentor individuals, what specific characteristics of mentoring relationships are most effective, and how mentoring changes over the course of a life time, has on mentoring and career development is a serious gap in current literature (Lunsford, 2014). The variations of relationships cause the results of the mentor/mentee relationship to be inconsistent and not always effective (Lunsford, 2014). Over the past 40 years there has been a dramatic increase in research in regards to mentoring in the fields of psychology, education, and business (Keel, 2009). Though material exists linking mentoring and STEM careers, there is need for further study.

Individuals' perceptions of what they can accomplish can be extremely influential on their choices and whether or not they fight to overcome a situation (Jackson, 2010). Younger women who long for scientific research and attempt to enter these fields may become discouraged with no one to help them along after they enter the workplace (Etzkowitz, Kemelgor, Neuschatz, & Uzzi, 1994). Mentoring relationships offer realistic expectations for the mentees and may offer mentees a role model to guide their development (Murphy & Kram, 2014). When mentoring programs are aligned to business goals, it allows for corporate support and longer lasting programs. The approximate cost for replacing one employee values roughly that same employee's year salary (Lamber, 2003). That means if 20 women each making $50,000, leave a STEM role over the course of one year, it will cost the corporation $1,000,000 to replace them. It benefits all parties to increase the focus on women employee retention.

The most immediate challenges exist with women in college and immediately after entering the workforce (Jackson, 2010). Young women who do not have support tend to shy

away from STEM as majors, while women who have support from their parents and teachers do better in this area (Robelen, 2010). Though women are doing well academically and are graduating with STEM degrees in large percentages, the gender gap in STEM persists when it comes time for women to work full time in STEM careers (Brandt, 2014). In some cases, women's lack of confidence with no support leads to aversion to STEM and causes them to back away leaving males three times as interested as women to pursue long term careers in these fields (Wosczyna-Birch & Resnick, 2013). Therefore, a change must be made towards dev eloping more mentoring opportunities in order to facilitate the growth of women in life long STEM careers through career development.

Though the influence of mentors has been at least discussed for all careers, the characteristics of the ideal type of mentor for women's success in STEM is still unclear. The effect of generational differences, frequency of meeting, and pairing of male-female versus female-female have been identified as important, but not thoroughly studied (Hillman, 2013). Women represent an untapped resource that could help drive technology even further forward (Yoo, 2015).

This study aims to identify how mentor relationships affect women and what it means to them in STEM fields to understanding how this might be a determining factor in increasing women persisting in these career fields. Specifically, this study hopes to identify ways these relationships can be optimized to help offer women long-term career development and increase their STEM success. Any initiative to lead a change may be able to use the knowledge gained from this research study to spread this new information and hopefully help to increase the number of women representation and effectiveness in STEM.

Purpose of the Study

The purpose of this study is to explore what characteristics of mentoring make an impact on women professionals in STEM and how mentoring can make a positive difference in women's career trajectory. With only one quarter of STEM professionals are represented by women, there is a large amount of room for growth (*The National Science Foundation*, 2015). In addition, the study will indicate the challenges and opportunities presented when mentoring is a factor for career development. Men are included in the study to see if and when men and women differ in their responses. This study includes a diversity of men and women including differences in age, race, religious affiliation, and culture. However, the focus of the analysis is on how mentoring can support career growth and benefit women in the workplace.

In this study, surveys were used to easily target a wide range of technical individuals in one particular corporation. The survey included questions from three sub-categories: importance of career development, impact of mentor relationships and criteria of mentor(s). Subsequently, volunteers were solicited to identify if there were characteristics that were more salient for men versus women. The purpose of including a diversity of individuals was to recognize potential differences between men and women, and also differences among women and among men as groups. This work assessed whether or not mentors are influential, to what degree they may be influential, and what traits help optimize the relationships success. Furthermore, the work connects critical mentorships with long-term career development. A larger survey sample pool led to development of an overarching picture of mentoring in the STEM profession. The follow-up smaller, more targeted sample identified for interviews allowed for more particular details to be discovered, as well as a clear path forward for all those interested in increasing the total number of women in STEM.

Significance of the Study

Understanding the relationship and impact of mentors and mentoring to women will allow for a better understanding of what can help lead women to success in the workplace. This includes giving companies the tools to be able to build sustainable mentor programs. Opening the door to identifying what women can do to improve their chances of career advancement helps to yield a higher number of women sustaining longer careers in STEM. It can also open the opportunity to increase the number of women in leadership roles. This can most effectively be done by learning and maximizing the benefits women gain from mentorships and how mentoring impacts career trajectory. Having opportunities to form career mentor bonds early on will foster opportunities for women's future success.

Research Questions

Based on the literature analyzed by the researcher in Chapter 2 and the background information collected in Chapter 1, the following questions are used as the building blocks for this report.

1. What does mentoring look like for individuals in STEM?
    a. How do mentorships form?
    b. What are the needs of the mentee?
    c. What does the mentor look like?
    d. What is the frequency of their meetings?
2. How does mentoring evolve to impact career development?
    a. Who guides mentorships?
    b. What is the influence of mentoring on career development?
    c. What types of mentoring exists?
3. What is the significance of mentoring for women in STEM careers?
    a. Do women help other women in STEM roles?
    b. What external factors influence women's decisions?
    c. How does mentoring impact career choices?

Conceptual Framework

In order to understand the role that mentoring is assumed to play in the workplace and what role it actually plays for women in STEM fields, it is necessary to understand 1) the gendered nature of both education for women and the gendereed nature of the STEM field specifically; and 2) what impacts women's career path in the labor force in STEM fields. This is studied by analyzing literature covering the background of STEM and how it connects to women in the STEM workforce and studying career development, which is one path to career growth. Chapter 2 outlines these two pieces of literature and then positions the research on mentoring for women in STEM careers at the interesection of the two. See Figure 1 for a visual display of this conceptual framework. Understanding the impact and how these three elements are connected the first step in maximizing this research.

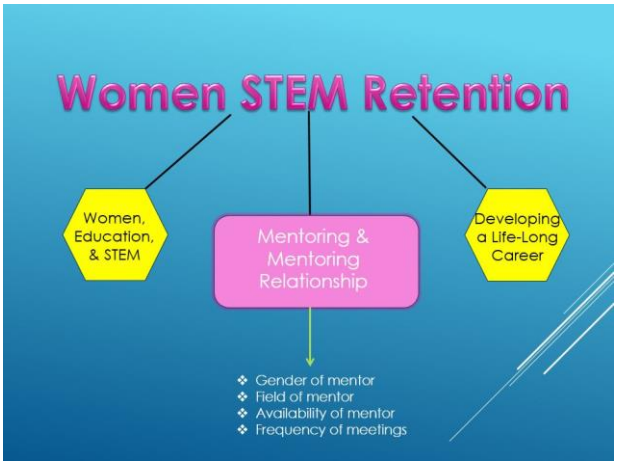

Figure 1 - Path to women in STEM retention.

A note on mentoring. To many people, mentoring is an important relationship affecting the decisions people make. Research shows it is not only important to women in STEM, but the relationships that develop between a mentor/mentee can be critical in influencing peoples' perceptions across disciplines (Shaughnessy, 2013). For women, the opportunity to have another woman to look up to helps younger generations to "shatter the glass ceiling" (Shaughnessy, 2013). Mentors can also help women learn how to counter the structures working against them in

STEM (Keating, 2002). Some companies have already implemented a formal mentorship process, however, research shows that not all women make good mentors. In fact forcing women into the role of being a mentor can damage younger women just as much, if not more so, than not having one at all (Keating, 2002).

The history of mentoring has been in the form of informal relationship, while now it has transitioned to something more formal with scheduled meetings and set discussion topics. California Institute of Technology completed a research study, which measured the retention rate of women in graduate and postdoc programs before and after female to female mentor pairing (McBride, 2003). The University made the assumption that women mentoring women would yield the best results and did not compare men to women mentor pairing. With the women to women pairing, Call Tech experienced a higher rate of retention and success for their female graduate and postdoc students than they ever had in previous years suggesting mentoring in fact made a difference in their academic careers (McBride, 2003). On the other hand, negative mentoring experiences can also generate additional workplace stress, have just as much influence over a mentee's career decisions, and lower job satisfactions (Eby, Buits, Lockwood, & Simon, 2004). Thus, developing an understanding of what makes up a positive mentoring experience for all parties participating is essential.

Frequency of meetings can also vary significantly and may lead do a difference between men and women or have an impact on mentoring relationship satisfaction. Research has been done to support that there are varying frequencies of meeting based on the numerous stages of a mentoring relationship, however, there may also be a different need for women compared to men (Ensher & Murphy, 2011). The quality and quantity of the mentorships and what occurs in these meetings are also a large factor as to whether or not having a mentor or mentors make a difference. Generating a positive environment is essential to the ultimate success of any type of mentorship pairing.

The differences of between the mentor and mentee that can impact mentoring relationships include age differences, race, class, nationality, and ethnicity (Crossman 2015). There are three different generations predominantly making up today's workforce and are all expected to have the same needs although they are all very different and the workplace would benefit from incorporating these differences ("How to Manage Different Generations", 2016). Although this is a difference that is often ignored it can lead to generational conflict because the assumed same sex pairing may not be as effective as may be previously assumed. More commonly studied is the heritage difference between Caucasians, Africans, Asians, Hispanics, Indians, and every other represented female groups in the United States. Race influence can be a strong influence on women starting as young girls and continuing into their careers. Mentors with diverse cultural backgrounds can be invaluable to helping young women progress in STEM (Brandt, 2014). Ultimately, there are differences among women in STEM that have yet to be identified and if they are not identified could lead to women's success or demise in a high profile field. When considering mentorships, one must also observe the inherent differences between women, not just between women and men to improve the likelihood of women's professional success.

Studies have shown that diversity in the workplace increasing profitability in the long term (Schipani, Dworkin, Kwolek-Folland, & Maurer, 2009; Adams, 2014). Although it is not fully understood why, organizations who have more women in executive level roles make up the top 20% of high financial performers (Adams, 2014). Tools such as mentoring and networking are two of the most popular methods of helping to facilitate the retention of women in careers and suggested to be possible solutions to further leadership advancement (Schipani, Dworkin, Kwolek-Folland, & Maurer, 2009). Women who currently reside in upper level leadership roles emphasized the importance of mentoring in their careers and how they helped guide their pathway in the workplace (Schipani, Dworkin, Kwolek-Folland, & Maurer, 2009). Facilitating

mentorship pairing for women can help retain women in STEM as well as lead them towards a long-term, potentially upwardly mobile career in these fields. Keys to the most successful mentor relationships is a continued area of study that should be explored.

Companies across the country struggle to offer career development options and grapple with keeping talent long term. Offering career development options allows for employees to identify which values are important to them, which direction they should take their career, and what would be the employee's ideal job role (van de Ven, 2007). In addition, the need for greater flexibility for the sake of family is a hurdler women often face in the workforce (*Chemical Engineering Progress*, 2009). Lack of models to demonstrate that women can have a proper work/life balance as well as a career trajectory can be an area of improvement when focusing on women's retention in the technical workplace. With an average of 32% of women receiving Ph.D.'s in STEM related fields, there is an obvious disconnect between where women are and where they could be since only a quarter of STEM professionals are comprised of women in all positions (*The National Science Foundation*, 2015). Women's doubt in ability to maintain long term STEM careers is truly hindering the whole United States because of the lack of development and support offered.

Definitions of Terms

The following definitions are pertinent terms that guide this study:

Career Development: Process of increasing learning and understanding to make advances in one's position in an organization

Mentee: Individual who is predominately guided, or mentored, by another individual. Can also offer feedback.

Mentor: Individual who predominately gives guidance, passes experience, or makes suggestions to a mentee. Can also receive feedback.

Mentorship: A personal developmental relationship in which a more experienced or more knowledgeable person helps to guide a less experienced or less knowledgeable person.

Self-efficacy: The belief or confidence in an individual's ability to make decisions or ability in a specific career field.

STEM: Science (biological and physical sciences), technology, engineering and mathematics.

Technical: Term used to describe STEM related job functions in an organization

Assumptions

Mentoring has been proven to be an effective tool, however, the actual impact on technical organizations is unknown (Reisz, 2004). Even with companies that have programs in place, there is currently no information that indicates exactly how mentorship programs should be laid out, who should be a part of these programs, or how much involvement executives should have on the follow through of the programs, which is laid out through Chapter 2. Regardless, this research assumes that there should be programs in place and all individuals should be a part of them. The study looks to identify what traits in a mentor would help facilitate success and what the meetings should look like to obtain the best results from the relationships that form.

In this research, it is assumed that all individuals are looking to others for guidance and feedback on performance. This postulation coupled with the lower percentage of women present in STEM careers at the organization of study, forced the researcher to observe both men and women in order to gain a general understanding of mentoring in STEM fields. Second, due to the methods of collecting data and desire to protect the identities of the participants, findings are generalized instead of specific to a particular race, age, or other identifying criteria. The researcher assumed there was no distinction between the needs of women of different races or education. Third, the document analysis was conducted on only information provided through

the human resources department. The researcher did not question additional consultants or outside parties to confirm or deny these were the only resources available. Finally, all of the research was collected from one corporation due to resources that were available. Further study of other organizations may help to support or challenge the findings discovered in this analysis.

The biggest assumption the researcher had going into the study was that there was a definite relationship between mentoring and career development. Throughout the study, the researcher identifies relationships that are applicable to the organization studied but may not apply to additional technical organizations. Lastly, this relationship was anticipated to have a large impact on retention of women in STEM. These theories were supported in this research through studying one organization.

Summary

While women are graduating from college in the STEM fields at the same rate as men and entering those careers, their numbers in management do not reflect the numbers of people who statistically should appear in those fields. The literature suggests there is clear discrimination affecting women's choices and opportunities. This study is about the role that mentoring is assumed to play in helping women navigate STEM careers in order to improve opportunities available to them. Although mentoring is not the only tool to help improve the gender gap present in the STEM workforce where women only represent 26% of the total work population, it is the focus of this study (Hyer, 2013). Then outline what Chapter 2, 3 and 4 will do.

The next chapter discusses the mentoring in detail and how it is connected to career development and the growth of women. It also highlights the importance of continuing to support women in STEM fields and why it matters to address this gap. Retention issues cost corporations thousands per year, in addition to the impact of the lost talent, making the focus on

women even more critical for all involved (Lamber, 2003). In the literature review, the researcher shows how mentoring can be used as a tool to develop women and provide a path to long term careers in the STEM profession.

Through the use of a mixed methods approach, this research searches to identify what mentoring looks like for individuals in STEM, how mentoring impact career development, and what the significance of mentoring is for women in STEM. The main focus is on one particular chemical organization and the employees who work in the STEM focused departments. Using a document analysis, survey design, and interviews, findings show there is a relationship between mentoring and career development for women in STEM job roles. This study provides additional insight into what can be done to close the present gap that exists.

Chapter 2

Introduction

Regardless of the strides made with women in the workplace, the battle is not over. This chapter begins by discussing why it is important to increase women in the STEM fields and what benefits exist in making the current gap a focus. This research suggests mentoring and opportunities for career development as a method of closing this gap. These three aspects are what comprise the streams of literature discussed and how they relate to women's success.

Research shows women represents half of the total U.S. population yet only 28% represent of those working in science, math, technology, and engineering, and offering solutions on how to increase this low representation has become a welcomed find (See Figure 2) (*The National Science Foundation*, 2015; Hyer, 2013). This has led to an increasing number of investigations of the women who have selected STEM careers in hopes to identify reasons or influences behind their choices to remain or leave STEM professions. Mentoring can be critical to changing the organizational culture of an environment and enhancing the needs of those residing in a workplace (Thomas, Bystydzienski, & Desai, 2015). Paying closer attention to women in the workplace by offering tools such as career development and mentoring can help bridge the current gap that exists.

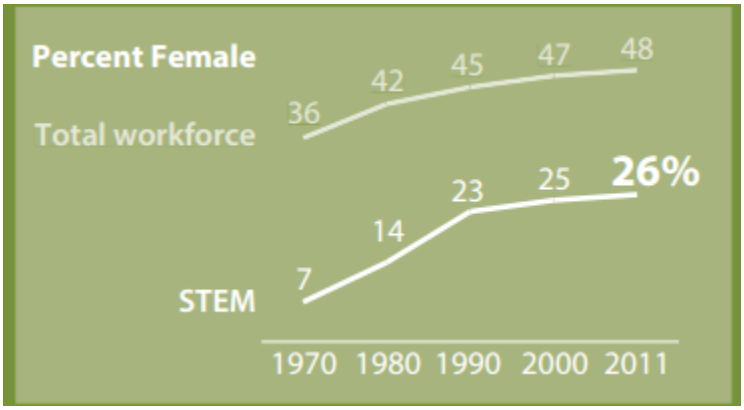

Figure 2 - From the U.S. Census Bureau showing the lower percentage of women in STEM compared to their representation in the total workforce (Hyer, 2013)

Research shows that women experience many hurdles in STEM fields, including lack of career opportunities or a confusing career path which may alter expectations (Creed & Hughes, 2012). Studies indicate that one of the top three reasons an individual decides to leave a job is due to lack of career opportunities (Davis, 2015). It starts with a lack of engagement and desire to continue investing time into a position until the individual ultimately exits the role or organization (Davis, 2015). Women who are more likely to overcome these hurdles had a higher level of self-efficacy and were more motivated to conquer challenges they faced (Buse, Bilimoria, & Perelli, 2013). Furthermore, employees with mentoring experiences help enable career mobility, increase enjoyment in one's job, and help allow an individual to persist in a position or field (Shaughnessy, 2013). Since mentoring can have some influence on career development and a lack of career development can lead to individuals exiting a field, a relationship can be formed between these two concepts and how they impact women.

This chapter discusses the fundamentals of these three topics and provides a better understanding of how mentoring can be used to bridge career development and women's retention in STEM. Mentoring allows for knowledge transfer and can serve as a vehicle to help guide women through barriers they may face during their career. Identifying the impact of mentoring on career retention for women in STEM and the characteristics that help classify a good mentor are important pieces to offering a path to victory and decreasing the gender gap in STEM fields. Specifically, this research will address why having women in STEM is important and why the lack of presence in STEM is significant, why career development is important to retention, and how mentoring can be used as a stop-gap, as illustrated in Figure 1.

STEM, Education, and Women

It is essential to this research to first understand what STEM is, what education is necessary to succeed in this area, and what it looks like for women in the STEM workplace. The

occupations that are encompassed in the "STEM" acronym, which stands for Science, Technology, Engineering, and Mathematics are widely disputed. Those disciplines that fall under "science" can be categorized under both the social sciences, life sciences, and physical sciences. For this study, the most commonly defined occupations as determined by "Development and Evaluation of STEM Interest and Self-Efficacy Tests" will be used as a standard of reference (See Figure 3). More women are present in life sciences than any other category, as shown in Figure 6. Although previous studies hypothesized the additional presence of math in the other STEM fields are what causes women to stray away from these subjects, research shows that women are simply not as interested in these other subjects (Hill, Corbett & St. Rose, 2010). Physical science and life science also tend to require graduate level education over technology, engineering, and mathematic professions which favor more work experience. Identifying what can sway the minds of the women in the United States is the first step towards moving in the right direction and closing the gender gap that exists. Offering mentoring as a solution could address such a dilemma.

Physical science	Life science	Technology	Engineering	Mathematics
Astronomer	Agricultural and food scientist	Computer security specialist	Aerospace Engineer	Accountant and Auditor
Atmospheric and space scientist	Animal scientist, zoologist, and veterinarian	Computer and network system analyst	Architect	Actuary
Biochemist/ biophysicist	Biologist	Computer programmer	Biomedical engineer	Computer scientist
Chemist	Dietician/nutritionist[a]	Computer software engineer	Chemical engineer	Cost estimator
Environmental scientist	Microbiologist	Database administrator	Civil engineer	Epidemiologist
Geoscientist	Registered nurse[a]	Drafter	Computer hardware engineer	Mathematician
Physicist	Pharmacist[a]		Electrical engineer	Operations research analyst
	Physician, dentist, and related careers[a]		Industrial engineer	Statistician
	Medical and laboratory technologist[a]		Mechanical engineer	

[a]Indicates majors or careers that have a high component of science courses as part of their curriculum but are not traditionally considered part STEM fields.

Figure 3 - List of occupations which are categorized under the STEM acronym. (Milner, Horan, & Tracey, 2014).

In order to address the disparities, a movement to encourage more women to pursue STEM careers began in 1991 when the U.S. Department of Labor launched the Glass Ceiling Commission to try to stop the prejudice against qualified women advancing in the work place (U.S. Bureau of Labor Statistics, 2013). Shortly thereafter, "Take Our Daughters to Work Day" was introduced in hopes of introducing young girls to the many possibilities they had for careers outside of the stereotypical professions.

While the effects of these campaigns are not causal, by 1999, the notion that women worked outside the home, and in STEM related fields was no longer a strange notion. By 1999, 60% of women across the United States had jobs outside of the home and doctorate degrees received by women increased to 40% of graduates (U.S. Bureau of Labor Statistics, 2013). In 2000, 37% of those working in life and physical science were women, 42% in mathematics, 10% in engineering, and 29% in computer science (Landivar, 2013a). In the late 1990s when women's presence in STEM careers began to be tracked, a new concern surfaced: women were entering the labor force, but they made up far less than half of the total possible in each STEM discipline.

Although women are increasing their prominence in industry overall in the technical segment of the workforce, women still only represent 28% of science, math, engineering, and technology related fields (*The National Science Foundation*, 2015). In 2011, 45% of the STEM population was represented by women in the life and physical sciences, 47% in math, 27% in computer sciences, and 13% in the engineering fields (Landivar, 2013a). This was an increase from the 28% in biological sciences in 1998 but only a small increase in the engineering fields (*The National Science Foundation*, 2002; Hill, Corbett & St. Rose, 2010).

While the numbers are still unequal overall, there is even more disparity for minority women. In 2011, black women represented 6% of the STEM workforce and Hispanic women made up only 7% (Landivar, 2013a). Age is another factor affecting low numbers of women in

STEM. Most notably is the slight downward trend of women over the age of 50. Though over the past thirty years there has been an increase in women in STEM professions, once women pass the age of 50 years old, there presence in STEM begins to decline over the course of a normal career expectancy (See Figure 4) (Landivar, 2013a). Anticipated career retirement age is 66, according to recent Gallup polls (Brandon, 2014). This suggests that even when women are in STEM careers for a majority of their professional lives, they are still exiting the technical field. Together this information supports the additional attention drawn to the need of continuing support for women STEM professionals through the duration of their careers.

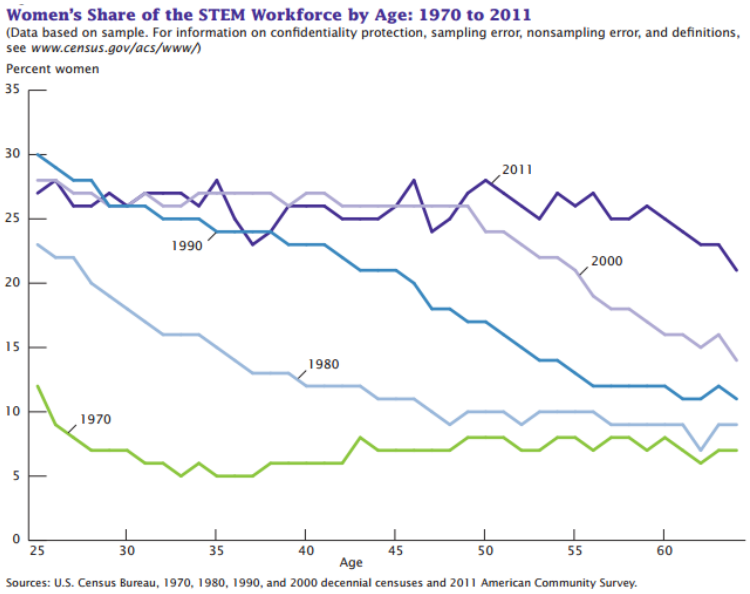

Figure 4 - Graph of women between the ages of 25-60 in STEM over 40 years. (Landivar, 2013a).

Regardless of the increase of women in the social sciences, lower turnout in engineering, computer science, and mathematics, has kept the issue of women in STEM on the radar. The education system has done a great job encouraging girls and young women to graduate with STEM degrees but their success in educational attainment does not translate when it comes to the workplace (Beede, Julian, Langdon, McKittrick, Khan, Doms, 2011). This is despite the fact that women in STEM make 33% more per year in salary than women who are in non-STEM

jobs, particularly in the higher level STEM positions (Beede et. al, 2011). Since almost half of households have women in the position of the maintaining the higher level of salary in the family, offering an opportunity for women to continue to climb would be extremely beneficial (Wang, Parker, Taylor, 2013).

Unyielding efforts have been made to increase the presence of women in STEM, beginning at an early age. Regretfully, this initiative is struggling to hold for them in the workplace. The decline of women in STEM over time indicates women are entering the field and leaving for unknown reasons. This section discusses why it is so important to continue to try to retain women and what impact they have on the industry.

Why STEM Developed and its Importance

Congress, in 2007, passed the America COMPETES Act, which was meant to increase the competitiveness of STEM by promoting STEM education and increasing funding for research investment. This act was renewed in 2010, as the United States government continued to feel as though supporting STEM was an important need to increase the country's global competitiveness (Beede et. al, 2011). The National Academy of Sciences/Engineering also asked for more funding for college and graduate education and research and development in this area. Colleges are also independently offering incentive programs for women to enter these under represented fields. STEM careers are considered to be job positions that help to build, transform, and drive the world. In order to continue to improve the United States, directing attention towards STEM is critical.

The modern day STEM acronym was first coined in the 1990s by the National Science Foundation (Bybee, 2013). Buzz began developing around STEM because there was a lack of activity around technology and engineering in school programs, which was in-turn causing a low number of science, technology, math, and engineering college graduates. Although it was

argued that technology and engineering were wrapped up under the science category, not enough time is spent on science subjects in schools, let alone all three disciplines during a student's time spent in grade school education. The purpose of separating all four of these fields is to develop the content and practices of each subject (Bybee, 2013). It is argued whether or not science educators, medical professionals, and social scientists are considered to be represented in STEM, however, the Economics and Statistics Administration only considers medical professionals to as a part of the STEM movement (Beede et. al, 2011). Specifically, fifty occupations have been identified as STEM careers and have been designated standard occupational classification codes, which are highlighted in Figure 5 (Beede et. al, 2011).

The more recent reform of STEM in education stands out from previous attempts to modifying education because of its growing importance and sudden need of professionals around the globe in these content areas (Bybee, 2013). This need for STEM experts adds a new emphasis on addressing this growth area and reaching out to individuals that leaders of the world have never before tried to expand. Developing STEM is important because of four underlying themes (Bybee, 2013):

1. Addressing global challenges that people of today must understand
2. Changing perceptions of the environment and associated problems
3. Becoming aware of the 21st century workforce skills and
4. Continuing issues of national security and being able to stay ahead

Though many realize the importance of more people entering STEM, encouraging people to choose these fields and develop careers in these areas has proven to be difficult. It has served as more of a rallying point for politicians and has had less movement in the educational fields (Bybee, 2013). The low representation of women in STEM has truly proven to be a large issue with only small gains of progress. Not only are women's discoveries as impactful as men's

discoveries but they can also bring an alternative perspective that is currently being missed in the workplace (Sotudeh & Khoshian, 2014).

Long-term efforts have been made to increase women's presence in college graduate STEM programs. The need for workplace reform has become necessary because of the huge impact that having an education has on STEM jobs. Compared to non-STEM workers, 61% are represented by less than a high school diploma, a high school diploma, or some college and only 31% have a bachelor's degree to a doctorate degree. Of those currently working in STEM roles for both men and women, 42% have a bachelor's degree and 21% have a master's degree, while only 21% have less than college degree (Landivar, 2013b). Focusing on each discipline inside of STEM and emphasizing to students the magnitude of sticking to STEM while in college and onward is vital to bridging the gap of women choosing STEM. This indicates that education is critical to both women and men entering STEM careers who desire lifelong jobs in this field.

Education's Initial Effect on STEM

For science and engineering graduates, three in four graduates are not working in STEM related fields, regardless of the time and effort spent obtaining their undergraduate degrees (Hyer, 2013). Instead, they are heading towards management, law, education, and accounting. This is often because science and engineering require even more education than simply an undergraduate degree (Hyer, 2013). Although there are 141 women enrolled in some sort of graduate school to every 100 men, in STEM based fields, women are not as prevalent (Perry, 2013). Women have a higher likelihood of obtaining a graduate degree is a specialty outside of STEM roles as opposed to choosing one of them, as shown in Figure 5 (Perry, 2013). Then, when women go up against men in the workforce, women begin to fall behind and hit a glass ceiling because they do not hold graduate degrees in these STEM fields. Because of the current

structure of the technology field, the added education is considered to be necessary over general work experience to hold higher level positions.

Total Graduate School Enrollment, By Field and Gender, 2012

Field	Male	Female
Arts and Humanities	43.5%	**56.5%**
Biological, Agricultural Sciences	46.5%	**53.5%**
Business	55.2%	44.8%
Education	25.5%	**74.5%**
Engineering	76.7%	23.3%
Health Sciences	22.1%	**77.9%**
Mathematics and Computer Sciences	70.9%	29.1%
Physical Sciences	62.8%	37.2%
Public Administration	24.5%	**75.5%**
Social, Behavioral Sciences	37.7%	**62.3%**
Other Fields	39.7%	**60.3%**
Total	**41.5%**	**58.5%**

Source: Council of Graduate Schools

Figure 5 - Percentage of students with graduate degrees with STEM fields highlighted (Perry, 2013)

Because obtaining education can be so impactful for any individual entering a STEM field, looking at what other factors aid to why there are less women being retained in STEM careers becomes even more important. For first year college students, male and female, in a four-year institution, about 48% express interest in majoring in one of the many possible STEM fields (U.S. Department of Education, 2014). Before even taking their first STEM class, there is an inequity of percentages of males who want to major in STEM compared to women who want to enter STEM (See Figure 6) (Hill et al., 2010). Women from all races are hesitant to enter the STEM field almost immediately after beginning college. Of the total number of students who have intent on obtaining STEM majors, only 81.5% of students actually complete any of the courses required to acquire a STEM degree (U.S. Department of Education, 2014). From all of the students who successfully completed a STEM course, 92.4% switched majors *away* from STEM after only their first year in college. Not only is there a large percentage of total students

who leave STEM, but studies have found that women leave these fields at an even higher rate than men (U.S. Department of Education, 2014). Lack of interest in STEM classes and lack of a strong social connection has women drifting away even faster than men before they even exit college (Thoman, Arizaga, Smith, Story & Soncuya, 2013).

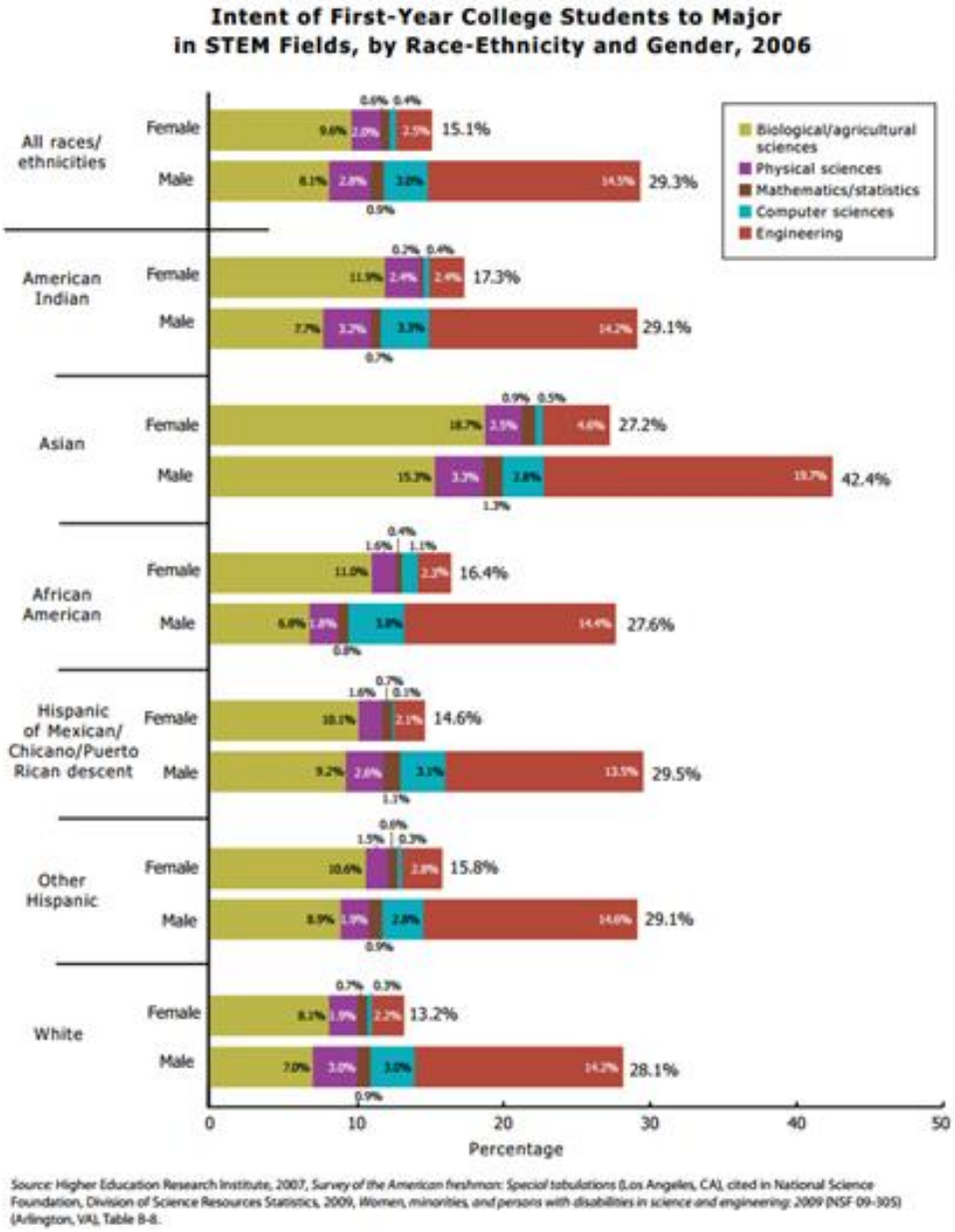

Figure 6 - First year college students looking to enter STEM separated by gender and ethnicity (Hill et al., 2010)

Data shows that students who attend larger, less selective schools tend to drop out of STEM degree plans at a higher rate than students in smaller, more selective schools (U.S. Department of Education, 2014). Females who chose STEM in private institutions also fared better than those who chose public institutions (U.S. Department of Education, 2014). This would suggest that the larger colleges offered less support to their students than the smaller institutions by simply acknowledging the size differences between universities. Having support through advisors, counselors, and role models for students in STEM is suggested to be the key to raising these numbers (U.S. Department of Education, 2014). Many believe this assumption can in turn be translated to individuals in the workplace. Further support of women while growing their careers may also lead to raised numbers of women persisting throughout their professional lifetime instead of leaving early. With the United States unemployment rate estimated to be 6.5% among people actively looking for jobs and 6.2% of total available jobs are STEM professionals, more women being encouraged towards STEM could help lower these statistics (Landivar, 2013a; DiMaria, 2013).

Women and STEM

Understanding why women are so critical to the STEM industry is fundamental to gaining more support for focusing on resolving the gap that currently exists. Once the education hurdle is crossed and women make it into the workforce, there is still a large difference in the percentage of men in STEM job roles verses women who only represent 26% of the available functions. In the world today, about five million people, or roughly 4% of the total population, work in a STEM related field (Hill et al., 2010). Although this is a relatively small portion of the jobs available, STEM is currently the area anticipated to grow the most within the next five years and could benefit from incorporating more diversity (Hill et al., 2010). Enticing women into the

STEM fields is key to maximizing productivity in these areas and further increasing innovation (Corbett, 2011).

Representation of women has increased over the past twenty years particularly in life sciences. On the other hand, when the numbers are looked at closely, women are still remaining in the lower faculty ranks or corporate position. Of people with doctorate degrees in STEM fields, only 29% are females working full time in the sciences, compared to 62% of males with doctorate degrees who work full time (Hill et al., 2010). Similarly, only 15% of women who receive their doctorates in technology work full time, while 79% of men with doctorates work full time (Hill et al., 2010). For example, in 1996, women made up 42% of individuals who graduated with doctoral degrees in biology, yet ten years later in 2006, only 25% became tenured faculty (Hill et al., 2010). Even with their advanced degrees, most female graduates are still in lower position jobs or not working in STEM fields at all. This further supports the gap that is existing in all STEM job functions, not just in the corporate world.

Some of the biggest challenges in the world, such as making sure there is fresh drinking water, are currently being analyzed by STEM experts. However, an aspect of STEM innovation that can go unnoticed is the challenges that STEM professionals must solve that impact men and women differently. For example, women are more likely than men to be misdiagnosed in the hospital and sent home because the side effects medications have on men versus women are different (Del Giudice, 2014). Studies are more often completed on the male species and therefore female anatomy differences are ignored. Providing an alternative perspective by introducing more women into these work groups earlier on may help to stop overlooking these challenges.

To get true perspective and optimize the amount of creativity and innovation resulting from these esteemed groups of colleagues, it is important to have a representation of all ethnicities and both genders (Corbett, 2011). Research indicates that having women

representation on director boards in organizations help to enhance trust and legitimacy for shareholders because an alternative voice breaks up the monotony of what an all-male board would otherwise offer (Perrault, 2015). It is important to have the presence of women in larger quantities to help give women a stronger voice in these disciplines. Lower percentages of women can lead to a smaller impact simply because they are out-numbered. The continued focus allows for women in upcoming generations to continue to excel and break through future barriers.

Over the past forty years women have moved from being focused on caring for the home to being the primary source of the family income. In families today, 61% of mother's have a similar level of education to their spouses and 23% of two-parent families have women who are more educated than their male counterpart (Wang, Parker, Taylor, 2013). Of all households in 2011, 40% of them had women who were responsible for maintaining the higher level of income or sole income in families and single mom households (Wang, Parker, Taylor, 2013). This makes it even more important to encourage women to pursue STEM careers where the average salary is higher than in non-STEM job roles. In order for a change initiative to begin, corporations must be invested in a minimum of a three year change plan that is committed to by all parties (Barton, 2015). Because of long term focus, companies are not focusing on how important it is to highlight and focus on promoting more women in STEM (Barton, 2015). Launching and focusing on new initiatives while maintain the importance and value behind increasing the percentage of women in STEM is paramount to bridging the current gap that exists.

Women and Career Development

In a lifetime, individuals will spend more time working than doing almost any other single activity. One of the most researches methods of improving job role retention is through

career development and generation of a documented plan (Gomez, 2014). It allows individuals to develop a better sense of loyalty to his or her colleagues and the organization (Gomez, 2014).

When career development was first established, it was focused on young, Caucasian, males (Cook, Heppner, & O'Brien, 2002). As the climate of the workforce has changed, it has become more relevant to observe the impacts on women and what new aspects should be considered. In addition to gaining the skills necessary to complete job tasks, understanding self-efficacy and how career development is incorporated in career success can help make even more connections between women and sustaining STEM stars.

Influence of Self-Efficacy

The issue of self-efficacy is a concept often overlooked when considering the career path of women (Betz & Hackett, 2006). Because self-efficacy, or the belief in an individual's ability to produce something, cannot be specifically measured and it greatly impacts the decisions of a man or a woman, other factors are necessary to preemptively help guide individuals in new directions. Self-efficacy has been greatly studied by a number of scholars to explain the range of career development factors such as interests, goals and actions taken (Choi, Park, Yang, Lee, Lee, & Lee, 2011; Lent, Brown, & Hackett, 2000). Research shows that there are two types of self-efficacy, content domain of self-efficacy which is doubt in a specific career field, and process domain self-efficacy which is doubt in making decisions. Depending on the importance of performance, environmental factors, and a few other concepts, self-efficacy can have a greater or less impact on the individual in both circumstances (Choi et al., 2011). In STEM, where driving results and high pressure atmospheres are common, self-efficacy can have an impact making the importance of career development that much more important.

Since self-efficacy has been correlated to career decision making, it becomes a worthy point of discussion when considering factors to keep women in STEM professions (Milner, Horan, & Tracey, 2014). A STEM Career Interest Test and a STEM Career Self-Efficacy Test were developed in order to gage the relationship and identify what can be done to increase self-efficacy and the desire to retain in STEM (Milner, Horan, & Tracey, 2014). In a recent study, 213 students were measured in regards to their interest and confidence in STEM against their ability to do well in the same subjects. Results showed that a strong relationship was discovered, indicating a higher self-efficacy in STEM yielded a higher level of performance (Milner, Horan, & Tracey, 2014). Further understanding of how to increase self-efficacy may lead to a stronger female STEM job retention by using tools that impact self-efficacy. One method of understanding and increasing self-efficacy is through documented career development plans.

Research shows that individuals have a more positive attitude towards STEM when there is a perception of diversity (Fulmer, 2014). The reasons behind this are specifically unknown, yet 582 students surveyed from different universities around the United States help determine this fact. The challenges of work/life balance have added to the difficulties of women being able to be present in STEM and help form that positive attitude (Sotudeh & Khoshian, 2014). Family hurdlers, particularly when children are involved, cause women to exit academia between postdoctoral studies and faculty employment, which can be translated to the corporate workplace (Sotudeh & Khoshian, 2014). Although research shows that women with children produced more scientific creations than women without children, many women do not believe this to be true (Sotudeh & Khoshian, 2014). Focus on self-efficacy in both the career field and career decisions can help squash this negative preconceived notion and promote the good work that is done by women.

Career Development

In the workplace today, individuals are looking for more than a job but also a fulfilling career that satisfies professional and personal needs (Berger & Berger, 2011). Employees are looking for career growth, supportive manager, and meaningful work to help keep them committed to what they do (Berger & Berger, 2011). Talent and development has long been discussed in corporate America as important to retaining employees in the workplace and a feasible option to satisfying these needs. This is especially true for women in STEM because of the high turnover rate companies already face. Women face a higher commitment to their job and company as well as maintain a better work/life balance when they have had the opportunity to develop (Kaminski & Reilly, 2004). Addressing softer skills such as working with others is not often a factor in individual appraisals and the impact of addressing the needs of females is forgotten (Kaminski & Reilly, 2004). Having the opportunity to work on more than just the tasks necessary to complete job related tasks helps generate job satisfaction (Berger & Berger, 2011).

Career development is considered to be a collaborative relationship that occurs between the organization and the individual (Hite & McDonald, 2008). The relationships formed in a woman's career can have a big impact on their personal and career development as well as their career decisions (Lalande, Crozier, & Davey, 2000). Development requires growth and constant expansion of one's skills, which if fostered, can lead to an improved perceived attitude towards work-related experiences (Hite & McDonald, 2008). Although career development is led by the individual, encouraging tools that will help women create a career plan will help them lead more sustainable, life-long careers (Lalande, Crozier, & Davey, 2000).

STEM careers are anticipated to grow another 18% in the next four years alone so encouraging all people towards these technical fields is a necessity (Kier, Blanchard, & Albert, 2014; DiMaria, 2013). Programs around the United States are being launched to help women

break the traditional mold and gender and racial divides to get all individuals on board and working together (*Community College Journal*, 2012). Using a popular development tool, particularly mentoring, can help influence women to remain in STEM careers for the duration of their careers and in turn help to expand the growing innovation in STEM.

Women and Mentoring in STEM

Research shows that self-efficacy issues and career development can be influenced by a third party, which could be represented by a mentor. For example, in career development, managers are used to generate commitment among employees (Berger & Berger, 2011). A manager can serve as a mentor or as a link to future mentors that can continue to facilitate that positive attitude. Furthermore, a positive attitude can lead to an improved self-efficacy perception. Although these may be factors that impact all individuals, women can leverage this knowledge to improve their standing in the STEM corporate environment. Developing an understanding of mentoring can help to bridge the connections between women, self-efficacy, and career development.

Mentoring has been defined in different ways by different scholars. This study defines mentoring as a relationship established between a mentor and a mentee, or a coach and his or her athlete (Gehrke, 1988). A mentor works to advise and teach his or her mentee while giving feedback and rehearsing strategies (Gehrke, 1988). The mentor offers opportunities to try new things and helps to open doors that one would struggle to open otherwise (Gehrke, 1988). Often times the mentor acts as a protector and attempts to deflect blame until the mentee can become independent and in turn mentor others (Gehrke, 1988). Most of all, a mentor believes in their mentee and offers emotional support, even if physical meetings are infrequent (Gehrke, 1988). The gift of mentorship can affect not only the mentee but also the mentor by them both learning from each other, as long as both parties are open to the idea.

Impact of Mentoring.

Because of the great diversity now present in the workplace, mentoring has made a large impact on the new talent entering the workplace (Shaugnessy, 2013). Relationships can offer advice and guidance in relation to both career and personal development. Mentoring has become increasingly more important as a development tool with more women in the workforce and the desire to address the different needs that exist in a diverse culture. There is still an issue, however, with women not progressing in their careers as quickly or rising as high as males are in the same roles (Shaugnessy, 2013). Research suggests that there both negative and positive mentoring experiences that can occur and impact a career in different ways. This study looks to investigate what factors may help to encourage more positive relationships and help women navigate less helpful affiliations.

One option in fostering helpful mentorships is by individuals developing a network of guiding individuals instead of depending on only one. Increasing the mentoring network is essential in decreasing the gap that exists in STEM but the relationships must be developed effectively with clear goals in mind. Creating thoughtful mentoring relationships help to facilitate a stronger workplace environment. There are several specific purposes that make mentorship most successful which include (Shaugnessy, 2013):

1. Personal and emotional guidance
2. Coaching
3. Advocacy
4. Career development facilitation
5. Role Modeling strategies and systems advice
6. Learning facilitation and friendship.

Because of the distinct differences between the great diversity in the workplace, the umbrella of mentorship covers the needs of all groups of people. True mentorship programs also offers

encouragement for women to move forward in male dominated workplaces. Also, it is essential that organizations implement actionable mentoring plans as opposed to solely documented agendas.

Scientists concur that the likelihood of younger women staying in science increases when they have a mentor or are actively involved in a mentorship program (McBride, 2003). A large issue that currently exists is the lack of women role models in higher level STEM positions (White, 2007). Although younger women can take men as mentors, because of their different perspective, it may not always be effective (Madell, 2012). Joining female networks can help to give women that support system they are looking for while offering valuable feedback that can lead to longer lived STEM careers (White, 2007). When an individual has the opportunity to share professional goals and ambitions with a mentor, they tend to be the most successful (Sharma & Freeman, 2014). In Caltech, women completing their post-doc in this institution increased 65% just as a result of establishing a clear mentorship (McBride, 2003).

More and more universities are recognizing this as a problem and are developing mentor programs in their undergraduate programs as well as their graduate programs. Virginia Polytechnic Institute, Virginia State University, and Harvey Mudd College all put together a living-learning, mentoring environment for their students who showed interest in STEM their freshman year (*NSTA Reports*, 2012). They grouped these students with upperclassmen and graduate students based on similar fields of study only. The programs they launched have been studied for the past ten years. Results showed that 82% of the women who participated in their mentorship program graduated with a STEM degree versus 64% of women graduated who did not participate (*NSTA Reports*, 2012). Continuing to evaluate similar programs in different environments and disciplines will help to gain a better understanding of mentoring's impact on women.

With the great initial success this college faced by implementing mentoring programs for STEM, it makes sense to extend these concepts into the workplace. This research looks to observe mentoring in a particular technical corporate environment, with the primarily location in the United States. Currently, over 70% of Fortune 500 companies have some sort of formal mentoring process already in place, though effectiveness of each program has not been analyzed (Murphy & Kram 2014). Of those organizations that have multiple development opportunities, mentoring programs are the lowest program cost option that yields the highest, most influential result (Ramalho, 2014). Mentors offer career, psychosocial and role modeling support to individuals, which allows them to gain confidence in their work, show commitment to their organization, and desire to remain longer in their positions (Murphy & Kram, 2014). Mentoring has been connected to positive organizational socialization and job satisfaction, which improves the atmosphere for all employees. Research suggests that the positive impacts of mentoring is not only felt by those being mentored, but all those they work with (Ragins & Cotton, 1999). Facilitating a positive work environment can take many forms and emphasizing mentorship can help create an optimistic atmosphere

Types of Mentoring Relationships

Scholars debate if there is any difference between women who have male or female mentors. Madell, who interviewed several industry professionals, determined that because of the dearth of women leaders, women have in many cases only had the ability to use men as mentors (Madell, 2012). Mentorships that have been established, however, have proven to be successful for women's career success (Madell, 2012). Alternatively, women mentors can offer a more similar perspective to women mentees and in examples where this does occur, they are much more effective (Madell, 2012). In an optimal situation, research suggests women would select other women for mentors but that is just not always an option (Madell, 2012). Additional

research shows that in Shaugnessy's study, having a mentor is far better than not having a mentor at all and it helps to keep women in STEM longer, regardless of a male or female mentor (Shaugnessy, 2013).

Another contributing factor of different types of mentoring to consider is informal versus formal mentoring strategies. Informal relationships are more spontaneous and unstructured, with those who are more tenacious who receive the mentoring opportunity (Smith, Howard, & Harrington, 2005). There is no guarantee a successful outcome and there is no pressure to force a quantifiable result. On the other hand, formal mentoring is structured and often managed by a third party who identifies pairing in mentoring relationships and determining goals to be met through the relationship (Smith, Howard, & Harrington, 2005). Formal programs focus on including organizational benefits in the relationship and require expert training and guidance to those who participate (*Management Mentors*, 2015). The duration of formal and informal mentoring is another key difference between the two types of relationships with informal mentoring program being a much more sustainable relationship and formal mentoring lasting roughly one-third the length of time (Ragins & Cotton, 1999).

Regardless whether an individual participates in formal or informal mentoring, there are also different ways relationships develop and persist. One example is traditional mentoring versus special project mentoring. These types of relationships address the aspect of time mentor spends with a mentee and in what respect. Traditional mentoring is considered relationship that last throughout a mentees career, regardless of meeting frequency (Clark, 2015). Special project mentoring is only present for projects and are short lived experiences (Clark, 2015). The time spent in a relationship may also be impacted by incorrect pairing or increased mutual benefits discovered by both participants that may elongate or shorten the relationship. Other characteristics of mentoring relationships include frequency of meeting, general attributes or compatibility, and the support given by the corporate organization. Further research is necessary

to identify what traits of mentoring relationships harbor a positive mentorship and which traits have no impact.

Summary

As the literature review has shown, women are identifying STEM fields as a career direction and are enrolled in the education programs necessary for entry to those fields. The field is growing and women are qualified to enter employment, yet they are doing so at lower rates compared to men. Challenges remain with women keeping those jobs and moving up in leadership rank. While there are many barriers to their success, including ascertaining proper work/life balance, overcoming self-efficacy challenges, and identifying the correct individuals to provide career guidance, research suggests that programs promoting career development can help women manage or overcome many barriers. One of the key tools available is "mentoring". Based on review of the mentoring literature, this study focuses on identifying what traits are ideal in mentor, how frequent connections should be made, and what needs must be met by the mentor to make the relationship successful. Furthermore, this research makes connections between how a mentor can influence career development and to what degree. Mentoring programs are growing in popularity at STEM companies, but the current available research is not clear on how relevant mentoring relationships are to women mentees. This study looks to help answer some of those questions and focus the next steps of future investigation. The following chapters look to collect data on these questions and form connections between the topics discussed here.

Chapter 3

Introduction

Women's aptitude for scientific activities have been demonstrated, yet their numbers in STEM fields belie their abilities (Hill, Corbett & St. Rose, 2010). This study highlights relationship between mentorships and career development for women interested in remaining in STEM careers. In this chapter, the overall methodology for this study will be discussed and what methods will be used to collect data. The type of method used to assemble the data to support the research questions is the mixed methods approach. With the triangulation of documents from the corporation being studied, surveys, and interviews, three core research questions were analyzed. These questions were answered by using different data collection approaches. The first two research questions were answered through data collected from the survey and the one-on-one interviews, which are the following:

1. What does mentoring look like for individuals in STEM?
    - How do mentorships form?
    - What are the needs of the mentee?
    - What does the mentor look like?
    - What is the frequency of their meetings?
2. How does mentoring evolve to impact career development?
    - Who guides mentorships?
    - What is the influence of mentoring on career development?
    - What types of mentoring exists?

Next, the final research question was satisfied by solely one-on-one interviews. Using the data collected in this research, the researcher was able to draw several conclusions and identify clear examples supporting the initial inquiries. This question is referenced below:

3. What is the significance of mentoring for women in STEM careers?

- Do women help other women in STEM roles?
- What external factors influence women's decisions?
- How does mentoring impact career choices?

Cumulatively, these questions helped to guide the research and identify what gaps exist in advancing women in STEM careers. The research identified that mentoring, as a part of career development, can positively serve individuals who desire a job in the technical field. Since women tend to leave STEM in greater numbers, they have the most to gain with more improved mentoring and career development opportunities. Throughout the research the use of a mixed methods approach was able to yield the best results.

In this chapter are details supporting the research approach and the design of this study. Quantitative analysis and qualitative theme identification methodology will be used to isolate the responses of participants and turn them into valued data for the findings portion of this study. The rest of this chapter describes the research site, the research design which includes the methods of data collection and analysis, and ethical considerations for conducting the research.

Research Design and Rationale

This research will be analyzed using a mixed methods approach with quantitative questioning and heavily focused qualitative questioning. A mixed methods approach will allow for a better understanding of the research problems and how to answer it (Creswell, 2012). Because of the complexity of the issues of mentoring women in STEM, a better understanding can be developed through the quantitative and qualitative analysis completed in this research design. A triangulation approach was used beginning with analysis of mentoring in the corporation of focus for this study. The information gathered from the human resources department of the corporation focused on helped to generate the questions used in the survey and the interviews. It allowed for the researcher to make references that were specific to the organization as opposed to more general mentoring questions. A survey research design was

used to gather quantitative data from a large population of technical workers from the identified company. A survey was the best way to obtain information in the current state of a population (Janes, 2001). Clearly identifying the variables helped to maximize the amount of useful information collected (Creswell, 2012). The survey followed a convergent parallel mixed methods design. This type of design allowed for both qualitative and quantitative questions to be asked, though primarily quantitative through the survey, in order to simultaneously collect data (Creswell, 2012). Finally, 20 one-on-one interviews, following a qualitative design were completed to gain the bulk of the data for this research. A phenomenological approach was used to identify themes in the interviews.

A mixed methods design allowed for collection of quantitative and qualitative data in multiple phases, which is ideal for conducting a survey followed by interviews, as is in this research study (Creswell, 2012). It allowed for many types of questions to be asked to a larger group of individuals. Researchers have given five specific reasons which encompass why a researcher would select mixed methods. These reasons include triangulation, complementarity, development, initiation and expansion (Hesse-Biber, 2010). For this research, triangulation, complementarity, and development mixed methods approach shaped the information collected. Triangulation is the act of examining different dimensions of a research problem, which was done in this research by observing documentation provided by the organization, conducing a survey to gain broad feedback, and one-on-one interviews to gain detailed, personal perspective (Hesse-Biber, 2010; Creswell, 2012). Complementarity is the desire to gain a fuller understanding or clarifying results by examining different overlapping aspects, which was done through interviewing several individuals and deriving connections (Hesse-Biber, 2010; Creswell, 2012). Finally, development is meant for one aspect of research to help grow another area, which was done by using the document analysis information to drive the survey and interview questions (Hesse-Biber, 2010; Creswell, 2012).

Population Description

The focus of this research was on a chemical company with roughly 6500 employees around the globe. The organization, which will be referred to as Company A in this research, is composed of three main business units. Company A employs technical, business, and corporate workers who range from a number of degree backgrounds, ages, ethnicities, and a number of other qualifications. This research focuses on the specialty chemicals parts of the business, which makes up about 3000 individuals globally. Particularly, the focus was on individuals who are working in STEM job roles. These job roles ranged from lab scientists to plant engineers and included entry-level employees up to the most senior level professionals. A predetermined distribution list was generated by the company and used by the researcher to distribute the survey and collect a sampling for interviews. This research focused on a variety men and women of all different backgrounds with different levels of experience from the technical department in Company A who are located in the United States, which totals about 650 people as of December 2015. Of those individuals targeted, 70% of the population is composed of men and 30% is composed of women.

Site Description and Access

Because of the type of research, a specific location was not necessary to conduct any of the research. The survey was sent to individuals located in Kentucky, Tennessee, Texas, New Jersey, North Carolina, West Virginia, Virginia, Mississippi, and Delaware. Modern computer-based technologies allowed for the documentation to be transferred through the internet, surveys to be distributed through email, and interviews to occur virtually, which allows for the increase of a targeted market (Hesse-Biber, 2010). Since Company A was where the researcher was employed, access to these resources was easily attained. A distribution list consisting of the

individuals in STEM careers available to participate was acquired through the administrators, who kept an active list of employees in the technical department.

Though the lists are updated frequently, some individuals transitioning into business roles may have been incorporated, however they were updated to the best of the organization's knowledge. In order to protect the identity of the participants, particular demographics were not solicited. Any diversification of the population was based on the company's method of hiring. The only information available of these participants was that they worked in one of the nine states listed above and held technical jobs. These technical jobs could range from lab scientist, engineer, statistician, or team leaders. Because of the size of the target, it is anticipated a natural diversity would have blossomed. Individuals who were interviewed were selected on a volunteer basis and the site of meetings were dependent upon the request of the interviewee. All individuals who volunteered to participate in the interview were questioned. Of the 20 interviews, 19 were conducted face-to-face and 1 was conducted remotely over a telephone. Interviews were limited to two locations only based on the volunteers who wanted to participate.

Research Methods

Documents Review and Analysis

Because this is a triangulation study, at least three points of evidence must be provided in order to provide accurate support to the data outlined (Bowne, 2009). The three aspects of analysis were a document review, survey analysis, and interview analysis. Document analysis is an analytical method in qualitative research in order to gain understanding and evaluating information (Bowen, 2009). Those documents that qualify for this type of analysis are any type of documents that contain information pertinent to the study. In this case, the researcher contacted the human resources department of Company A and requested all documents available on mentoring. The HR representative provided 12 documents that covered several aspects of

mentoring, including one-page fliers, training programs for both mentors and mentees, and general outlines for mentoring relationships. For the sake of this research, three particular documents were focused on, which included Mentoring Overview, Mentoring Program – Mentee Guidebook, and Mentoring Program – Mentor Guidebook. These three sets of documents were chosen because they provided a summary of all of the information available. The Mentoring Overview and Mentoring Program – Mentee Guidebook are included for reference in Appendix A. Understanding what processes are in place for Company A helped to understand what programs were in place, how the organization defined career development and mentoring, and what training was available.

The documents that were analyzed included mentoring training programs, essential building blocks for the corporations mentoring system, mentoring action plans, and what the company has determined are the core values of mentoring. Studying these documents offered context and showed the background at this corporation as well as highlight historical mentoring opportunities that have been presented in this organization (Bowen, 2009). It allowed for the researcher to compare what mentoring processes the company claims to be in place and what processes the participants feel to be in place. Although this is only a starting point, it gives great insight into the culture of this organization.

In the Mentoring Overview, mentoring was defined as well as listed the benefits of participating in such a relationship. It allowed the researcher to ask participants what programs they felt were available to them. The two mentoring programs also clearly documented what should occur in the meetings and how the meetings should be approached. This led to the questions participants were asked about what occurred in their meetings. The documents combined provided guidance to the interview questions but were not referenced with the participants through the study.

Survey Analysis

Internet surveys are very commonly used in the corporate environment when conducting research, particularly for market feedback. Surveys are becoming increasingly popular for social sciences and health more recently as well because of the ability to collect results quickly and for a low cost (Couper, Kapteyn, Schonlau, & Winter, 2007). In this case, a cross-sectional survey design was used for the reason of collecting lots of data quickly at one time (Creswell, 2012). Web based surveys largest concerns are the low response rates because of lack of interest or general technical internet problems (Creswell, 2012).

The survey was in the form of a web link so it could be posted and distributed easily in an email where everyone would see the same information and be able to access it in a similar way. SurveyMonkey was used as the conduit to question participants across nine states, where 650 individuals were targeted. Filters were put in place so only those who were mentors or only those who were mentees were able to answer their appropriate questions. Data was populated automatically by measuring the response rate and tallying the responses for each question through the web interface. The program masked all responses under each question so no one individual stood out among the others in order to protect the participant's anonymity. Then, the researcher was able to move the data from the web interface, through features offered by SurveyMonkey, into an Excel file which was separated by question for easy analysis. Using excel data analysis such as graph generation, descriptive statistics of the participants was highlighted along any other quantitative information that was pertinent to the research. Although one open-ended question was provided to the participants asking for any additional feedback, very low response volume did not require any type of qualitative analysis for the question.

Survey questions were based off of information gained through document analysis and modified to answer the research questions developed through the literature review and incorporate the questions brought forward by the streams of literature. Questions addressing the

demographics were primarily chosen based on other dissertations previously published, with three additional questions targeting specifically to a technical organization. It was important to place questions in the correct order and discuss all questions with committee members to ensure they were all asking what they were intended to be asking instead of having multiple interpretations. Participants also had the opportunity to skip a question if they did not feel comfortable responding. The quantitative questions outlined in the survey were used as the foundation for the qualitative questions during the one-on-one interviews. This allowed for the quantitative structure of the survey to be most effective.

In order to increase the response rate and being cognizant of the participants' time, the survey was intentionally created to be shorter and take a small amount of time to complete. The survey consisted of thirty analytical questions with one additional question asking for participants for the follow-up interviews. It was estimated each individual did not spend more than 10 minutes completing the survey. Questions were broken into groups so that they allowed only the correct people to answer particular questions as opposed to giving random answers. For example, one question asked individuals whether or not they had been mentored and responding no would release them from the survey after that point. This was all done to help encourage individuals to complete the entire survey.

The survey was sent to those in the technical department in Company A, with one follow up email after one week to encourage the most amount of individuals to participate. Literature estimates it takes about two weeks including reminders to get willing individuals to respond to a survey (Segal, 2014). After this point, typically those who have responded will have done so and it will no longer be necessary to continue to solicit. Because it will be a medium length survey with no incentives, it was anticipated that about 20% will respond (Segal, 2014). After the first week, the responses dramatically decreased, insinuating the number of respondents had in fact plateaued after the two week timeline. Survey questions are outlined in Appendix A.

In North America, there are about 1700 employees present in the targeted business in Company A. The survey focused on the technical department specifically in Company A, which is comprised of 650 men and women whose education range from high school graduates to Ph.D.'s and from 18 to 70 in age. This group of individuals was targeted because they are defined to be those working in a STEM job role. Those who participated in the survey are described in Figure 7. There were 170 individuals who responded, which yielded a 26% response rate. Of the original 650 individuals, about 70% of the population is male and 30% of the population is female. Responses indicated about the same representation was shown in the survey with 67% of men responding and 33% of women responding. Figure 7 shows the descriptive statistics of the participants who took the survey.

Variable	Frequency	Percentage (%)
Gender		
Male	114	67.1
Female	56	32.9
Age		
18 to 27	29	17.0
28 to 37	37	21.8
38 to 47	31	18.2
48 to 57	43	25.3
58 to 67	29	17.1
68 or older	1	0.6
Race		
American Indian/Alaskan Native	1	0.6

Asian/Pacific Islander	10	5.9
Black/African American	8	4.7
Hispanic	5	2.9
White/Caucasian	141	82.9
Multiple ethnicity/Other	5	2.9
Education		
High School	9	5.3
Bachelor (BA, BS)	96	56.5
Master (MA, MS, MBA)	29	17.1
Doctorate (Ph.D., Ed.D.)	31	18.2
Other professional degree	5	2.9

Figure 7 - Descriptive statistics of the participants in the survey sent out at Company A showing age, gender, race, and education. (N=170)

The survey collected a well-represented sampling of who is present in the organization across education, age, and race. Because of the current make-up of the organization, similar to the percentage of women versus men, there is a greater representation of Caucasian indvidiauls over other ethnic groups. Since what is actual is what was represented in the survey responses, the researcher did collect a good sampling of individuals who participated. Looking at both men and women in STEM helped to produce a baseline understanding of mentoring in STEM in this particular organization and direct where there may be divergences between the needs of men and women career decisions or career progression.

Interviews

In order to obtain a more detailed account of mentoring experiences, follow-up interviews were necessary to identify the differences between men and women. To accomplish

this, the final question in the survey asked individuals to volunteer to participate for follow-up interviews. The researcher targeted a minimum of 15 employees for individual interviews and received 20 volunteers. All volunteers were interviewed and asked to recant their mentoring experiences. All interviews will be conducted within four weeks of sending out the survey. Meetings and discussions were conducted based on the availability of the participants.

Interviews included 11 females and 10 males who ranged from 23 to 62 and represented each job level category. All 20 participants were either currently in R&D/technical service or manufacturing job roles. Fourteen of the twenty participants had been employed by the organization since the completion of their education. Of the remaining six, only two made any reference to previous employment in their interviews. Interviews ranged from 25 minutes to 60 minutes, depending on the individual's desire to elaborate on their experiences. Differences between the men and women interviewed were used to identify gaps for women on the same career paths as their male counterparts.

The purpose behind the interviews was to help describe mentoring situations in more detail and allow for the gain of unanticipated responses, which was not the case in the survey. Common patterns and themes that resulted became the basis for this research. The primary focus was the qualitative data collected from these interviews with the support of the quantitative data collected from the surveys and the qualitative data derived from the document analysis. One-on-one interviews allowed for the participant to express his or her feelings without fear of judgement or concern of other colleagues sharing private information.

Questions were focused on better understanding the mentor/mentee relationship and any challenges that exist from the presence or lack of a mentor. Interviews addressed the evolution of mentoring over time as well as allowed for interviewees to describe any other experiences that extend beyond the initial expectations of this research. One-on-one interviews helped to support and expand initial themes identified from the survey stage of research. The questions asked

addressed participant's experiences, perceptions, and their paths to career development. It also addressed mentorship expectations and where gaps existed between young career professionals and their life long STEM careers. Questions asked of the participants is shown in Appendix C.

Based on the responses given by the participants, questions were modified and added to facilitate open dialogue. Some responses in the first few interviews allowed for additional direction in later interviews, which allowed new information to surface that was not previously considered. Individual interviews also allowed for earlier interviews to help the improvement of later interviews. It also gave interviewees the opportunity to approach the researcher at a later date if additional thoughts came to mind, which occurred on several occasions. Once all of the interviews were completed, findings were determined by coding each interview before combining all of the interviews and highlighting higher level themes. All of the information collected provided a large amount of data and yielded a number of key concepts that support the initial foundation of this research.

Each interview was recorded in order for the researcher to fully transcribe and code all of the information collected. This was done by a recorder application on a Samsung smart phone. One month was allotted to document and code all of the information collected. All transcription and coding were completed by the researcher. From here, themes were identified among each participant and then again with all of the participants. Finally, themes between the survey responses and interviews were also highlighted. A phenomenological approach was used to address the qualitative data collected in this segment in order to distinguish shared traits between a group of people (Merriam, 2009). Information gleaned from these three research approaches allowed for the findings described in Chapter 4.

Ethical Considerations

The goal of this research was to help guide the future of mentoring in the workplace and career progression, particularly for women in STEM job positions. The surveys, interviews, and documentation collected has yielded extremely promising results. Because of the surveys and interviews, this research required IRB approval, as it required human subjects to gather data; it however was considered Exempt, Category 2, which is associated with minimal risk to the participants. Survey and interview questions were provided to the IRB committee prior to receiving approval. Exempt, Category 2 allowed for a very quick approval process. Personal biases included the desire to identify specific traits that lead to strong mentoring relationships and determining connections between mentoring and career development for women in STEM. Since quantitative analysis was minimally used, careful identification of themes in the qualitative data collection was critical to distinguishing correct themes and discoveries.

Only 5% of the U.S. workers are employed by STEM related fields although STEM disciplines are responsible for more than half of all the economic activity (Adkins,2012). This research is critical in addressing the growing concern that this insufficient supply to STEM will cause the U.S. to not be able to compete against the rest of the world (Jackson, 2010). It is for these reasons that this study is of high priority to any team affiliated with science, technology, engineering, or mathematics as well as human resources present in all businesses. Most of all, the purpose of this work is to determine what aspects of mentoring has an impact on women's career choices and persistence in STEM. It is extremely important that human participants are used in order to identify true factors effecting women in STEM careers. In order to obtain the information necessary for this research, there is no other way to do this besides questioning the female STEM population.

Individuals who participated in the survey, did not have to identify their names or any particular contact information. They were only asked their age, gender, chosen career field, level in the corporation, and years of time spent working in their chosen career, however, survey tools categorize all participants and does not isolate particular individuals' responses. This allowed for the researcher to protect the anonymity of the participants but it made it more challenging for the researcher to sort through data. Survey data could not be separated based on female responses versus male responses or any other overarching attribute. This allowed each individual to be more honest with their answers because there was no way to track their responses back to them.

Interviews after the surveys were conducted on a volunteer basis and individuals had the right to decline to answer questions at any point in time although no participant felt any desire to do so. Nineteen out of the twenty participants chose to participate in face-to face interviews with one participant sharing experiences over the phone, simply due to location. No attributes were documented of the volunteers except for their years of service and gender. Then, for this research, each individual was coded to ensure full identity protection. Participants were encouraged to share as many personal experiences as they feel comfortable with sharing and none seemed to have any concerns. No initial letter or written consent was necessary, as decided by IRB.

Exempt, Category 2 indicated that there is essentially no risk to the participants, and this researched feel under that category because it only collected data through surveys or questionnaires (Robson & Christensen, 2012). The IRB protects the participants being surveyed and interviewed. These individuals were made aware that they were offering their assistance to this effort while understanding that their personal information would not be in jeopardy of being divulged to others. Maintaining their protection ensures that they would not be harmed for

volunteering and that the integrity of this effort and future efforts will not be compromised. The high volume of participants allowed for the researcher not have to solicit any additional volunteers.

Participants were required to be above the age of 18 so there was not any concerns of minors needing consent to complete the survey. There was no time limit, the survey was in English, and the participants were ensured that any connection between them and their responses will be kept confidential (Escobedo, Guerrero, Lujan, Ramirez, & Serrano, 2007). Research surveys often include an explanation prior to the individual starting the survey, to explain what the survey is looking to target, and that they are free to stop taking the survey at any point in time, which was included before the research in this survey (Brandt, 2014; Jackson, 2010). In this research, there was no need to withhold any information from the participants, so there was a full disclosure introduction. Any coding of the participants can be done for the interviews portion of this research. Only quotations were necessary and fictitious composite characters were created to share stories. There were no other ethical issues or concerns.

Now that the data is collected, the researcher will keep all of the information until after the research paper is completed and successfully defended. Any identifying information and data collected will be disposed of after degree completion.

Limitations

First and foremost, the research completed in this study only observed one organization. Suggestions and data collected reflect only one chemical company and is where the researcher is an employee. This is a huge limitation that requires additional research and data support. The survey data collected targeted individuals who are currently residing in a related STEM position so there was no influence from individuals who are outside of STEM or were once in STEM and

left for alternative career paths. Studying this may give further insight as to what could have helped them remain in STEM positions and what specific instances led to their career changes, which is missing from this research. Analysis of the survey results also had limitations because responses could not be tracked to demographics in order to maintain subject anonymity. More conclusions could have been drawn had the researcher been able to connect findings to particular demographics of individuals.

Those asked to participate in the survey were all technical employees in the targeted organization located in the United States. The interviews conducted, however, primarily consisted of those located at the main facility and not from neighboring sites, due to the location of the researcher. Therefore, the impact of different locations on the interviewed participants was not incorporated in the study. Those who participated in the interviews came from individuals who participated in the survey, which also could have limited the volunteers and the types of perspectives received. Finally, interviewing more participants could have increased the amount of information received and provided additional insight that was not identified in this study.

Because there was no incentive to take the survey or participate in the interviews, the researcher depended on the desire to drive change from the employees and their willingness to participate. This yielded 26% of the possible targeted audience of 650 individuals. Although this was still a significant percentage of the populations, a higher percentage of participation may have changed the interpreted results. A time limit of two weeks was set for the participants, which may have kept additional responses, however, due to the corporation limitations, it was not possible to continue to send out notifications for participation.

Summary

The purpose of this research is to develop a clear picture of mentoring in the workplace, identify how mentoring can impact career development, and how mentees become mentors. These points will shape the way future corporations develop programs and focus on the growing need to increase female representation in STEM careers. Also, this research looks to identify what traits are influential for mentors to possess in order to lead towards a successful women-mentoring experience. This research will identify whether mentors have an impact on careers for women and how many mentors help to make this impact. The researcher will draw connections between women having mentors and career development. I will look to discover what trends are common among the women surveyed and interviewed, while using the information that has been collected by the company's mentor program and use this to the increase of women in STEM for the next generation.

The methodology was specifically chosen to gather objective data while protecting the individuals participating in the process. Using this tactical approach of gathering large amounts of general, anonymous data, it is possible to circumvent ethical dilemmas while maintaining a robust dataset. In this way, I hope to facilitate groundbreaking advancements in STEM for women while maintaining the security and confidentiality of all who contribute to this sound investment in our future.

Chapter 4

Findings and Analysis

Agriculture, chemical, and industrial & computer industries spend the most on their research and development, which is what drove the selection of a chemical organization for this study (Hirschey, Skiba, Wintoki, 2012). This study analyzed an organization where 650 individuals out of about 3000 were employees working in the technical field. A document review was used to provide the building blocks of the survey and interview question design. Then surveys and interviews were used to assess the perception of mentoring and how it impacted career development. Findings indicate that mentoring and career development looks different for the employees with more professional experience compared to individuals currently entering the workplace. Differences were also indicated between men and women for more experienced employees and less experienced employees. This research suggests there are different needs required for different years of experience and gender in order to better succeed in the technical workplace.

About 25% of the employees working in the technical departments responded to the survey sent out and there were also a variety of years of experiences and individuals in different job levels who participated, as shown in Figure 7 discussed in Chapter 3 and Figure 8 below. Entry level describes a newer employee or an employee who has not made any career advancements so far in the organization. Then there are two types of promotions more advanced employees can receive, either one in their current job role or one which requires them to change jobs. If any employee has to change jobs, this can either mean a new workgroup with the same general responsibilities or a completely different job role with new responsibilities. Management and senior management are defined differently based on the type of reports they have. Senior management have two types of reports, those who do not have individuals working for them as

well as lower level managers who have additional employees reporting to them. Those who fall under the category of management alone, only have employees who do not have direct reports of their own reporting to them.

Variable	Frequency	Percentage (%)
Job Level		
Entry Level	37	21.8
Received 1 or more promotion in job	45	26.5
Received 1 or more promotion by changing jobs	60	35.3
Management	25	14.7
Sr. Management	3	1.8
Years of experience		
0-2 years	17	10
3-5 years	26	15.3
6-10 years	27	15.9
11-20 years	23	13.5
Over 20 years	77	45.3

Figure 8 - Descriptive statistics of the participants in the survey sent out at Company A observing job level and years of experience. (N=170)

The final measurable difference between the employees surveyed was monitoring their movement inside STEM roles. Since literature supports movement exiting STEM, the researcher wanted to observe any movement inside STEM roles that may support career development, as shown in Figure 9. These descriptive statistics showed that there was very little movement occurring between STEM jobs, which could be caused by lack of internal opportunities or lack of STEM career development. This is a noteworthy data point for future researchers to investigate.

All of the data collected helped to provide framework for mentoring and career development in Company A.

Variable	Initial Job		Current Job	
	Frequency	Percentage	Frequency	Percentage
Job Role				
R&D/Technical Service	105	61.8	101	59.4
Business	4	2.4	6	3.5
Stewardship	1	0.6	2	1.2
Legal	0	0.0	0	0.0
Manufacturing	51	30.0	56	32.9
Other	9	5.3	5	2.9

Figure 9 - Descriptive statistics of the participants in the survey sent out at Company A showing job roles over time. (N=170)

In the next segment of this research, the researcher conducted 20 one-on-one interviews of participants who volunteered to participate after completing the survey, although there was no way to correlate their survey responses to their interview responses. Here there were 11 women and 9 men interviewed who represented a wide range of years of experience. In order to preserve the anonymity of the respondents and better represent these individuals in this study, four composite individuals. They include two men and two women, which are described in this Chapter and represented by Figure 10. All of the details of the four composite characters are true to the general findings, although no character represents one individual in the study.

The first woman interviewed was **Laura**, a woman in her late 40s, with over 20 years of service at the organization. She made some progress in her career, getting promoted several times, however, never quite made it to management level. She has a spouse and children and she

discussed them as instrumental to her career choices. Although she believed that focusing on family may have had something to do with the plateau of her career, she expressed a positive outlook on the many projects she got to work on and said she enjoyed her profession. With only a handful of years to go before retirement, she said to stay in her role as long as she can because she is proud of all that she has accomplished.

Yvie is a woman in her later 20s with a bit over five years of service at this company of study. She has a strong desire to be engaged in the organization, volunteers for extra-curricular actives available at the organization, and often offers an additional hand on cumbersome projects. She has been in research and development for the entirety of her short career so far and is battling with what line of work will follow her into her 30s. As her focus is turning towards her personal life, she is beginning to be concerned with what will happen to her career as she begins to grow her family. A pleasant work environment and an enjoyable job has kept her from moving on but she is reaching the point where she cannot remain in a professional holding pattern. She is trying to figure out the next step in her career as she turns to mentoring for support and guidance.

Pat represents a male in his early 50s with over 25 years of experience in the research and development department. He has been in the same corporation since graduation and began an entry level Ph.D. scientist. From there, he moved from business to business, always in the technical departments, until he reached the highest level of a senior scientist. By making connections in the workplace and actively seeking new projects, he was able to make great steps to reaching his ultimate goal position. He has experienced mentoring and has mentored others, however, all relationships have developed organically. As he faces the end of his career, he enjoys a large amount of vacation and comes to work because he loves his job.

Rob is a man in his early 30s with about 10 years of service at this organization. He, like Pat, started his career immediately after college and has been working in a technical role ever

since. His career path has allowed him to move around and see manufacturing, product stewardship, and research & development, providing him a unique set of experiences. The biggest concerns he is currently facing is identifying where to go from here in his career. Rob is not quite sure whether or not he wants to remain in technical but longs to make professional advances and in the near future intends on remaining in technical. Up until this point, his mentoring experiences have not been the best but he is actively seeking opportunities to grow and develop.

Laura, in late 40s 20 years experience Has higher education (Ph.D.)	**Yvie**, in late 20s 5 years experience Has higher education (Masters)
Pat, in early 50s 25 years experience Has higher education (Ph.D.)	**Rob**, in early 30s 10 years experience Has higher education (Masters)

Figure 10 - Summary of the four composite individuals highlighted in this study.

Through the surveys and interviews, the researcher was able to answer the research questions, as outlined in Chapter 1, and lead towards a direction of future research. Overall, the findings illuminated understandings about what mentoring looks like, how mentoring is understood by respondents to impact career development, and how mentoring is associated with improving women's success in STEM careers. Each of these findings will be discussed in this chapter.

An Overview: Identifying a Mentor

The first goal of the researcher was to identify what mentoring looked like for professionals in the STEM fields. Through the document analysis, the researcher identified which programs were available to employees and what training programs had been in place. Based on this, the survey questioned how many individuals had participated in mentoring programs and what requirements were needed to yield an optimal mentorship. Participants

included 114 men and 56 women, with their ages ranging from 18 to 72. From the survey, more than half of the respondents, 96 individuals out of 170 questioned, had participated in a mentoring relationship over the course of their career. Of those who had participated in some sort of mentoring relationship, half served as both mentors and mentees. The survey data collected could not differentiate responses between men and women, different educational backgrounds, or different ethnicities. Because of this, all qualities in this section are assumed to apply to all STEM individuals.

How Mentorships Form

In this organization, mentoring or other similar development activities are not the first priority. Economic issues and downsizing drove the company wide decisions to be made from the top down and those at the bottom are forced to come from behind. The current industry climate focuses on cash generation and not on employee development. Using documentation provided by the Human Resource department of the organization, a list of activities that were once or are currently available were provided to identify whether or not these activities were used by the employees. As shown in Figure 11, the most prominently used available activities were selected by at least half of the participants. This included networking opportunities, conferences, and development plans. Follow-up interviews suggested that these were the events that generated mentoring relationships. Pat for example had some experience with development plans and stated, “Some (mentoring) relationships were initiated by a more senior professional who were suggested by my manager to develop me.”

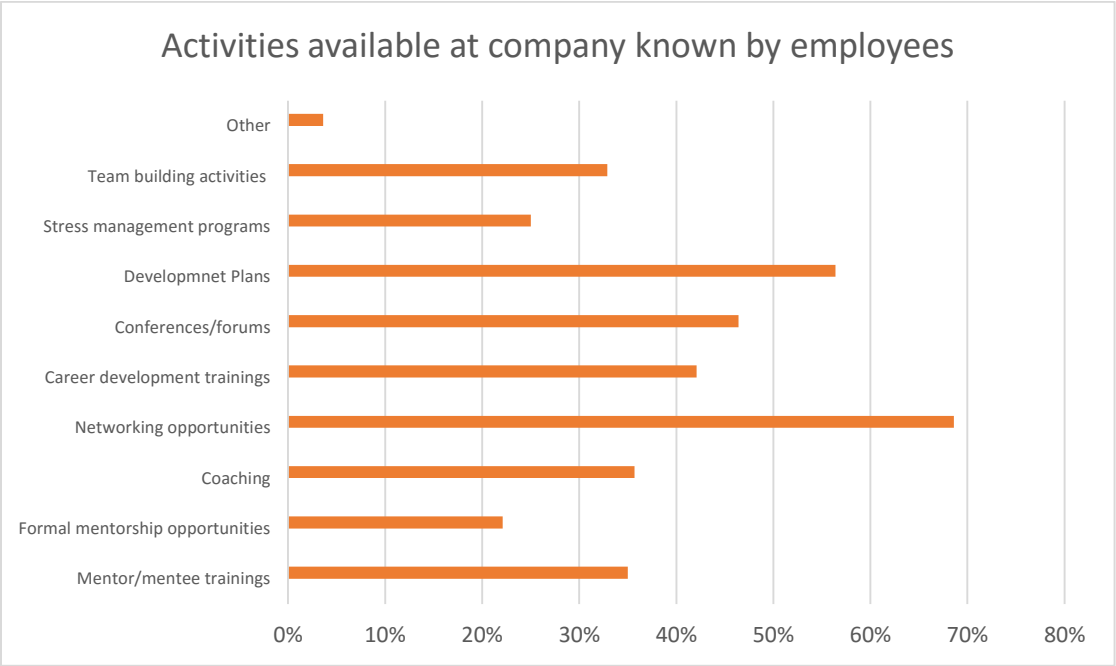

Figure 11 - Opportunities available to employees over the past 40 years, which employees can chose to leverage or not participate in.

Some of the lower percentages, such as formal mentorship opportunities, represent some of the legacy programs that are no longer wide spread in the corporation. This could suggest that the corporation discontinued them because of lack of participation or a decrease in resources. Regardless, participants greatly favored networking opportunities and definitive development plans over other prospects.

Almost two-thirds of the mentoring relationships established are through informal mentor pairing. These informal work connections can occur because employees are working in the same work group, someone steps in to make a pairing suggestions, or through cross-group interactions, as described by those who participated in the one-on-one interviews. What is most notable is the least likely mentor/mentee pair occurs from the mentee themselves seeking out a mentor, which is visually demonstrated in Figure 12. In fact, this occurs less than 1.5% of the time. This supports that informal pairings are the most critical when first establishing a relationship.

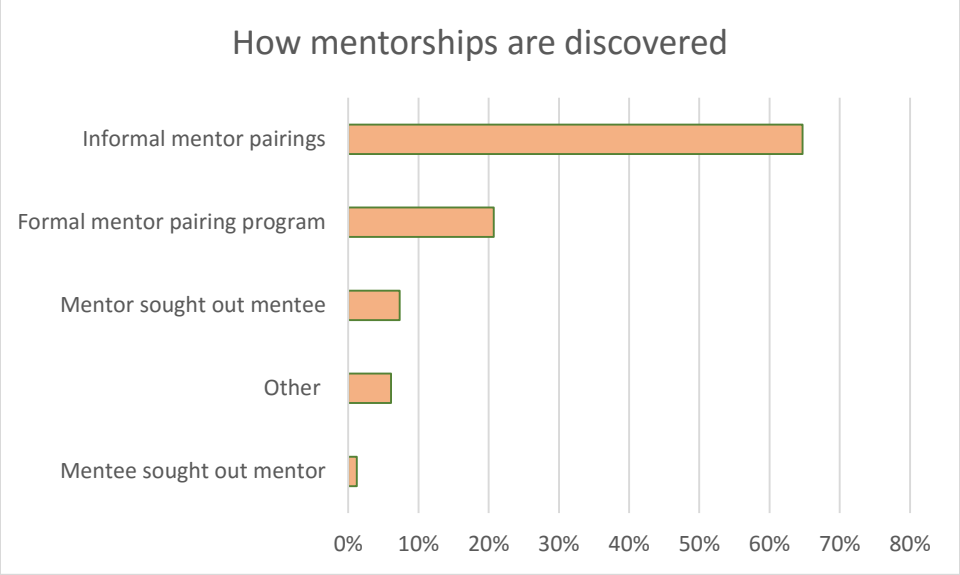

Figure 12 - All participants (N = 170) were asked how they met his or her mentor most of the time.

What do participants seek in a mentor

To understand the impact of mentoring on career development, the researcher asked what attributes mentees were seeking and why. Through the interviews conducted, the same general attributes in a mentor were sought out by both men and women, as well as by junior and senior employees.

General Attributes

Laura and Yvie both looked for an individual with experience, large networks, confidence in oneself, willingness to help others without concern for themselves, provide letters of recommendation, and teach them how to be professional and adapt to the workplace. One major difference between Laura and Yvie was that Yvie asked for career guidance and development opportunities as well as direction in identifying the correct mentor match. This was a difference between junior and senior mentees in general.

For Pat and Rob, they also had similar needs. They both desired networking opportunities, a mentor who could identify strengths and weaknesses, and a role model. Again,

Rob, the more junior of the two males, sought support for career development, while Pat did not seem as concerned and instead sought to leverage his mentor's networks in his current role with less of a focus on overall career growth.

Through the survey, participants supported what was discovered in the interviews by stating that the most important support offered were the following:

1. Mutual goals
2. Career Development Guidance
3. Networking Opportunities
4. Guidance for work/life balance
5. Self-Esteem Growth

It showed that physical traits of an individual have very little impact on a mentoring relationship.

Understanding Strengths and Weaknesses

Regardless of whether or not a relationship evolves or ends, most participants indicated that it was critical that a mentor was aware of the mentee's strengths and weaknesses in order to properly provide guidance, as shown in Figure 13. Data suggests that those relationships that lasted the longest, also were more likely to be those where mentors understood their individual abilities.

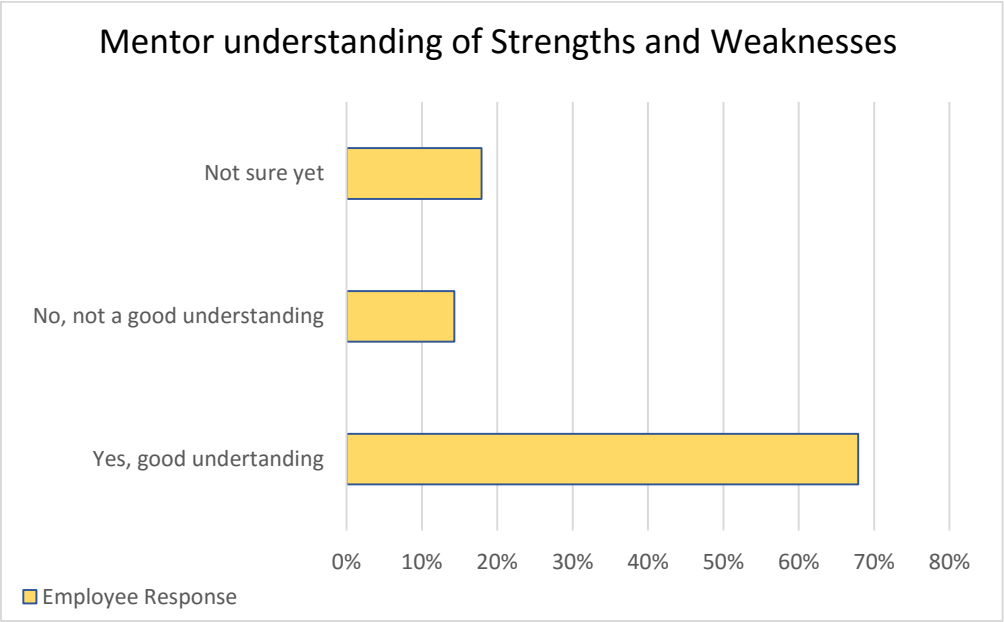

Figure 13 - Mentees were asked if their mentor had a good understanding of his or her strengths and weaknesses in the workplace.

When searching for a mentor, individuals were searching for someone with a higher level of professional status, frequent availability, and active listeners. The added benefit of having a mentor that can understand a mentee's strengths and weaknesses helps provide a more fruitful relationship from all involved.

Does gender matter to mentees?

Continuing to better understand what mentoring looks like for employees at this organization, participants were asked what attributes were needed in a mentor, which is shown in Figure 14. Information gleaned from this question suggests that identifying a mentor who is of the same gender is not as critical to an employee as some literature suggests. Although the literature states that women look to other women to establish their careers and identify work/life balance (Fulmer, 2014), this research shows that individuals are looking for anyone to guide them, not just people of the same gender. The interviews supported this sentiment, suggesting neither men nor women have a strong opinion about the gender of their mentor.

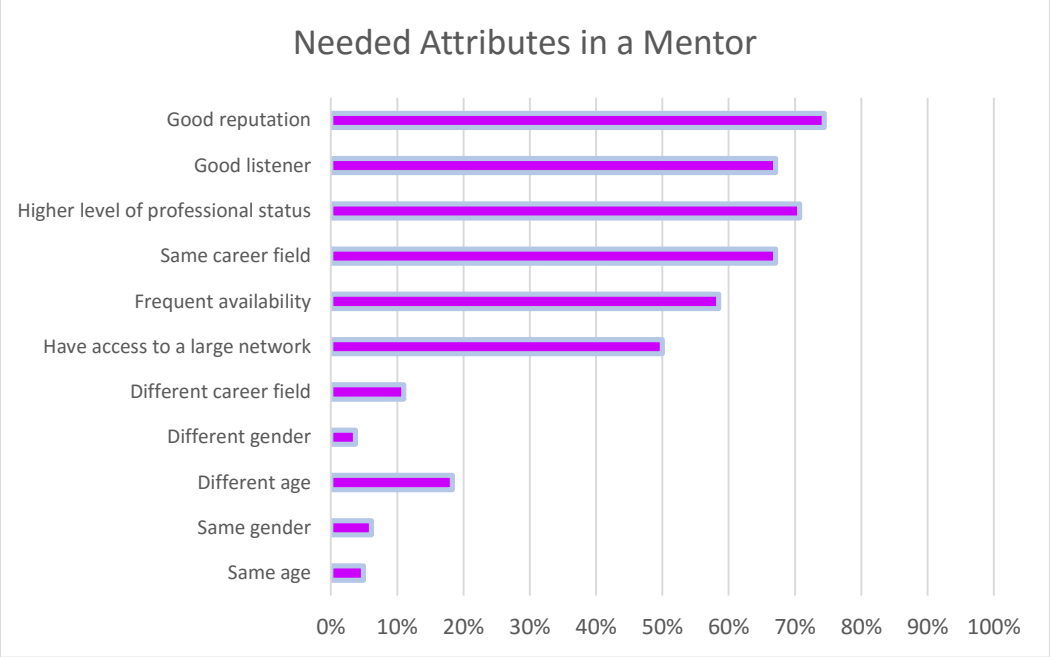

Figure 14 - All participants (N=170) were asked what attributes a mentee required of a mentor.

There is a greater desire among STEM employees to develop an upward moving career than finding a match that fits a particular image. The impression of an oppressive career trajectory leaves employees more concerned with progress and whether or not a mentor can help them in achieving career goals. Yvie, a female with 5 years of service, went on to explain,

> I don't even really know if having a mentor that was a woman and had a bachelor's in chemistry [or other similar degree], I can't say for sure that would help me either. Because who knows if their life is what I would want my life to be. I think I would really like more opportunities to meet [different] other people. Like somebody random.

Having someone who can share professional stories and can help extend the mentee's network is more critical than having a mentor who is of a similar age or gender as literature suggests, which is data from the survey represented in Figure 14. Making these connections and opening up a mentee's mind is the real key to successful relationships and in turn, more successful careers.

Ultimately, the goal of studying mentoring's impact on women is to strive towards stronger relationships and better careers will allow women to remain in STEM for their full careers.

Inside these mentorship meetings, Rob discussed how he would makes sure he reaffirmed his mentee's self-confidence by focusing on strengths and listing his or her talents while Yvie appreciated the frankness of her mentorship discussions, which offered areas of improvement by acknowledging weaknesses. In both situations, the participants highlighted needing to find the time to make those connections in order for their strengths and weaknesses to be highlighted and truly understood by their mentors. Maintaining an active relationship is how open dialogue can form between mentors and mentees, which requires a large of time and effort to be invested.

Finding the time to meet

From a macro perspective, employees are only engaging in mentoring relationships between 0 and 5 times per month, shown in Figure 15. However, Rob and Yvie felt as though this was not enough time and were often struggling to gain additional meetings while not wasting the time of the mentor. In contrast, Pat and Laura, more senior employees were less concerned with meeting frequency and did not indicate this as a concern in their mentoring relationships.

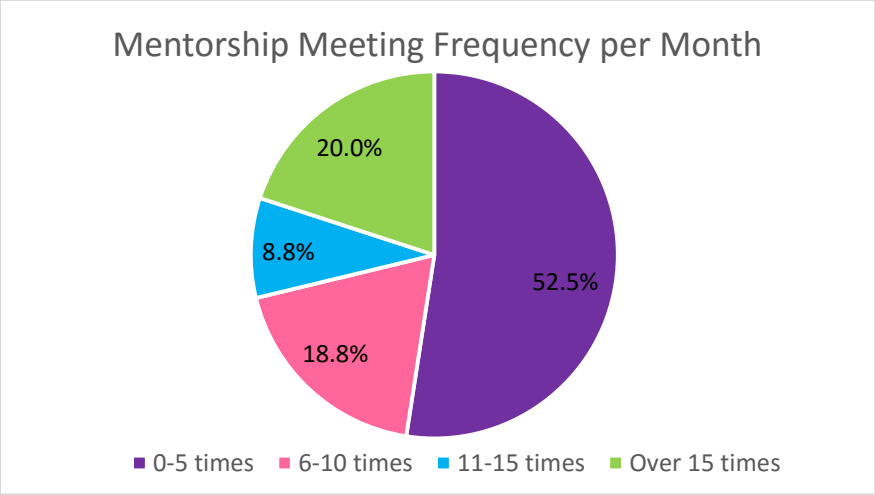

Figure 15 - The graph shown measures the number of times a mentee meets with a mentor on average every month.

In order to form that relationship bond, employees with less years of service look for more one-one-one time with their mentor. Younger employees in the workplace, just like children in the home, need straight feedback, someone able to sponsor and guide them, and flexibility (Meister & Willyerd, 2010). Even when a correct match is identified, if there is a feeling that the senior professional does not have enough time these relationships become ineffective. This may not have been a need many years ago but with present mentee's longing to carve out long term careers in STEM fields, it is essential to optimize the benefits of mentoring.

Although the company offers networking opportunities and development plans and employees acknowledge they exist, there is a disconnect between the programs in place and their effectiveness. These opportunities and plans laid out by the organization are shown in Appendix A.

Mentoring to Career Development

Managers guide mentoring and thus career development

Finding mentors has proven to be the most challenging aspect of a mentorship. If individuals are not in the "right place/right time" or do not navigate the "system" correctly, it leads to frustration and employees looking to leave STEM fields. Managers are often employees first and last line of defense. It requires managers to put their subordinates first, ahead of personal and group gains, which is a hard find. If employees are not sorted with a manager who is engaged in the employee's career progression, employee's vacate the STEM fields regardless of their potential. The majority survey participants indicated they have had 2 or 3 strong mentors during the course of their career, as shown in Figure 16. Because of the varied age range of the participants, this is an estimate of mentors assume for individuals with less career experience whereas older individuals may be responding based on experience. There is some error to

consider, however, the average of two or three mentors is what is anticipated for an individual to have over the course of a career from the respondents.

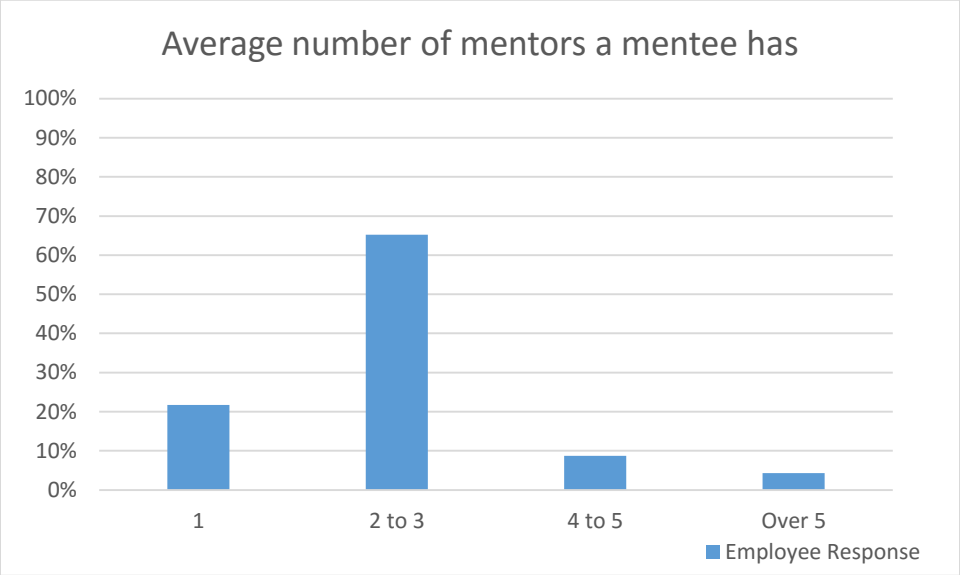

Figure 16 - Employees in Company A were asked about their number of mentors in a career.

Operating under the assumption that the average employee will experience about three mentors in the span of a career, this means there are very few chances a manager has in helping to provide a subordinate with a correct mentor match. Only a short number of interactions can initiate a change for employees who are not making career progress to choose to leave a corporation or change a career path. In the interviews, Rob went on to discuss how he faced similar challenges saying,

> Because R&D does not have a career path set, you cannot grow with these roles so you eventually have to seek out someone to charter a career path. And usually that depends on you find and how they try to help you figure out where to go.

In this particular organization, technical employees often struggle with identifying a clear career progression. Typically, if an individual enjoys his or her job and wants to remain in the particular role, he or she can only receive four promotions in an entire lifetime. This makes

carving out a career path essential for an individual to continue to make upward moves over the course of a career. As Rob discussed, if an individual wants to remain in the STEM fields, it is a must to find a mentor to help discover a path to continue expanding his career.

Managers are necessary to help an employee seek out these mentors as well to help form the connections that are not easily found without that senior employee providing direction. Many managers believe that mentors are the key to success because they can offer visibility and open doors to bigger projects (Chandler, Eby, McManus, 2010). If this is assumed to be true, it is important to offer these opportunities to all employees to give them an equal chance to excel. Many employees do not know how to generate that informal relationship, which has shown to be the best environment for mentorship discovery as shown in Figure 12. For example, Yvie, an employee who has had two different R&D positions in the same company said,

> If you want a mentor you have to go out and seek one. But in the same breath I think it would be really awkward to go up to someone and say 'will you be my mentor?' That's not me and it's an awkward question to ask. So I think it's more or less luck of the draw. For me, it was complete luck of the draw.

In Yvie's situation, she had a manager suggest a mentor and helped facilitate the relationship. Once Yvie's manager opened the door of communication, she was able to turn to her mentor for career advice and the relationship helped to lay out what her career would look like. Originally she had been looking to leave her STEM job role for a business position, but changed her mind to remain in STEM because of the mentorship pairing. If a manager could get involved and help younger employees navigate the precarious career navigation, it could help retain more individuals in this field.

Pat, who is a more senior level male employee, described his impact on fellow coworkers because of his job position. He said,

> I was thinking about someone in my group before who was really struggling with what they wanted to do next. They were interested in a different kind of role so I described for them many of these types of roles and what they were liked. And then if they showed a particular interest in an area, I could help them make connections with people specifically in those jobs. I would say 'You should talk to so and so who's in that business and they can tell you more about their day to day role'. So it would start off as a conversation and because of my experience I was able to better direct them.

In many situations managers do not realize how influential they are when it comes to an employee's career development. Managers can open or close doors for employees just by helping them expand their network and listen to their concerns. Pat was able to help navigate a younger employee's career just by taking time to meet with them. Rob on the other hand, has continued to struggle because he is not in the same business as Pat and has had a very different mentoring experience, starting with a manager who could not help him find where he belongs.

Career success is a concept that many STEM professionals in this study discussed. Those surveyed were asked what was most important to creating their career success. Participants were allowed to select more than one response, with some options not receiving any selections. Figure 17 shows which responses individuals selected and that the top three tools that impact career success are mentoring/coaching, training programs for development & mentoring, and networking. Through interviews participants stated that they used networking as a tool to obtain mentors. All three of these tools are intertwined and support the intricacy of mentoring and career development. This demonstrates how important mentoring and career development, together, are for individuals looking to succeed in the STEM fields.

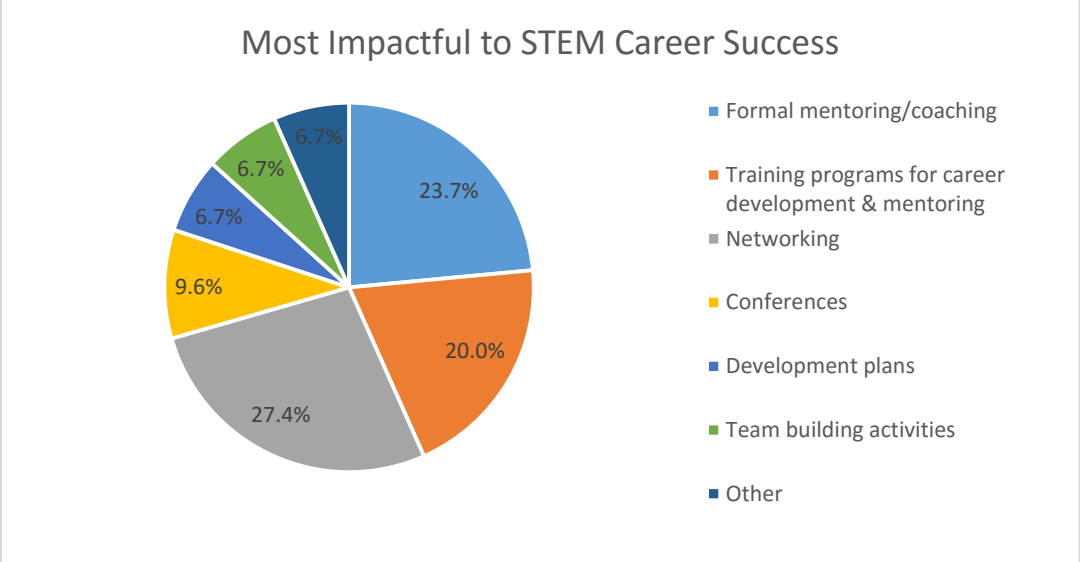

Figure 17 - Those interviewed were asked what characteristics were most impactful aids to career success over the length of a technical career.

Self-efficacy, mentor pairing, to career development

As some of the literature discusses, self-efficacy, which is the doubt in one's ability in a specific career field, is a concept that can be extremely damaging to employees and when there is not a strong mentor supporting employees, it can cause a development of this concept. In some cases, employees who fail to find mentors begin to have self-efficacy issues as they fall further behind in their career advancements. Employees lose confidence in their ability to succeed in STEM careers because they struggle to get ahead in their careers and grapple to find mentors to help them navigate the tribulations. For example, Rob, a male with 10 years of service, discussed his ongoing struggle with trying to find where he belonged and how to make advances in his career. Rob said,

> I went to talk to one of the fellows (person of highest technical level)… and I was trying to get him to help mentor me but he didn't have the time or the capacity so that didn't work out. And then when they (the organization) finally assigned someone to mentor me, he was basically almost competing with me for

> the same role. And it basically wasn't in this guy's best interest for me to succeed. I wouldn't say he did anything on purpose but he definitely wasn't a mentor. I tried and tried and it was pretty terrible.

Rob went on to discuss how his career has continued to flounder and he is not sure what his next step will be, though a strong mentor presence could help change his lost path.

On the other hand, during Yvie's interview she talked about how much she needed guidance and support because she was unsure what career path to take and how to determine what she was skills she had in the workplace. Yvie discussed how important it was to have a mentor to help guide her and give her confidence. She said,

> He [her mentor] has been helpful in kind of believing in my abilities and trying to help me get a better job, which has been really nice. [Their relationship] just worked really well together. He has taught me to really value my skill set and play it up and not be bashful. I really needed someone to push me to do things I would be shy doing otherwise or building confidence.

Creating structure and offering support are key traits to generating a positive mentoring relationship and help to increase self-efficacy, which is critical to long term career success. The dialogue that occurs between a mentor and a mentee can be extremely important to mentee choices.

When creating a career, mentees often turn to mentors to make important professional decisions. Mentee's trust their mentors have a better sense of the environment and know what choices make more sense to allow them to progress. Of those who had participated in a mentoring experience, 90% of the respondent's utilized feedback from mentor's to make career decisions, represented in Figure 18. The survey did not differentiate between choices that help or hurt the mentee's career or at what points in a participants career a choice was influenced. Based on the interview responses, a mentor can direct a mentee positively or negatively.

Without a proper paring, mentee's are more likely to make the wrong career choices and further support the damages caused by self-efficacy. In Rob's situation, he left his manufacturing role for a more visible scientist role in hopes of advancing his career. Because of his poor mentoring situation he returned to manufacturing and has remained stagnant in that job role ever since. On the other hand, Yvie, who was ready to leave her technical role, chose to stay and continue to pursue a STEM career because of her positive influences.

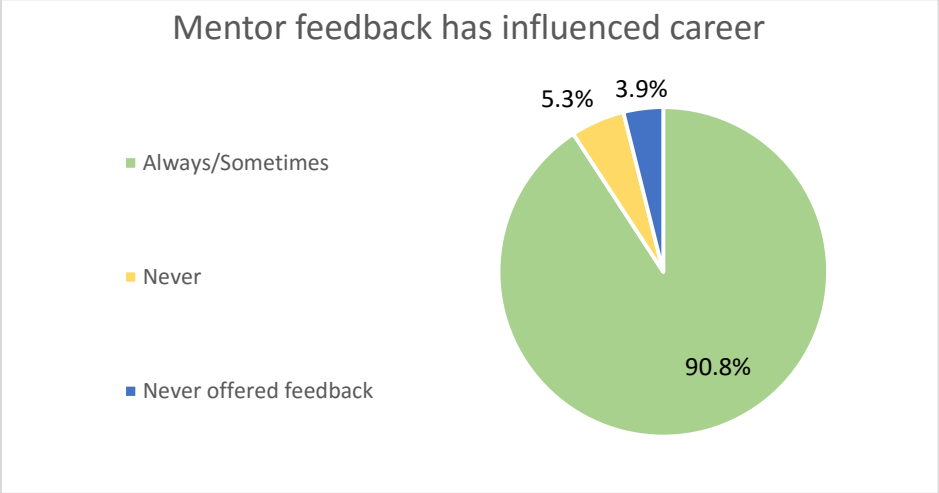

Figure 18 - Mentees were asked how often their mentor had a big influence on what career decisions they made over time.

In a similar situation, Laura, a female in her late 50s, discussed several of the mentors she had over the course of her career. The mentors she experienced did not have an active interest in her development and were not helping Laura generate a forward career direction, which she felt like she needed. As the literature states, neglect of protégés by a mentor and passive protégés lead to bad mentoring relationships, which can impact self-efficacy (Chandler, Eby, McManus, 2010). Laura, discussed how her lack of direction caused her to have doubt in her own successes and remain in her current job role for over 14 years. Although she did receive in role promotions, she had hoped to have a broader amount of experience by this point in her career. She said,

> My major takeaway [from my career] is that mentoring is important. I think that my unsuccessful career is because I didn't pay attention to and get the right mentor. And the one's I had didn't pay enough attention to me. For example, the one mentor I did have, I thought he helped me but because he wasn't respected professionally and didn't have a strong network, it ended up hurting me. He was never able to connect me to other people to help me move my career forward.

During her twenty year tenure at the company, although she remained in the same role, she was only promoted twice. Although personal reasons kept her from moving to a new company to obtain that career development elsewhere, she regrets how she did not push harder to advance her career at Company A. This is a common feeling from those who believe the key to overcoming that hurdle is that mentor match.

Participants are equating strong mentorships with career success, although mentoring is only one possible tool to carve out a pathway. Investigating to what degree mentoring actually does impact career is an area worth further study. Research shows, however, that knowing when to end or transition a mentorship can help to avoid disconnects and negative impacts that may occur (Chandler, Eby, McManus, 2010).

Two Types of Mentoring – Long term vs short term

The next step was to start investigating what mentoring, in particular, looked like for the same individuals in STEM job roles. Of those who responded to the survey, 56.2% of them had experienced some sort of mentoring during their career, with nearly 41% of them participating in a single mentorship for no longer than 1-3 years, as shown in Figure 19. This shows that once a need is met by the mentorships, the relationship either transition into something else or is no longer necessary. The data does not account for less experienced employees who may not have been in the workforce long enough to have longer mentorships.

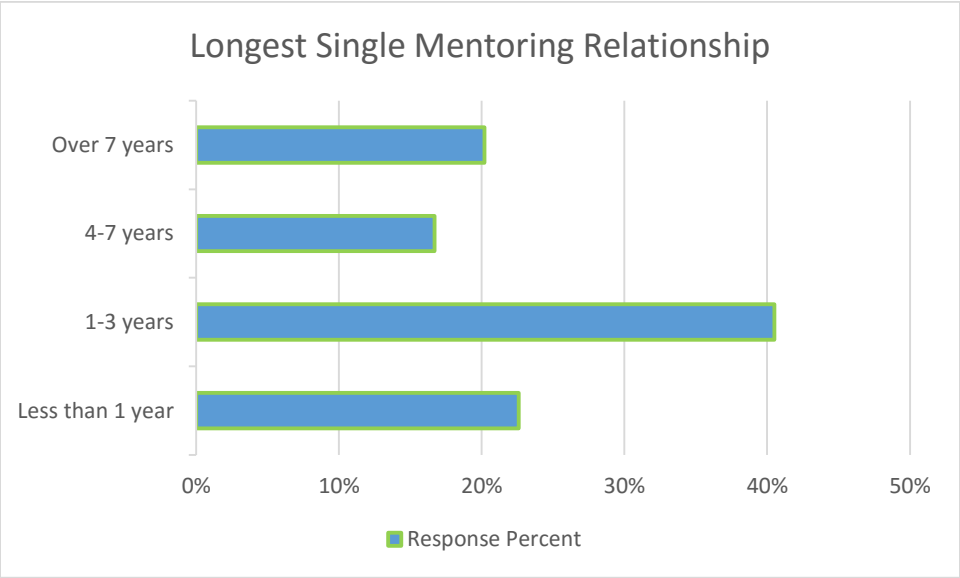

Figure 19 - Survey participants (N=170) were asked how long their longest mentoring relationship lasted.

In support of this conclusion, through the interviews it was confirmed that in fact there are two types of mentorships. The first type of mentorship includes those who part ways once the particular demand has been satisfied or the pair discover they are not properly matched. The second type of mentorship are those that turn a mentoring relationship into a friendship.

Often times, relationships that are 4 years and over are no longer simply a more senior individual guiding a less experienced individual but the pair begin discussing more personal topics and there is a mutual growth and connection. Pat, an older male with 25 years of service, went on to describe his long term mentoring relationship saying,

> It gets to a point where you're just so comfortable [that] instead of just being a mentor/mentee it becomes more of a colleague [equal] level. Not that it wasn't before but it becomes that you can talk about a lot of things. Not just work lives but also personal things. I think it's good.

This type of relationship is an example of the second type of mentorship, which satisfies a need and evolves into friendship. However, many times a career change or mutual goal

causes a pair to part ways. Yvie, a younger, less experienced employee discussed a time where she ended her mentoring relationship. She said,

> I would consider this woman Sharon as a mentor. I reached out to her about a year or so ago when I was interested in pursuing a career in manufacturing and she was the quality leader at the time. So I would talk to her and she would help connect me with people who were working in different roles over at the plant. She would suggest develop activities for me and what I could do to better prepare me for such a role. And then it kind of fizzled out as we both got busy and she took on a new role.

This type of relationship is an example of the first type of mentorship, a relationship that ends once a need is met or circumstance changes. Both types of relationships can be very effective and can help increase career progression.

Regardless of the type of mentorship, almost 50% of initial promotions in the technical field occur when a mentee is in a strong mentoring relationship, as shown in Figure 20. Making individuals aware that ending mentorships can be equally as beneficial as maintaining relationships can be important in encouraging mentee's to seek out mentors regardless of how they end. Both types of relationships serve a purpose and can result in career growth. The remainder 17% of employees who have not yet been promoted may represent the younger employees who have not yet had an opportunity of receiving a promotion. Future studies may indicate this percentage of individuals be sorted into the "yes" or "no" category for this particular question.

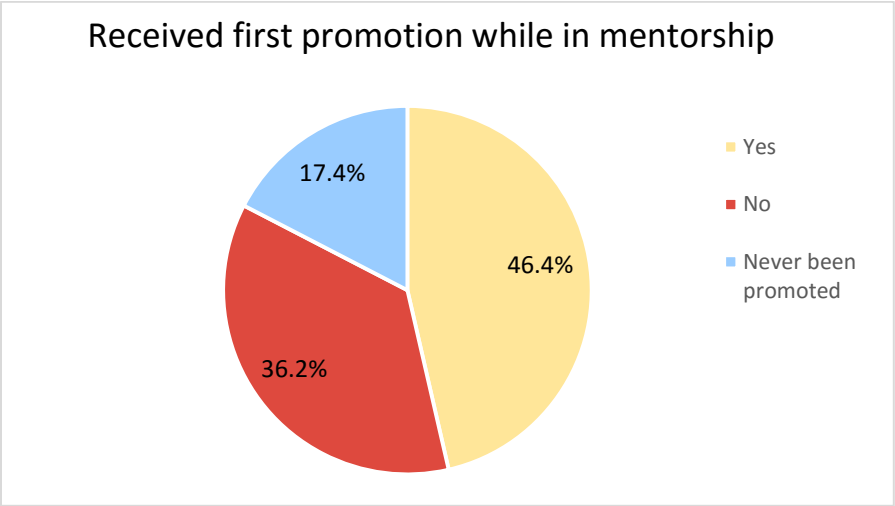

Figure 20 - Participants were asked if they had a mentoring relationship when they received their first promotion.

Significance for Women in STEM

Generational differences in the workplace

The literature shows that there is a growth of women majoring in STEM fields, yet there is not the same trend seen in the workplace. Those women who have been in the workforce over 15 years or so are disconnected with the younger generation of women currently entering the workplace. Previously, women were not tasked with being the sole family providers, however today, 40% of women are responsible for maintaining the higher level of income to support the family (Wang, Parker, Taylor, 2013). Yvie talked about her experience trying to focus on female mentoring relationships and she said

> I attended a meeting about mentoring through a women's group. There were all these middle aged women, who all had very nice salaries with nice careers set-up, and then a bunch of young women who were really at the bottom of the totem pole, in the technical area. We talked about mentoring but nothing came up it. It seemed as though it was all talk. They made it seem like they were open to being mentors but they weren't. There was no process. It was hard.

Although she thought simply finding another woman would help accelerate her career, this was not the case. Each generation of women has a different need and must be addressed differently. Laura, who has had several roles but never reached a management position, said,

> There needs to be some initial mentor that newer employees receive, to each them the basics or the etiquette of the workplace. It's those little things that help everyone get along that make a big difference. They need to understand that you have to keep the communication line open, that there's a lot of sharing, and more team work and less hijacking. There's a culture barrier.

The concept of "one-size fits all" for mentoring strategies is a hurdle organizations must face. A barrier that exists in the workplace is the lack of adjustment between different individuals in STEM job roles. Mentoring needs constant adjustments and data in this study shows that old programs in the workplace are not always effective several years later. Unlike STEM courses which remains relatively constant, the workplace continues to change year after year. There are economic impacts and personnel changes just to name a few moving targets facing individuals who enter the corporate environment. Because of fluctuating workplace environments, professional pairing is more challenging than in academic areas. Identifying a mentor who has a strong desire to assist a mentee and can make the time to engage is often more beneficial than simply pairing a more experienced female with a less experienced female. The needs are different for all women and finding someone to trust can come in all different sizes. The most helpful tool we can provide women is to help them understand their differences so they can better work together.

Women are concerned with impact on family

Another one of the biggest difference between men and women when it comes to mentoring and career advancement is the concern of maintaining a family while advancing a

career. This was a particular issue for younger women compared to younger men. Even before women are married they are concerned about how they will manage dual-careers and how far they can forward their careers before having children. Younger men did not feel the added stress of having to reach a certain career level before children and in fact did not mention family ties at all in any of their interviews. Although older men did mention how they were able to navigate with families, it was the women who were more tied by location and family leave.

Women who had more years of service such as Laura talked about how things have changed in regard to monetary responsibility and workplace flexibility. She thought about the beginning of her career and said,

> After working full time for about 10 years, I got married and had a child and decided I didn't want to come back to work full time. At first they told me the only option was full time so I resigned. And then a couple of months later, they came back to me and said they would be flexible. I ended up working a part time for the next few years until I was ready to come back. I've been here ever since.

This type of workplace flexibility is simply nonexistent today. In contrast, Yvie talked about her family struggles. She said,

> One of the things really holding me back in my career is my family. My husband works over 100 miles away and there's no flexibility in this job. So I'm making over an hour commute, one-way to keep this job even though there is a closer facility because the corporation is not focused on my development. With the financial state of the company and its anticipated upswing, keeps me here waiting to see if I can make it work before I leave for another job. But time is ticking and I need to figure out where I want or need to be before I start having children.

Remarks like that are truly eye opening. From this particular situation it may seem as though Laura had it a little bit easier than Yvie has it today. However, what it really shows is

corporations are allowing their financial situation to negatively impact STEM, career development, and women. In the same organization 30 years ago the company was willing to work with Laura to retain her in her STEM role. Now, there is no such accommodations for women who go out on leave or have personal situations that impact their ability to work full time. Today, the same organization is unable to relocate an individual to help her meet her family needs. Because family is such a big concern for a large percentage of young women, this kind of resistance pushes them out of STEM. For Yvie, it would certainly make her life easier to enter sales, for example, so she would have the ability to work from home a few days a week. Although she has not made such a move yet, it is something she is considering.

In the same situation, men are not as concerned with the inferred biological clock. None of the younger men interviewed even mentioned their personal concerns. Older men, such as Pat, simply said "I made career moves when I could get a greater income and could maintain a good work/life balance." The emphasis placed on this aspect of life is much greater for women so it increases the likelihood they will leave STEM in the middle of their career. Having a mentor can help give women a chance to see where their career can go and keep them from exiting early.

More outgoing, confident personalities fair better

Finally, as discussed several times in the findings, identifying a mentor is paramount in advancing a career. One of the biggest differences between men and women is the drive to identify the right mentor and the belief in themselves to mentor others. Laura talked about her experiences throughout her career and lack of managerial position and said

> I don't know if I should take some of the blame where I could've been more outgoing and say 'Hey what's out there. Help me find my way.' But it would have been nice had the company at least helped direct me towards what

> opportunities were there. I always took courses that were available but I never really sought anyone out to help me. My personality just isn't the type to seek anyone out.

Almost as though Yvie were in the same room as Laura, she had similar stresses when it came to finding a mentor to guide her career. Yvie, who is about 30 years younger than Laura, said

> I am hitting road blocks. There are a couple of things that I guess I need to work to overcome. I think maybe being a little bit too shy to reach out to people I already know is one issue. Forget about people I do not already have a relationship with. The second this is not knowing who to reach out to. And the third issue would be I still don't really know what I want to do or what type of people are the right ones to talk to. It's hard for me to approach someone regardless and this just makes it that much harder.

In contrast, Pat discussed his past experiences, where he easily climbed the ranks to become a senior leader and said,

> When you hit it off with someone you just work with them. I mean in the old days you could do that sort of thing. When you work on a program and someone else that may be in a position you want to have or you're interested in, then you just approach them. Not always just worked related topics come up but I had no problem just talking to anyone I thought could be additive to my career in some way.

This trend was consistent among those interviewed. Men felt more comfortable approaching individuals and developing that initially collaboration level while women seemed to wait more for someone to approach them. In the situations of both Laura and Yvie, the women are struggling to overcome their innate personalities and find a mentor who can help advance their careers. Laura, over the course of our discussion, admitted that she never reached the ideal place

in her career and would have been more aggressive if she had the opportunity for a second try. Pat seemed to have less trouble navigating the system. This research's purpose is to keep Yvie from facing the same hurdles Laura faced and find as a pathway to long term success.

Furthermore, of those interviewed, 2 out of 9 men had concerns about their ability to mentor others while 10 out of 11 women had concerns. Pat, for example, simply said, "None really. All those I've had a mentoring relationship with were relationships I wanted or needed to cultivate and were colleagues so there was no concern." And Rob responded with, "No. I think mentoring has helped me and I know I can help others. Seems like a natural skill." Comparatively, Yvie's initial response was, "Am I good enough to be a mentor? Maybe I'm hard on myself but will I really be able to identify someone else's strengths and weaknesses?" This could also impact women mentoring other women because personal block or self-efficacy can be impeding overcoming the hurdle of generational differences.

Mentoring to career success

Over time, the idea of career success and development has become more important and critical to female STEM stars. During Laura's interview, an older female of over 20 years of service, she discussed how things have changed over her years of service and how the concept of allowing for a career in STEM roles were not common. She said,

> Times have changed because when I hired into the lab it was clear cut. This is your job. And it was clear cut and although there were slim opportunities they were available. [They had you] start visiting plant sites, customer sites, you did troubleshooting, things like that and then you could move into those roles. It wasn't until maybe 10 years ago that they started hiring people with [specific degrees] and they wanted a career path in their current roles. I think when that happened they didn't have a clear path of how that was going to work.

Employees are just starting to demand that careers are carved out of roles that once seemed stagnant and leveraging mentors, networking opportunities, and trainings are what has proven to work so far. Rob, who has been in research and development roles for the duration of his career said,

> The most effective tool in my development so far has been networking in the sense of just having an idea of what all is available for you to do. And knowing what opportunities are there. Because there's usually not a list of stuff or a road map. Or even a way of knowing everyone in this role has followed this path. Or these skills or attributes are needed to achieve this goal or something like that.

Without the added assistance of managers or senior employees, it is important to have these other opportunities because they can help bridge the gap between lost individuals and someone looking to pay it forward.

Summary

Overall, mentoring is changing in the workplace, particularly in STEM fields. Mentorship is not a set formula that can be applied to all individuals, which makes sense that previous research done for young girls majoring in STEM does not necessarily apply for women in STEM careers. There is a desperate need for technical divisions in corporate to focus on mentoring for all younger employees and incorporate career development plans into the every day workplace. Corporations lose millions of dollars when employees leave roles because of lack of development and managers are the first line of defense. Enhancing and optimizing mentoring programs for young employees will help save corporations money, provide individuals with job satisfaction, and allow for longer, more fruitful STEM careers. This research was also significant for women because it identified that there are differences between the way men perceive mentoring versus women and how the needs vary between genders. With

such a focus on enhancing STEM careers through mentoring, corporations would be leading a valuable first step towards increasing diversity and retaining STEM stars.

Chapter 5

Summary – Conclusions and Recommendations

With women only representing 28% of those working in the STEM fields, it is an important focus for many researchers today (*The National Science Foundation*, 2015). There is a great amount of diversity in the workplace and targeting this talent by developing them is essential (Shaugnessy, 2013). The main purpose behind this study was to better understand mentoring and career development for women in these professional areas. Specifically, the researcher investigated what mentorships in STEM look like, how mentoring impacts career development, and how those two subject are significant for women in STEM. Using a mixed methods approach, the investigator was able to approach the study from multiple perspectives and allow for a more intensive analysis. Documentation from the corporation being studied guided the questions asked of the participants and allowed for a more focused approach.

One survey was used to identify descriptive statistics and gain a general understanding of mentoring in this particular organization of study. Subsequently, individual interviews were conducted to provide a more in-depth, richer perspective of mentoring on career development. Using studied coding techniques, the researcher identified small codes, which translated into a larger overarching themes and the summary of these findings are discussed in this Chapter (Bryman, 2011). The themes identified suggests that there are key learnings that can be used to improve the likelihood of success for women as STEM professionals.

Discussion of Findings/Conclusions

There were a very diverse group of participants studied in this research to gain a strong understanding of the challenges being faced. Based on the findings of this investigation, several conclusions are proposed, which are disclosed below, supporting the importance of strong

mentoring programs in the technical industry. Themes discussed are one method of retaining women in STEM careers.

The first research question asked what mentoring looked like for individuals who worked in STEM, how these relationships formed, and how often mentorships needed to occur. Most relationships develop organically through networking events, working on common projects, and mutual connections. These informal connections occur in 65% of mentorships that exist or have existed in Company A. This indicates these types of interactions are critical to initial mentor to mentee connections. Further investigation of this was observed and categorized under research question number two. Once this was established, participants were asked what attributes were needed in a mentor. Respondents overwhelming required the same general needs, whether it be the physical attributes of the mentor or nuances that made particular individuals more sought out. These needs included the ability to share experiences, access to a large network, and teach them to be professional and succeed in the workplace. Mentors also needed to be receptive and open to discussing strengths and weaknesses with their mentee.

Of those surveyed, 80% concluded that the most important need for a mentee is that their mentor had a good reputation. A good reputation would require a mentor to be known by other colleagues and be respected by fellow employees. Interviews supported that individuals who had mentors who were not as well respected struggled more than those who had esteemed mentors because of preconceived notions of other colleagues. The additional connections that more distinguished mentors have are also beneficial for mentees who are looking for assistance to carve out a career. This suggests that there really is an ideal set of characteristics that must exist for a mentor.

In addition to having a well-respected, more tenured mentor, mentees desired a mentor who was willing to spend the time to develop them. Over 50% of participants indicated they interact with their mentor less than five times per month, which is not enough to establish a

strong bond or relationship. An increased amount of time allows to also facilitate a stronger working environment by offering guidance, development facilitation, and role modeling (Shaugnessy, 2013). This study did not observe the impact of a mentee having a mentor that meets this criteria versus one who does not, however, this could be a direction of analysis in future research.

Next, the second research question looked to identify how mentoring impacts career development. A combination of data collected from the surveys and the data collected from the one-on-one interviews indicated that managers are the key to establishing the initial mentoring pairs because the average individual anticipates experiencing only 2 to 3 mentors in a lifetime. This means that a mentee experiences very few relationships before making career decisions. Coupled with the learnings that most mentorships form through informal interactions, it is helpful to have a conduit to help create these relationships. Managers are responsible for steering younger employees in the right direction and finding the best mentorship pairs are critical to ensuring success. This is because managers are the most accessible resource for employees who are new to the workplace. Of the respondents, 90% of the mentees indicated that a mentor's feedback has influenced their career decisions. Although literature indicates self-efficacy can be an issue for individuals belief in their ability to succeed in particular subject areas, mentors can have an impact on these decisions. The impact that individuals believe mentors have on their career choices make the influence of managers even more critical. Not only are managers best aware of the skills of subordinates, they can also facilitate mentorships that helps STEM stars' retention.

In addition, the data indicated that there are two different types of mentoring relationships. These two types of relationships are categorized as either long term or short term connections. Those mentorships that are short term are because of improper matching or those that are paired to only satisfy an immediate need that ends once the project is completed or

another similar situation. The second type of mentorship occurs when the mentor and mentee develop a longer term relationship. Longer term relationships either continue in a long term partnership or transition into a friendship, utilizing the relationship whenever appropriate. Both types of relationships serve an important purpose and data collected from this research does not indicate whether one relationship is more valuable than the other. Both offer a large amount of value to mentees and career path decisions. These two types of relationships are worth noting because although short term relationships can be dismissed, they still serve a valuable purpose in the growth and development of career driven individuals.

Finally, the third research question addressed the impact mentoring and career development has on women in particular. Literature argues that women to women mentor pairing is necessary to yield the most success for the next generation. Contrarily, this research indicates that there are significant differences among the generations and having an older woman mentor a younger woman may not necessarily be the best pairing. Having a mentor who has similar goals and understands what steps are needed to make an upward career progression are more important for the success of women in STEM. Furthermore, women tend to be more concerned with the impact of their families on their careers. Because of this, women need to be able to see what their career options are and what moves they can make to advance their career as soon as possible. Mentorships allow women to map out their options and make progress towards achieving their ultimate career goals. This helps in women retention in STEM when they can better understand what their options are in the long term. The research collected indicated that a relationship between mentorship, career development and women's long term presence in STEM exists and the connections have yet to be optimized. The interviews confirmed that the networks and gained experiences from their mentorships help to shape and develop one's professional career making it critical to the success for women looking to be retained in these roles. Data showed that participants believe mentoring made the difference

between career success and potential failure. Although this is not definitively identified by this research, further studies can indicate whether or not mentoring is the only path to career success. What can be confirmed is mentoring adds value to the career progression of women in STEM and is at least one tool that can be used to help retain these stars.

Similar findings discovered in this study are anticipated if future researchers study a larger technical group of associates. Researchers who pursue this topic can help to support the data found in this research. Although this study was representative of the organizations demographics in the technical field, potential additional diversity in other organizations could also have an impact on the results. More specific mentor attributes and further support of the findings collected are anticipated if a greater sample size were to be questioned.

Recommendations

Based on the findings discovered in this research, certain recommendations are suggested for both those in industry and those in academia looking to further expand this critical area of study. Those in industry can utilize this information to make their corporations stronger and continue to strive to increase the percentage of female representation in the technical fields.

For Industry Actionable Items

With the country's desire to increase the attractiveness of STEM and their advantage on the rest of the world, it is important to continue to focus on success in this area (Beede et. al, 2011). It is recommended that the technical world pay closer attention to their employees and offer them all the opportunity to experience career development. Particularly, because of the great desire to increase the number of women who are representing the fields in STEM, there should be a greater emphasis placed on offering these opportunities to their employees. This would include offering formal and informal mentoring programs and increase the number of networking events that occur in the workplace.

In order to accomplish this, corporations can implement training programs, hold managers accountable for guiding their subordinates, and require formal programs that measure employee's participation and needs. Assigning responsible parties in the organization to oversee the programs and measure effectiveness will be a useful tool to ensure companies maintain focus on this useful tool. Carving out career paths, particularly for women who are currently underrepresented in STEM, can help to retain STEM stars.

For Academic Further Research

Future areas of study in academia can include utilizing the survey and interview questions on a broader population. In addition, tracking the specific demographics of individuals responses can help to draw more specific conclusions for different ethnicities, educational backgrounds, and ages. This would allow for a better understanding of more specific categories of people as opposed to only highlighting men versus women. Additionally, longer term research could track individuals over several years and monitor how the characteristics requested in this research truly impacted women's career progression. Identifying whether there are more specific general mentor attributes that influence women or how much of an increase there is on those women who did experience these types of relationships would likewise be helpful for future generations interested in improving STEM retention. Also, observing on a long-term scale how the two types of mentorships actually impact career progression as opposed to simply relying on the memory of older individuals may serve as an interesting research study.

Summary

This study has further opened the door to continued growth in the STEM professions for women today. Although a large amount of work has been done to encourage young girls to move towards STEM degrees in college, it is now time to shift focus and gain more momentum with women in these same fields. The research collected here suggests that there is a correlation

between mentoring and career development, which is directly impacting women's career success. As more of an emphasis is placed on implementing mentoring in the workplace, an increase in women remaining in STEM roles is sure to follow suite. More research is certainly needed to continue to generate the ideal mentorship situation for all individuals, however, this research supports there is a gap that must be closed in industry as it stands. Women are paramount to the continued success of the United States in their competition against the rest of the world. This research opens the door to continue to lead the way for future initiatives and show a whole new world of opportunities for STEM starts to succeed.

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Appendix A: Documents Submitted for Review

Mentoring Program

Unleashing the potential of our people

Mentee Guide

Introduction

The Mentee Guide and Mentee Journal are tools to provide Mentee with quick-help topics to begin a mentoring relationship and maximize the learning experience mentoring provides.

The Mentee Guide covers the following:

- Mentoring
- Mentoring Program Objectives
- Benefits of Mentoring
- Types of Mentoring
- The Mentoring Process
- Learner-Centered Mentoring Paradigm – Adult-Learning Principle
- Roles of a Mentee
- Setting SMART Goals
- The 4 Learning Styles Inventory
- Tips for Overcoming Mentoring Obstacles
- Guide for the Introductory Session (with the use of the Mentee Journal)
- Mentoring Session Guides (with the use of the Mentee Journal)
- Tips for Effective Listening and Feedback-Giving
- Preparing for Closure and ending the Mentoring Relationship

The Mentee Journal is tool to prepare for and record mentoring session discussions with the Mentor and to capture action plans and results. It consists of the following:

- Preparing for the Introductory Session
- Mentoring Partnership Agreement, which is a document to formalize the mentoring relationship
- Mentoring Session Notes Pages
- Summary of Discussion and Action Plans

The reasonable thing is to learn from those who can teach.

- Sophocles

Mentoring - Learning and Developing Through Others

Mentoring is a learning partnership of individuals that involves commitment to share knowledge, skills, experiences and perspectives, which result in more effective, productive, and successful members of the organization. It is an enabling process that addresses a diverse population and is available for all employees.

Mentoring is a mutually beneficial relationship that facilitates development of both Mentor and Mentee in the current and future business environment. Mentees can learn, develop and contribute more quickly when guided and supported by an experienced mentor. Mentors who have the expertise and knowledge become valuable resources to drive learning and growth. Moreover, there may be instances that reverse mentoring may happen, when a more senior employee seeks a mentor who is or may be the person's hierarchical subordinate or peer.

As a development tool, mentoring supports organizational goals and objectives as it supports alignment of employee competencies with corporate needs. The individuals cultivate developmental relationships thus encouraging employee to take ownership of their career growth.

Mentoring Program Objectives

Mentoring has the following objectives:

- ❖ Enhance employee development
- ❖ Foster a learning environment that utilizes experiential learning
- ❖ Increase cultural exchange and value for diversity
- ❖ Create an environment for leaders to emerge
- ❖ Enhance organizational understanding and capabilities
- ❖ Increase employee engagement and productivity

Employees are highly encouraged to be in a mentoring relationship.

Benefits of the Mentoring Program

Employees who are engaged in a mentoring relationship stand to benefit much from it. An organization that encourages and supports a mentoring program reaps the positive impact of such relationships. Some of the concrete benefits that are derived from it from various stakeholders are:

The Mentee:

- Develops networks and increases visibility
- Develops technical and professional skills from experienced and/or expert resources
- Receives career guidance, develops increased confidence and a sense of direction
- Learns to adapt to changes in markets, technologies, and environments more easily
- Feels part of the organization more quickly
- Gets a sense of and a deeper understanding of the organizational and corporate culture
- Gets a better understanding of the career options and opportunities and own development needs and opportunities

The Mentor:

- Experiences nurturing potential in others and the satisfaction derived from seeing someone develop and grow
- Intellectual excitement of having assumptions challenged and learn new perspectives
- A broader and more realistic view of the organization, its culture, and its issues
- A greater connection with different layers of organization
- Ability to put experience back into the organization

- Build networks within and outside of the business or function

Line Manager of a Mentee or Mentor

- A more effective, cohesive and engaged team
- Higher employee morale
- Increased skilled resources for deployment
- Capitalizes on the expertise within the current resources

Team/Business/Function/Organization

- Enables the transfer of skills, values and beliefs within the team or organization
- Employees are enriched by the mentoring experience and contribute more fully to the company.
- Helps turn the diversity of the teams into a competitive advantage by unleashing the creative energies.
- A richer, fuller mix of ideas, experiences and views making a more dynamic marketplace of ideas

Types of Mentoring

Mentoring for New Employees

Planned learning partnership for new employees in a business unit, to assist the new employee in integrating to the environment quickly, help understand the business and culture of the organization. This type of mentoring supports the on boarding program in the business or organization of new employee members.

A short term mentoring relationship that may run for 3 to 6 months, and may progress into a more informal mentoring relationship as the new employee becomes more immersed and integrated into the business unit or organization.

Mentoring for Competency Development

A planned learning partnership with the objective of developing a particular core or functional competency or competencies to improve, strengthen, or gain new ones in preparation for future tasks, objectives or roles. This could be informal/spontaneous or a formal learning partnership.

Employees may form the learning partnership across businesses, functions, levels, disciplines, genders, generations and cultures.

Informal/Spontaneous/ Voluntary Mentoring

This type of mentoring relationship is initiated by employee, to engage a mentor for a particular period of time, and with the objective of learning a particular skill, personal improvement, expanding points of view, seeking insight or additional business knowledge. This learning partnership is informal and may at times be based on the level of comfort an employee has with another line manager or colleague to learn from. This may be short-term or a per need basis.

Formal Voluntary Mentoring:

A Formal Mentoring program is employed when the learning needs and competencies for development are identified together with line manager and a recommendation to be in a mentoring program is agreed upon during the Performance Partnership discussion, and included in the Individual Performance Plan (IPP) under the Current Year Development.

Mentoring discussions or meetings are directed at improving or strengthening specific/targeted competencies – skills, knowledge, abilities and behavior.

Since this is considered as a short-term development plan and needs to happen within the current year, the duration is from 6 months to 1 year.

Mentoring for Career/Talent Development

Mentoring for Career/Talent Development is a formal, planned learning partnership, with the objective of accelerating the development of the critical competencies of key talents, high potentials, corporate promotables, and succession candidates, needed for leadership positions or for identified future roles. This may be a development action taken as an offshoot of the Strategic Workforce Planning or Staffing Meeting discussions.

This type of learning partnership is geared towards preparing the employee before he or she assumes a new role in a year's time. It is to ensure the individual's successful transition to the new role.

The learning partnership may be formed across businesses or functions, levels, disciplines, genders, generations and cultures. A specific mentor is identified.

The duration of this learning partnership is from 12 to 18 months prior to the move or transition to the new role, and may extend until such time that the individual is confidently comfortable in the new role.

Each of the Mentoring relationships mentioned above is mentee-initiated. Preparing for the mentoring relationship is important to appreciate the benefits it brings.

Becoming a Mentee

Determine which type of mentoring relationship do you want to engage in.

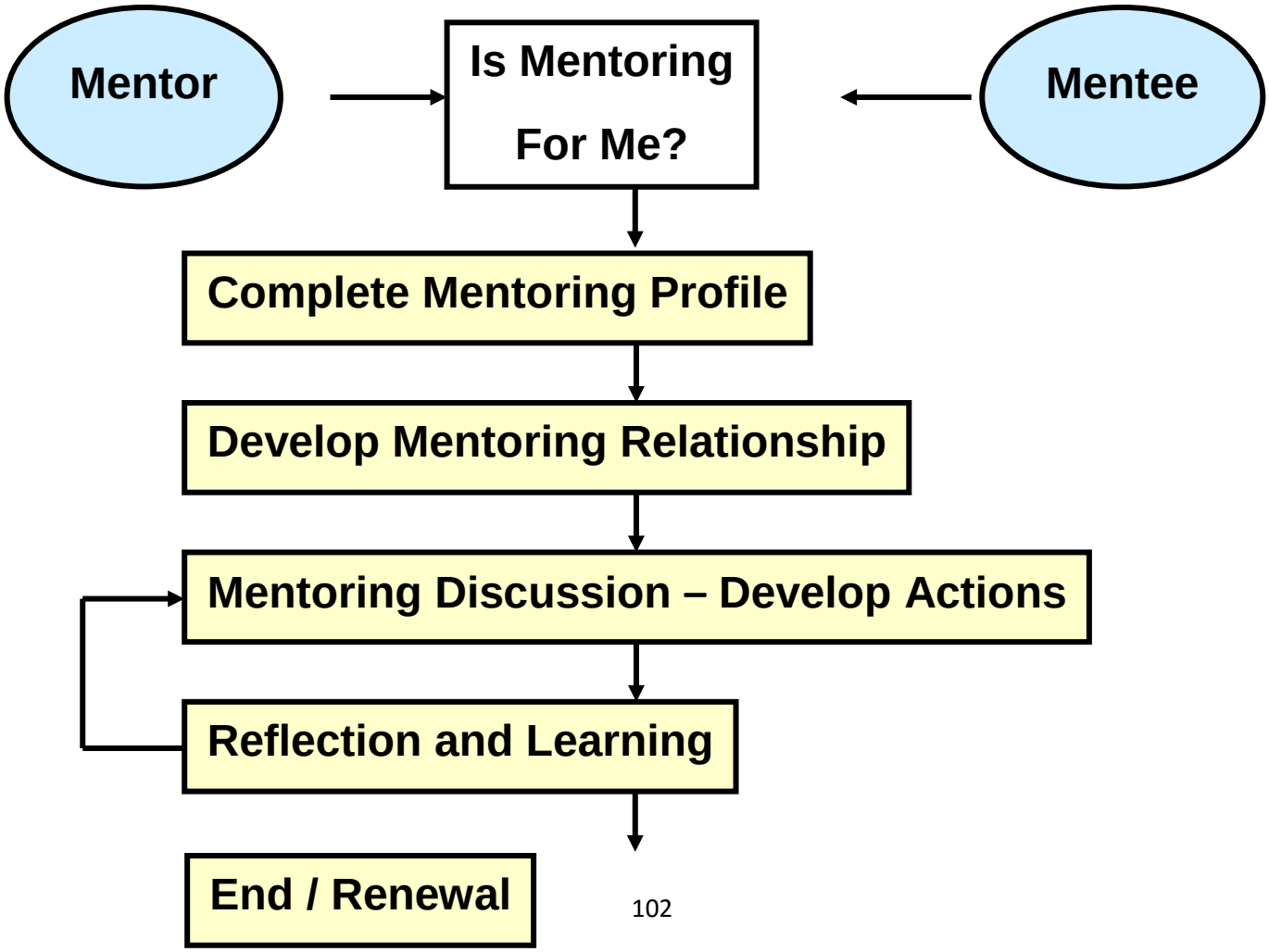
- Are you new to your job or role? Are you new to Chemours? Do you need to fast track learning about your role, function or about the company?
- Do you have a need to have someone help you uncover an aspect, ability or talent of yours that may be dormant and unrecognized?
- Do you feel you can do more in your job or role now, but is uncertain which area to grow into?
- Are there significant competencies required in your role that you feel you need to develop and working with someone who is a recognized expert in a particular field will help you gain either confidence or improve the level of skill that you have?

You may consult your line manager who will be able to help you identify your learning needs and may be able to recommend potential mentors to address your development goals.

Some mentoring relationships may be peer mentoring, and this requires a certain amount of humility and balance to foster real learning. Joint contribution leads to better growth for both individuals.

The succeeding sections in this Mentee's Guide will help you prepare and hopefully, have a successful mentoring relationship.

The Mentoring Process



LEARNER-CENTERED MENTORING PARADIGM

Mentoring Element	Changing Paradigm From	 To	**Adult Learning Principle**
MENTEE ROLE	Passive receiver	Active partner	Adults learn best when they are involved in diagnosing, planning, implementing and evaluating their own learning.
MENTOR ROLE	Authority	Facilitator	The role of the facilitator is to create and maintain a supportive climate that promotes the conditions necessary for learning to take place.
LEARNING PROCESS	Mentor-directed and responsible for mentee's learning	Self-directed and mentee responsible for own learning	Adult learners have a need to be self-directing.
LENGTH OF RELATIONSHIP	Calendar focused	Goal determined	Readiness for learning increases when there is a specific need to know.
MENTORING RELATIONSHIP	One life – one mentor, One mentor – one mentee	Multiple mentors over a lifetime, Multiple models for mentoring	Life's reservoir of experience is a primary learning resource; the life experiences of others add enrichment to the learning process.
SETTING	Face to face	Multiple and varied venues and opportunities	Adult learners have an immediacy of application.
FOCUS	Product oriented: Knowledge transfer and acquisition	Process oriented: Critical reflection and application	Adults respond best to learning when they are internally motivated to learn.

ROLES OF THE MENTEE

Type of Mentoring	Mentee Roles	Purpose	Mentor Roles	Mentor's Approach	Skills, Knowledge, Abilities	Uniqueness
Mentoring for New Employees	Peer	Acclimate and integrate new employees	Guide	Tell	Knows the organizations, policies, practices, information – how things get done	Only for the first few months of employment
Mentoring for Competency Development	Protégé Expert	Knowledge and experience transfer	Expert	Tell and demonstrate	Leading expert in a professional discipline or unique process	Knowledge that sets mentors apart from their peers
Mentoring for Competency Development **Mentoring for Career Development**	Junior member of the profession	Development in a specific profession, eg. Chemical Engineer	Advisor	Tell and discuss	Recognized as accomplished in a specific profession	Knows what it takes to be successful in the profession
Mentoring for Competency Development **Mentoring for Career Development**	Person with Unique needs	Living example of values, ethics and professional practices	Role Model	Illustrate and discuss	Successful in job and life, enjoys working with others who need help	A caring and concerned adult
Mentoring for Competency Development **Mentoring for Career Development**	Partner	Helping others think, learn and grow	Facilitator	Facilitate self discovery	Supportive listener, questioner and collaborator	A trusted ally
Mentoring for Career Development	High potential	Plan for moves to maximize career potential	Sponsor	Tell and discuss	Ability to influence selection decisions and career moves	Higher executive

SETTING SMART GOALS

Use the following questions to guide you to set SMART learning goals for the mentoring relationship.

SPECIFIC

- What are your learning outcomes?

- What are you trying to accomplish?
- Are your learning goals specific, concrete and clear?

MEASURABLE
- Can your learning goals be measured?
- How can you tell when you have succeeded?

AGREED
- Do you and your mentor both share a common understanding of what your goals are?
- Are you and your mentor satisfied that the goals provide a useful basis to work on?

REALISTIC
- Will you be able to achieve the goals?
- Are there other resources that need to be available in order to achieve your goals?

TIMED
- Is there a specific time frame for achieving your goals?
- Are you and your mentor satisfied with the time allocated?

THE 4 LEARNING STYLES

Check which learning style applies to you. Share with your mentor which learning style works best for you and which learning style you would like to try. This will help your mentor plan and provide you with the appropriate activity or action to maximize your learning experience.

THE ACTIVIST STYLE

- Enjoy being involved
- Enjoy new experiences and opportunities
- Happy to be in the limelight
- Prefer to be active rather than sitting and listening
- Not too keen on details
- Stick-ability is not their strong point
- Not concerned with having a plan

THE REFLECTOR STYLE

- Like to review what has happened
- Prefer to observe, think and assimilate information before starting
- Prefer to reach decision in own time
- Do not like to feel under pressure
- Listen carefully, weigh pros and cons
- Not drawn in at early stage of discussion
- Committed to outcome once they have reach a conclusion

THE THEORIST STYLE

- Like to explore methodically
- Tend to be detached and analytical
- Like to be intellectually stretched

- Prefer models and systems
- Uncomfortable with ambiguity and find contrary data uncomfortable
- Think problems through in step by step logical way
- Not content with broad overviews
- Need to know why and how things work

THE PRAGMATIC STYLE

- Like practical solutions
- Want to get on and do something
- Act quickly and confidently
- Like to try new ideas that work
- Respond to problem as a challenge
- Prefer experience to thinking and is impatient with thinkers
- Dislike too much theories
- Not enough attention given to gain people's commitment

OVERCOMING MENTORING OBSTACLES

High expectation - This has to do with the expectation that a mentor needs to be all things to a mentee

Strategy: Mentors will not be able to do it all or provide it all. Be understanding of mentor's limitations.

Burnout - Mentors who take on too much in the relationship may burn out or become stressed when other commitments and situations in life are going on at the same time.

Strategy: Understand that mentor's too have other responsibilities. Be considerate. When mentoring becomes a burden, you and your mentor try to figure out why and then do something about it. Mentoring should not be stressful

Lack of disclosure - Being unwilling to share information and feelings may create a situation where you or your mentor may read more into communication than is intended.

Strategy: Be straightforward, firm, and up front in your communications and sharing of information.

Ethical dilemmas - Mentors or mentees sometimes get pushed where they do not want to go. In the desire to meet learning needs, you may find yourself in a situation where you need to make ethical decisions.

Strategy: Be on the alert, and stay true to yourself and your principles at all times

Crossing boundaries - Mentors and mentees need to know when a boundary has been crossed

Strategy: Use the mentoring partnership agreement as a point if reference.

Prejudice and bias - Prejudice of any kind (gender, racial, ethnic) has no place in a mentoring relationship

Strategy: If you find that you are exhibiting prejudice or your biases are getting in the way, it is time to consider closure.

Procrastination - When you find yourself rescheduling mentoring meetings or putting off mentoring conversations, it is time to consider why it is happening

Strategy: If may be a time crunch, or it may be a signal for closure

STRATEGIES AND CONSIDERATION FOR INTRODUCTORY SESSION

To Do List using the Mentee's Journal	Strategies For Conversation	Mentee Considerations
Introductory Session, Getting to Know You section Take time getting *to know each other*	Review mentor's profile in advance of the conversation.	Establish rapport Exchange information Identify points of connection Share something about yourself
Talk about mentoring	Ask - Have you ever been engaged in a mentoring relationship before? What did you learn from that experience?	Talk about your own mentoring experiences, if any.
Introductory Session, Goal-Setting Section Determine your own learning goals	Share - What do I want to learn from this experience? What are the specific learning outcomes desired in this relationship? **What are the criteria for evaluating successful accomplishment of learning outcomes?** **What is the process for evaluating success?**	Be clear with your learning goals. Ask mentor if he or she has any particular learning goal in the mentoring relationship.
Introductory Session, Expectations Setting Section Determine your relationship needs and expectations	Discuss – What do I hope to get out of this relationship?	Help mentor become clear about what you need or want from this mentoring relationship. If you are not clear, use this as opportunity to clarify your thoughts with your mentor.
Define the deliverables	Discuss- What would success look like for me? Ask Mentor to share how success would look like for him/her.	

To Do List using the Mentee's Journal	Strategies For Conversation	Mentee Considerations
Introductory Session, Norms Setting Section Discuss options and opportunities for learning	Discuss ways – Learning and communication styles Share your learning style. Which learning style are you most comfortable with? What are you willing to try?	Discuss implications of each other's styles and how that might affect the relationship
Delineation of mutual responsibility	**Who will be responsible for what?**	What are you willing and capable of contributing to the relationship?
Accountability assurances • **Relationship ground rules** • **Confidentiality safeguards** • **Boundaries**	**How do we ensure we do what we say we are going to do?** **What are the norms and guidelines we will follow in conducting the relationship?** **How do we protect the confidentiality of this relationship?** **What are the not-to-exceed limits of this relationship?**	
Protocols for addressing stumbling blocks	**What stumbling blocks might we encounter?** **What process should we have in place to deal with them as they occur?**	
Consensual mentoring agreement	**What do we need to include to make this agreement work for us?**	
Introductory Session, The Mentoring Agreement **Complete the Mentoring Partnership Agreement**	**Summarize the Goals, Expectations, Norms of the Mentoring**	Review the discussion points and agree.

STRATEGIES AND CONSIDERATIONS FOR THE MEETING SESSIONS

To Do List using the Mentee's Journal	Strategies For Conversation	Mentee Considerations
Meeting Session: Spotlight Section Review the preview's meeting session and action plans Determine the topic for the meeting	Provide an update from your last discussion. What do you want to talk about today? What are the issues and challenges that you face?	Prepare an update prior to the session Continue to establish rapport Refer to the Summary of Actions page
Meeting Session: ***Learning Section*** Surface the Learning's	What actions have you done with the issues/challenges you are facing? What are/were the obstacles that you face/d?	Provide sufficient information for mentor to understand your situation.
Meeting Session: Options and Opportunities Section Generate options in addressing the current issue	What are the opportunities you see? What are options you have? What are the pros and cons of your options? Who can provide additional information or help?	Think through options.
Meeting Session: Action Section Identify actions to take and timelines Identify learning objectives	What is the agreed course of action from among the options? Timeline? What help would you need?	
Summary of Actions Complete Summary of Actions section of the Journal to record key discussion	Summarize the agreed actions based on the discussions	Check for understanding

TEN TIPS FOR EFFECTIVE LISTENING

1. Maintain appropriate eye contact, which show interest without staring.
2. Sit in a relaxed and more open manner.
3. Nod your head appropriately to show that you are listening.
4. Use non-verbal behavior like "uh-huh" and "mmm….. "
5. Keep silent at times instead of feeling you have to say something whenever the person stops talking.
6. Acknowledge the feeling expressed by the person in a non-judgmental way to show empathy.
7. Use active listening or ask questions to clarify what the person has said.
8. Ask questions to clarify or check for understanding.
9. Summarize to help keep track of what the person has said.
10. Paraphrase to check that you have understood what the person has said.

THE ART OF GIVING FEEDBACK

GIVING POSITIVE FEEDBACK

EFFECTIVE WAYS

1. Is specific about what is done well
2. Is given in a timely manner, immediately after the action
3. Is given when performance is improving or exceeds expectations
4. Is given without any strings attached
5. Is given because it is deserved, not as a sweetener
6. Is given authentically

INEFFECTIVE WAYS

1. Is so general that it could apply to almost anything
2. Picks out for comment something that the recipient always does
3. Is given in the hope of making people feel better to make them work harder
4. Is given to make accompanying criticism easier to take
5. Is given because it is what a manager is supposed to do

GIVING NEGATIVE FEEDBACK

EFFECTIVE WAYS

1. Is directed at a situation rather than the person
2. Recognizes there may be problems the person is struggling to deal with
3. Leads to joint analysis of the problem and why it has arisen
4. Is spoken objectively and directly
5. Is given in private
6. Is not allowed to affect subsequent relations

INEFFECTIVE WAYS

1. Blames the person concerned
2. Assumes the recipient is in the wrong and deserve a verbal punishment
3. Assumes that things should be better but offers no indication of how this could be achieved
4. Hinted at or delivered in a roundabout way
5. Is given in public
6. Lingers on in the relationship

TIPS FOR MENTEES IN PROVIDING FEEDBACK

Providing effective feedback to your Mentor helps improve the mentoring relationship and the way you can learn best.

What To Do	How To Do It	Example
Align your feedback with the learning goals.	Provide real-time feedback. Make it usable and realistic.	"I have a few ideas that might help…." "What works for me is…."
Provide feedback about behavior that the mentor can do something about.	Stay with the behavior rather than succumb to the temptation to evaluate it	"The impact of that behavior to me is…."
When you talk from your perspective, remember that your reality is not the mentor's reality	When you talk about your experience, set a context and be descriptive.	"In my experience, which was…., I found that…. I know that is not your situation, but maybe there is something to learn here."
Check out your understanding of what is being said	Listen actively Clarify and summarize	"If I understand what you are saying…." "Help me understand what you mean by…."
Use a tone of respect	Take care not to undermine the mentor's capability	"I liked the way you….? "I am curious...". "I wonder…." "Did you also consider….?"
Be aware of your communication style and how that works in your mentoring relationship	Share information about communication styles with your mentor, and discuss the implications for the feedback cycle	"I find that I get defensive when…" "I react positively when…."

Avoid giving feedback when you lack adequate information	Ask for time to get the information you need. Faking it doesn't work.	"To be honest with you, I need to think about that a little more."
See feedback as movement forward not as interruption from the journey	Continuously link progress and learning to the big picture and the journey	"When we started out…. And then…. And now…."

CLOSURE PREPARATION – STEPS AND QUESTIONS

CLOSURE PREPARATION STEPS	QUESTIONS
1. Revisit your goals and objectives	What was our goal in working together?
2. Envision a best-case closure	What would we really like to see happen when this mentoring relationship comes to and end? How can we ensure the relationship reaches a learning conclusion?
3. Envision a worst-case closure	If the ideal is not possible, how can we still ensure a positive learning conclusion? What might get in the way?
4. Plan for mutual accountability	What will we do to overcome any factors that get in the way of us reaching a learning conclusion?
5. Establish a process for acknowledging the time for closure	How will we know when it is the right time to bring the relationship to closure?
6. Establish ground rules for the learning conclusion conversation	What will be the agenda for our learning conclusion conversation?

Mentoring Training Program Overview for Company A

•Mentoring
•Learning and Developing Through Others

Module 300 :
Mentoring Training Program - Overview

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Content

- Definition of Mentoring
- When is mentoring recommended?
- Roles and Responsibilities
- Elements of a Successful Mentoring Relationship
- Mentoring Process
- Basic Skills in Mentoring

Defining Mentoring

•Mentoring is a learning partnership between individuals that involves a commitment to share knowledge, skills, experiences and perspectives, that result in more effective, productive, and successful members of the organization.

•It is a mutually beneficial relationship that leverages the experience of the Mentor and facilitates development of both individuals in the current and future business environment.

Defining Mentoring

WHAT IT IS

- A partnership of individuals working as equals toward a goal
- A working relationship with personal and professional dimensions
- Developmental
- Voluntary
- Available for all employees
- Requires honesty, openness, commitment, and effort

WHAT IT IS NOT

- On-the-job training
- A cure-all for substandard performance or poor management
- The same thing as managing
- A definitive tool for advancement
- Restricted to high-flyers
- It is not one-sided sharing of information and learning

Values and Benefits of Mento

- Reduces learning curve and improves productivity.
- Increases employee morale and satisfaction.
- Strengthens self-directed learning and development.
- Fosters collaboration and accelerates knowledge transfer among employees and across different functions.
- Ensures business continuity through the development of future leaders.
- Knowledge retention and sharing of valuable experiences within the organization.
- Increases cultural exchange and value for diversity.

When is Mentoring recommended?

- 1. Mentoring for New Employees

➢ To assist the new employee integrate into Company A or their business/functional environment quickly.

➢ A short term mentoring relationship for 3 to 6 months, and may progress into a more informal mentoring relationship as the new employee becomes more integrated into the business unit or organization.

When is Mentoring recommended?

- 2. Mentoring for Competency Development

- Developing core or functional competencies in preparation for future tasks, objectives or roles.
- Could involve employees across businesses, functions, levels, disciplines, genders, generations and cultures.
- Involvement of employee's line manager is highly recommended
- Either informal/spontaneous or formal mentoring partnership

Informal/spontaneous
- **Initiated by the employee, to learn a particular skill or some additional business knowledge. Short term or as per need basis**

Formal mentoring partnership
- **Mentoring need identified together with line manager and agreed upon during the Performance Partnership discussion (ie. included in the Individual Performance Plan)**
- **Mentoring discussions are directed at improving or strengthening specific competencies – skills, knowledge, abilities and behaviors.**
- **Duration is normally from 6 months to 1 year**

When is Mentoring recommended?

•Informal/Spontaneous Mentoring

•Informal or spontaneous mentoring happens when an employee engages a mentor whom he/she has established a more personal relationship with. This may be a former line manager, a peer, or another valued business/functional person. The mentoring relationship has no definite process or structure in place.

When is this mentoring relationship beneficial?
- **An employee needs a sounding board for some ideas in work and requires some level of expert opinion.**
- **Need help in making a career choice or direction.**
- **Need to improve network within the business or with other functions/business.**
- **Need feedback on a competency or behavior.**
- **Need to have a different perspective on an issue or challenge.**
- **Have insightful conversations.**

When is Mentoring recommended?

•Formal Mentoring

•A formal mentoring relationship is agreed upon by the line manager and employee during the Performance Partnership discussion. A mentor is engaged for a specific learning and development goal over a period of time and follows a specific process.

•The line manager may recommend or be consulted to recommend potential mentors.

When is this mentoring relationship beneficial?

- Employee and Line manager has identified a competency or skill that can be best learned from an experienced person.
- Knowledge on a competency or skill may be reinforced through working with an expert with specific learning goals and timeline.
- Distinct learning and development is expected and evaluated after some time.

When is Mentoring recommended?

- 3. Mentoring for Career and Talent Development
- Accelerate the development of critical competencies of key talents and succession candidates, needed for leadership positions.
- Supports the individual's successful transition into a new role in the future.
- May be formed across businesses or functions, levels, disciplines, genders, generations and cultures.
- A specific mentor is identified.
- The duration of this learning partnership is from 12 to 18 months prior to the move or transition to the new role, and may extend until such time that the individual is confidently comfortable in the new role behaviors

Roles and Responsibilities

Mentor

An experienced member of the organization who helps a mentee develop skills and experience necessary for career success.

A mentor:

- can be an advisor, a counselor, a guide, an expert or a role model
- is person-focused e.g. a Line manager who is both work and person-focused
- is a sounding board for mentee's to present ideas to and obtain ideas from, seek more insights and to learn from.

An effective mentor has a confidential, one-on-one relationship with the mentee and a commitment to share information and opportunities for career development over an extended period of time.

Roles and Responsibilities

Mentor

- **Partner**
  "We're in this together…"
- **Teacher**
  "This is how you…"
- **Advisor**
  "I might try taking this direction…"
- **Realist**
  "In this company, that idea will…"
- **Visionary**
  "What do you see 1, 3, 5 years out…"
- **Confidence-builder**
  "That was a great approach…"
- **Motivator**
  "You can do anything…"
- **Coach**
  "Let's work through this scenario…"
- **Communicator**
  " Let me hear your thoughts…"
- **Advocate**
  "You should present…"

Roles and Responsibilities

Mentee

An individual who values learning through and from others for his or her career development . The mentee seeks and accepts help from experienced persons to learn strategies for personal growth and professional excellence.

A mentee:

- seeks information, knowledge, perspective and skills from a fellow employee
- can be an individual who is new to the organization or to a business or function needing help to get integrated into the team culture

The Mentee is responsible for initiating the mentoring relationship.

Roles and Responsibilities

Mentee

- **Have a vision**
- **Ask for help**
- **Share needs and expectations**
- **Listen to suggestions**
- **Have courage to be different**
- **Focus on task**
- **Show appreciation**
- **Carefully balance time**
- **Be responsible for own success**
- **Develop a career plan**

Elements of a Successful Mentoring Relationship

1. Personal commitments of both Mentor and Mentee to the Mentoring Relationship
   - Objectives, goals and expectations are clear and understood by both.
   - Agreements of meeting dates and actions are observed.
   - Discussions are held in confidence.
   - There is mutual trust and respect.
2. Demonstrated support of Line Managers
   - Mentoring activity is valued by the Manager.
   - Line managers encourage employees to engage in a mentoring relationship, discussing how the program can help in the development of the mentee.
   - Mentors do not replace the need for Managers to grow and develop their people.

Elements of a Successful Mentoring Relationship

3. Value, benefits and requirements for mentoring are well understood
   - Both Mentor and Mentee are educated on the mentoring process.
   - Mentors have effective mentoring skills.
4. Sufficient resources are made available
   - Commitment to share information.
   - Parties are accessible to one another.
   - Learning resources on mentoring are available to all.
   - There is good "personal" chemistry between Mentor and Mentee.
5. Metrics are established and evaluated for effectiveness
   - The pair conduct interim reviews.
   - The relationship closes at the appropriate time.
   - Both parties are learning throughout the mentoring process.

Building Mutual Trust and Respect

Know each other both professionally and personally.

Observe the other person in action.

- Provide real and timely feedback.
- Be consistent with words and actions.

Understanding but not exploiting faults.

Learn to value the differences in perspective and seek to understand them.

Keep agreements on confidentiality.

Mentoring Pitfalls

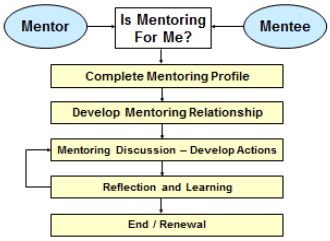
Mentee

- Not meeting often enough or consistently canceling meetings with your mentor.
- Over-dependence on your mentor to get your work done.
- Not listening to or applying advice that your mentor gives you.

Mentor

- Giving advice without being asked.
- Complaining about your own problems.
- Not understanding what the mentee is looking for guidance on.
- Consistently canceling meetings with your mentee.

The Mentoring Process



Complete Mentoring Profile

Mentor's and Mentee's interested in the Mentoring program need to complete a Profile Form. This enables mentee's to select appropriate mentor's.

Profile form contains:-

- Personal Information
- Competency Proficiency
- Experience
- Goals
- Other relevant information

Developing the Mentoring Relationship

- Mentee reviews the profiles of any potential mentors.
- Mentee contacts potential mentors of interest offline (phone, e-mail or in person).
- If your potential mentor agrees to a relationship, they will formalize the relationship with you as a mentee.
- Relationship begins offline through face-to-face meetings, phone calls, or E-mails. Recommended to meet at least quarterly .
- Mentor should have no more than 3-4 active mentoring relationships at any given point in time.
- Mentor relationship remains active as long as both parties desire.

Developing the Mentoring Relationship

Initial Meeting and Conversation

- Initiate and establish a good relationship.
- Establish rapport & trust.
- Set the mentoring objectives.
- Align expectations.
- Agree on norms to be observed during the mentoring relationship.
- Finalize Mentoring Agreement.
- Plan the agenda.

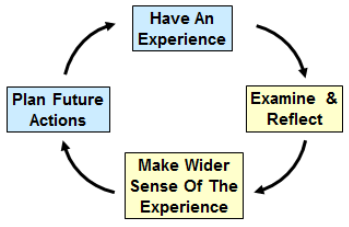
Introductory Session Guide for Mentor and Mentee

Mentoring Discussions

- Each Session should review the previous meeting's actions and path forward.
- Review any learning's from the actions completed.
- Discuss any current issues or concerns.
- Agree on next actions to be taken.
- Capture a summary of the key points from the discussion.

Action Plan for Mentoring Discussions

Reflection – a Learning Experience



Interim Reviews

Conduct Interim Reviews to check progress of the mentoring relationship

- How are we doing - quality of interactions?
- How might we strengthen the relationship?
- What can we do to make the process work better?
- What is our biggest success so far?
- What is the biggest frustration?
- What progress are we making towards realizing the learning goals?

End/Renewal

•Mentor relationship remains active as long as both parties desire.

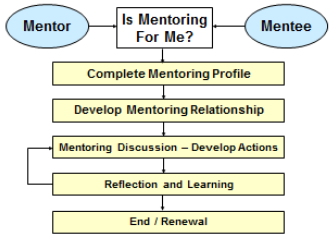
•Periodic confirmation will take place that mentor and mentee profiles and also relationships are still active.

It is time to close the mentoring relationship when…

- The mentoring goals have been achieved.
- The discussions stop revealing new perspectives and insights.
- No progress is being made.
- The mentee fails to integrate the learning's into his / her development.
- An absence of motivation (from either party).
- There has been a breach of confidence.

•Confidential Surveys are conducted at the end of the mentoring relationship to gain the key learning's from the experience.

The Process



Summary

- Significant value and benefit exists in mentoring programs.
- Mentoring requires a confidential, one-on-one relationship and a commitment to share information openly.
- Mentee's take responsibility to find potential mentor's.
- Line Managers need to support the process.
- The first mentoring meeting is critical.
- Meetings need to be regular (at least quarterly) and reflections on actions taken need to occur to ensure that learning takes place.

Appendix B: Survey Questions

Email to participants.

Hello!

I invited you to participate in a survey looking to improve the mentoring experience across technology and beyond. This survey will take no more than 5-8 minutes of your time and will help the development of this research if you are so inclined to take the time.

Any individuals who have an interest in participating further are welcome to volunteer for an interview.

Thank you so much for helping me accomplish this research. Please let me know if you have any questions. I look forward to your participation!

Regards,

Alexandra Viscosi

Survey Contents

Introduction to the Survey – Page 1

By selecting "next" you are agreeing to participate in this research study. The purpose of this research is to gain a better understanding of mentoring in the workplace. The length of this survey should take 5-8 minutes. If for any reason you do not feel comfortable completing the survey, please exit the form now or at any point during the survey. This information will be used to improve mentoring relationships for future organizations. For any additional questions please contact the co-investigator/researcher directly at 302-695-2087 or av445@drexel.edu. The principal investigator of contact is Dr. Kristy Kelly who can be reached at kek72@drexel.edu. This research has been reviewed and approved by an Institutional Review Board (IRB). An IRB reviews research projects so that steps are taken to protect the rights and welfare of humans subjects taking part in the research. You may talk to them at (215) 762-3944 or email HRPP@drexel.edu for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

Survey Questions – Page 2

Background demographic independent variables (Questions 1-8)

Age	1 = 18-27; 2 = 28-37; 3 = 38-47; 4 = 48-57; 5 = 58-67; 6 = 68 and older
Gender	0 = Female; 1 = Male; 2= other
Race/Ethnicity	1 = White/Caucasian; 2 = Asian/Pacific Islander, 3 = Black/African American, 4 = American Indian/Alaskan Native, 5 = Hispanic; 6 = Other/Multiple ethnicity
Level of Education	1 = High School; 2 = Bachelor (BA, BS); 3 = Master (MA, MS, MBA); 4 = Doctorate (PhD., Ed.D); 5 = Other professional degree
Initial Job Role Field of Study	1 = R&D/Technical Service; 2 = Business; 3 = Stewardship; 4 = Legal; 5 = Manufacturing; 6 = Other
Current Job Role Field of Study	1 = R&D/Technical Service; 2 = Business; 3 = Stewardship; 4 = Legal; 5 = Manufacturing; 6 = Other
Level of Career Position	1 = Entry Level; 2 = More than 1 promotion in current job role; 3 = More than 1 promotion through job changes; 4 = Management; 5 = Senior Management
Years of Experience	1 = 0-2 years; 2= 3-5 years; 3= 6-10 years; 4= 11-20 years; 5 = over 20 years

Survey Questions – Page 3

9. Are you aware of any of the following activities available at your company of employment? (Check box question)
    a. Mentor/mentee trainings
    b. Formal mentoring relationship opportunities
    c. Coaching
    d. Networking opportunities
    e. Career Development Trainings
    f. Conferences/forums
    g. Development plans
    h. Stress management programs
    i. Team building activities
    j. Other with blank

10. Of the activities you have participated in, identify the **most** impactful to your career development: (Choose from a list)
    a. Mentor/mentee trainings
    b. Formal mentoring relationship opportunities

c. Coaching
d. Networking opportunities
e. Career Development Trainings
f. Conferences/forums
g. Development plans
h. Stress management programs
i. Team building activities
j. Other with blank

11. Of the activities you have participated in, identify the **second** most impactful to your career development: (Choose from a list)
a. Mentor/mentee trainings
b. Formal mentoring relationship opportunities
c. Coaching
d. Networking opportunities
e. Career Development Trainings
f. Conferences/forums
g. Development plans
h. Stress management programs
i. Team building activities
j. Other with blank

12. Have you participated in a mentoring experience?
a. Yes (moves to page 3)
b. No (submits form)

Survey Questions – Page 3

Individuals who have participated in mentoring:

13. What is the longest single mentoring relationship you have maintained? (M/C)
a. Less than 1 year
b. 1-3 years
c. 4-7 years
d. Over 7 years

14. How did you first enter your mentor/mentee relationship? (M/C)
a. Formal mentor pairing program
b. Connections made through workplace
c. Accidental match
d. Mentor sought out mentee
e. Mentee sought out mentor
f. University connection
g. Other (with blank)

15. What attributes do you look for in a mentor? (Check-box)
a. Same career field
b. Same age
c. Same gender

d. Different gender
e. Different age
f. Different career field
g. Higher level of professional status
h. Good reputation
i. Have access to a large network
j. Good listener
k. Frequent availability
l. Other

16. On average, how often do you communicate with your mentor/mentee?
a. 0-5 times per month
b. 6-10 times per month
c. 11-15 times per month
d. Over 15 times per month

17. Has your mentor provided adequate feedback that has influenced your career decisions? (Check-box)
a. Always
b. Sometimes
c. Never
d. Never offered feedback

18. Which of the following applies to you? (Drop down)
a. Mentor (to page 4)
b. Mentee (to page 5)
c. Both (to page 4)

<u>Mentors – Page 4</u>

19. Do you and your mentee have a clear understanding of each other's strengths, weakness, and purpose for the relationship?
a. Yes
b. No
c. Other (fill in)

20. How many mentees have you had? (multiple choice)
a. 1 mentee
b. 2-3 mentees
c. 4-5 mentees
d. Over 5 mentees

21. As a mentor, rank the most important support offered by your mentees. (ranking system)
a. Mutual goals
b. Offer career development opportunities
c. Networking opportunities

d. Guidance for work-life balance
e. Help grow self-esteem
f. Other

22. As a mentor, what occurs in a meeting with your mentee? (Check box)
    a. Learning
    b. Asking questions
    c. Discussing needs
    d. Setting goals and expectations
    e. Developing time table
    f. Other (fill-in)

23. Have you been mentored?
    a. Yes (move to page 5)
    b. No (submit form)

Mentee – Page 5

24. How many mentors have you had?
    a. 1
    b. 2-3 mentors
    c. 4-5 mentors
    d. Over 5 mentors

25. Mentors must be able to: (check-box)
    a. Motivate
    b. Educate
    c. Lead
    d. Develop
    e. Offer opportunities
    f. Protect
    g. Maintain positive attitude
    h. Role Model
    i. Provide guidance
    j. Communicate effectively
    k. Be accessible
    l. Provide feedback
    m. Listen
    n. Other (fill-in)

26. Were you in a mentoring relationship when you received your first promotion?
    a. Yes
    b. No
    c. N/A

27. Were you in a mentoring relationship for your first career change?
    a. Yes
    b. No
    c. N/A

28. As a mentee, rank the most important support offered by your mentor.
    a. Provides recommendation letters
    b. Offer career development opportunities
    c. Networking opportunities
    d. Guidance for work-life balance
    e. Help grow self-esteem
    f. Other with blank
    g. None of the above

29. As a mentee, what occurs in a meeting with your mentor? (Check box)
    a. Learning
    b. Asking questions
    c. Discussing needs
    d. Setting goals and expectations
    e. Other

Thank you! – Page 6
Thank you for participating in the development of mentoring for the future.
23. If you are interested in participating in an interview to further share your mentoring experience, please Contact me at 302-695-2087 or av445@drexel.edu.

24. If you have any additional comments, please share them here.

Appendix C: Interview Protocol

Thank you for participating in my interview. This research is being conducted on behalf of Drexel University looking to study mentoring in the workplace. If at any point you would like to conclude, please let me know immediately. This interview will be recorded for transcription purposes. If you would like to know more about the research after our discussion, you can receive a copy of the dissertation upon its completion.

Interview Questions

1. Can you tell me about your current position? Can you describe your path to obtaining this role?
2. Can you discuss your career path and what has had impact on your decisions?
3. Describe your experience with mentoring programs and mentoring opportunities.
4. Has mentoring led to your career development? Can you share specific examples?
   ALT. Q for Mentors: How have you been able to change your mentees career development?
5. What were the reasons behind seeking out a mentor?
6. How has the mentoring relationship between you and your mentor evolved since your first meeting?
7. Have you ended any mentoring relationships? If so why?
8. What forms of knowledge or sets of skills do you think your mentee/mentor can offer you?
9. Describe how you teach your mentee the forms of knowledge and sets of skills he/she needs to know to be successful in the workplace?
10. What training or experiences have you had that has prepared you for participating in a mentoring relationship?
11. What qualities do you feel like you possess that will/does make/made you a good mentor?
12. What made mentoring relationships challenging? How did you overcome these challenges?
13. What doubts or concerns do you have or did you have about becoming a mentor?
14. What tools were most effective in your career development that were gained from your mentoring relationship?
15. If a young professional came to you would you recommend them seeking out a mentor, why or why not? (Observe work, personal, school examples).
16. Is there is something you would like to talk about that I haven't thought to ask?