A Dissertation

entitled

Recruitment Strategies Aiming to Attract Females into Undergraduate Engineering Programs: Examining Their Role and Use

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By 2009, the percentage of women who graduated with general undergraduate degrees had increased to almost 58% of all students who completed 4-year degree programs (National Center for Education Statistics, 2009a). These percentages, however, have not been reflected in the enrollment rates of females into undergraduate engineering programs. In 2009, the percentage of females enrolled in undergraduate engineering degrees was only 13% (National Center for Education Statistics, 2009b). Education is a lifelong decision and individuals are becoming more psychologically involved in their college choice (Maringe & Gibbs, 2009). Recruitment activities are only one factor in the college choice decision but are an important one. Recruitment strategies to attract underrepresented groups to the field of engineering had in general lacked success. Recruitment is a way to represent and promote a college or a university truthfully to those who are seeking information about it (National Association for College Admission Counseling, 2009). Recruiting consists of initiatives and materials which serve to persuade prospective students to enroll in schools and specific degree programs. Understanding the specific types of recruitment strategies created for women and the way recruitment
impacts enrollment trends of women will help institutions become more effective at attracting female students into engineering programs.

While research on recruitment has identified some recruitment strategies effective in attracting women to engineering, such as mentoring to prospective students (Ocif & Marshall-Goodell, 1996; Wilkins et al., 2006), marketing learning and living communities (Jaschik, 2010; Kuh et al., 2006; Stinson, 1990; Trenor, 2007; Washington Center website, 2011), as well as offering female-focused financial aid programs (Astin 1997; Cech et al., 2008) to prospective students, we still do not fully understand the whole array of recruitment strategies geared towards women. This study explored, for the first time, the array of recruitment strategies used by institutions to recruit women into undergraduate engineering degree programs. Its purpose was to map what institutions do to recruit women into undergraduate engineering programs, and shed light on why and how these institutions use the recruitment strategies they use. In addition this study aimed to analyze a potential relationship of strategies geared specifically for women with enrollment trends of female undergraduates in engineering programs. Although the study identified a host of traditional and specialized recruitment strategies geared for women, it also confirmed that many institutions have not yet initiated activities to recruit women to their engineering programs. Amongst those women-specific recruitment initiatives that the study identified, mentoring programs, female-focused financial aid, and female campus visits emerged as the prevalent ones. In addition, institutions often included female students and faculty as recruiters and role models, emphasized the need to build relationships with university representatives and the institution in general, and utilized existing programs designed for women as part of their recruitment message.
I would like to thank God for the life he has given me and the gifts he presents to me each day. Without the blessings of the good Lord, I could not have survived the issues life has placed in front of me. I am so thankful for having survived and am looking forward to serving God in whatever manner he has planned.

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List of Abbreviations

4Ps..........................Product, Price, Placement, and Promotion

IPEDS ......................Integrated Postsecondary Education Data System

NCES .......................National Center for Education Statistics
NSF ..........................National Science Foundation

STEM........................Science, Technology, Engineering, and Mathematics
SWE ..........................Society of Women Engineers

WISE..........................Women In Science and Engineering
Chapter One

Introduction

Recruitment strategies to attract under-represented groups to the field of engineering had in general lacked success. Recruitment is a way to represent and promote a college or university truthfully to those who are seeking information about it (National Association for College Admission Counseling, 2009). Recruiting consists of initiatives and materials which serve to persuade prospective students to enroll in schools and specific degree programs. Together these initiatives and materials were referred to as recruitment strategies throughout this study. Understanding the specific types of recruitment strategies created for women and the way these impact enrollment trends of women will help institutions become more effective at attracting female students into engineering programs.

Background of the Problem

In 2009, there were over 308.7 million people living in the United States of which 50.8% were female (United States Census Bureau, 2010). Figure 1 shows the accelerated growth of female over male students in undergraduate programs between 1970 and 2009. By 2009, the percentage of women who graduated with general undergraduate degrees had increased to almost 58% of all students who completed 4-year degree programs (National Center for Education Statistics, 2009a).
Figure 1. Number of Male and Female Undergraduate Degrees Granted Between 1970 and 2009. Adapted from National Center for Education Statistics, 2009a.

The positive graduation trend for women (Figure 1) is concurrent with women who continue to make strides within the workplace. Educational and employment advancements of women create better communities and a more robust society. Engineering has not been one of the fields affected by diverse growth.

Only 17.9% of the students enrolled in U.S. engineering programs were female in 2006 (National Center for Education Statistics, 2007) (see Figure 2). In 2008, the data showed an enrollment trend decline from 2006 of females enrolled in undergraduate engineering programs to 16.8% (National Center for Education Statistics, 2008) (see Figure 2). Unfortunately, in 2009 the number of women enrolled in undergraduate engineering programs continued to decline; the National Center for Education Statistics (NCES) reported that the percentage of females enrolled in undergraduate engineering degrees was only 13% (National Center for Education Statistics, 2009b).
Reasons for the Low Representation of Women

The low representation of women in engineering has been attributed primarily to social identity threat, lack of mentoring, and scarcity of female role models in the career field of engineering (Ethier & Deaux, 1994; Logel et al., 2009; Murphy, Steele, & Gross, 2007; Starobin & Lannan, 2008; Trenor, 2007). First, within engineering programs, women have felt social identity threat in part due to a “chilly climate” in the classroom. Chilly climate relates to the way females have been treated differently than their male counterparts in the classroom (Hall & Sandler, 1982). Women need to feel a sense of belonging within situations they are confronted with (Chow, 2004). The chilly classroom climate does not allow women to gain a sense of belonging (Chow, 2004).

Lack of mentoring is the second reason for low participation rates of women in engineering (Trenor, 2007). Students need mentoring through the entire college process (Savage, 2003). Mentoring plays an important role for females because of the support it
provides in the classroom and job placement, but is not being done at enough schools across the country to encourage women to enter engineering programs (Trenor, 2007).

The third reason so few women enter the field of engineering is the scarcity of female role models within engineering careers (Heyman, Martyna & Bhatia, 2002). Prospective female students are seeing more and more women in the workplace across all industries (Heathfield, 2011). However, the limited number of female role models in engineering positions could be a consideration in an applicant’s decision to avoid the field of engineering (Heyman et al., 2002).

**College Choice**

Education is a lifelong decision and individuals are becoming more psychologically involved in their college choice (Maringe & Gibbs, 2009). Recruitment activities are only one factor in the college choice decision but are an important one. Recruiting plays a role in the process of a student’s search for the appropriate college to attend (Paulsen, 1990). David Chapman (1981) studied the way external influences affect a student’s college choice. Chapman’s research identified three factors that have a strong influence on a student’s college choice, including: “(1) the influence of significant persons; (2) the fixed characteristics of the institution; and (3) the institution’s own efforts to communicate with prospective students” (Chapman, 1981, p. 492). This study’s focus is on the third influence, the institution’s communication efforts with prospective students. Recruitment strategies are ways colleges and universities communicate with students and are imperative to the enrollment success of institutions and their academic programs.
Recruitment Strategies

Recruitment strategies assist the prospective student’s decision on which college to attend by providing information about the institution and its services. In order to make a college choice and ultimately a program decision, recruitment strategies must be presented in ways that are enticing. College choices are made in similar ways by both men and women (Frisbee, Belcher, & Sanders, 2000). Recruitment strategies are usually geared to appeal to both genders (Frisbee et al., 2000).

Recruiting strategies can combine traditional and specialized approaches. Traditional recruitment initiatives focus on generalized messages directed to both men and women through recruitment materials. Some of the types of traditional recruitment materials used to help make college and program decisions in today’s higher education environment include: postcards, invitations, DVDs, phone calls, high school visit days, campus visits, and websites (Gilman, 2006). As a result of the technological progress of today’s society, current recruitment initiatives also include social media outlets such as Facebook, Twitter, and My Space.

Literature indicates that “specialized” recruitment methods are geared to work specifically on women (Astin 1997; Barletta, 2003; Cech, Capalbo & Sherick, 2008; Heller & Rasmussen, 2001; Jaschik, 2010; Ocif & Marshall-Goodell, 1996; Stinson, 1990; Trenor, 2007; Wilkins, Fujioka, & Hom, 2006). Through specialized recruitment approaches, recruiters appeal to women in an attempt to bring them into certain academic programs. Some examples of specialized recruitment methods colleges and universities use include: mentoring, marketing learning and living communities, and offering female-focused financial aid programs to prospective students (Astin 1997; Cech, Capalbo, &
Sherick, 2008; Heller & Rasmussen, 2001; Jaschik, 2010; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006; Ocif & Marshall-Goodell, 1996; Stinson, 1990; Trenor, 2007; Wilkins et al., 2006). Each of these initiatives aims to formulate a personal relationship with prospective female students. Research shows that “women cherish warm, close relationships, take pride in being needed, want to make the world a better place, and enjoy being recognized for their efforts” (Barletta, 2003, pp. 77-78). When recruitment strategies are geared towards women, they are designed to appeal to their needs and predispositions.

Mentoring programs, both over the Internet and in person, can be used as a recruitment initiative that target women because the mentoring programs establish role models many young women are looking for in the field. Mentoring over the Internet is one example of a specialized recruiting strategy geared toward women. As one study (Wilkins et al., 2006) revealed, mentoring over the Internet was able to effectively assist young women to feel more comfortable within Science, Technology, Engineering, and Mathematic (STEM) fields. One reason Internet mentoring could have been effective was the technological skill-set of the generation being targeted (high school students).

“Twenty percent of college students began using computers between the ages of five and eight; by the time they were 16 to 18 years old all today’s current college students had begun using computers” (Pampaloni, 2010, p. 23). Students involved in the Internet mentoring program felt better about their skills because they were able to share their experiences and receive guidance from mentors in the engineering field (Wilkins et al., 2006).
Mentoring programs conducted face-to-face are also effective recruiting strategies and are used when available. Face-to-face mentoring is more intensive than mentoring over the Internet because of the direct participation it involves (Chester & Chester, 2002). The participation of individuals from the college (e.g., administrators) as well as mentor(s), and the students can make face-to-face mentoring programs very successful (Chester & Chester, 2002). Mentoring guides women as they enter programs and help them form a harmonious relationship with their mentors. Mentoring encourages women to enter engineering programs, and applying Martha Barletta’s (2003) research findings by “making them feel warm, helping them develop close relationships, enabling them to make the world a better place, and allows the women to be recognized for their efforts” (pp. 77-78).

Another example of a specialized recruitment initiative was discussed by Stephen Stinson (1990). Stinson (1990) studied social and living communities and their positive influence on the recruitment of women into engineering programs. Learning communities are also attractive to prospective female students (Washington Center website, 2011). Women are attracted to schools that have learning and living communities as part of their student life (Kuh et al., 2006; Stinson, 1990; Washington Center website, 2011). Within the recruiting process, typically “the young woman who expresses an interest in engineering will hear from a female junior in engineering” (Jaschik, 2010, p. 1). Recruitment approaches are meant to raise students’ interests in engineering programs and because recruiting plays such important roles in the process of college selection, students with similar interests tend to relate better and listen to the experiences of those who are currently experiencing what they are interested in (Jaschik, 2010). Learning and
living communities are significant parts of student life and in turn, as research shows (Jaschik, 2010; Kuh et al., 2006; Stinson, 1990; Trenor, 2007; Washington Center website, 2011), are used as important elements of recruitment initiatives. Learning and living communities help entice women into engineering programs by, using Barletta’s (2003) research findings regarding what women need, “making them feel warm, develop close relationships, and take pride in being needed” (pp. 77-78).

Partial or full diversity scholarships are another example of a special engineering recruitment tool (Astin, 1997). Various forms of female-focused financial aid are one way for institutions to attract women into a field that is predominately male-oriented. When institutions can offer financial aid programs directed specifically to women or minorities, the programs are correlated with a high representation of women (Cech et al., 2008).

**Statement of Problem**

While research has identified some recruitment strategies effective in attracting women to engineering, such as mentoring to prospective students (Ocif & Marshall-Goodell, 1996; Wilkins et al., 2006), marketing learning and living communities (Jaschik, 2010; Kuh et al., 2006; Stinson, 1990; Trenor, 2007; Washington Center website, 2011), as well as offering female-focused financial aid programs (Astin 1997; Cech et al., 2008) to prospective students, we still do not fully understand the whole array of recruitment strategies geared towards women.

**Purpose of Study**

The purpose of this study was to map what institutions do to recruit women into undergraduate engineering programs, and shed light on why and how these institutions
use the recruitment strategies they use. In addition this study aimed to analyze a potential relationship of strategies geared specifically for women with enrollment trends of female undergraduates in engineering programs.

This study explores, for the first time, the array of recruitment strategies used by institutions to recruit women into undergraduate engineering degree programs. While studies (Carr, 2001; Gillman, 2006; Grandillo, 2010) have examined recruitment materials, these studies have not collected in-depth information on each of the existing female-focused recruitment strategies.

**Research Questions**

The study aimed to address the following research questions:

- **RQ₁**: What types of recruitment strategies geared towards women have been undertaken by institutions of higher learning?
- **RQ₂**: Why have institutions chosen to use these recruitment strategies?
- **RQ₃**: How were these recruitment strategies structured to appeal to women?
- **RQ₄**: What types of recruitment strategies were more strongly related to an increase in female enrollment trends in engineering programs as viewed through the eyes of admissions directors and engineering department administrators?
- **RQ₅**: Was there a relationship between recruitment strategies and enrollment trends of female students pursuing undergraduate engineering degrees?

**Significance of the Study**

Increasing the number of female students in undergraduate engineering programs will improve workplace diversity and help fill an emerging employment gap (Bouville, 2008). Diversity is important because engineering is the second largest profession in the
United States (Commission of Professionals in Science and Technology, 2004). “Science and technology have been and will continue to be engines of U.S. economic growth and national security” (National Science Board, 2003, p. 1). The National Science Board estimates that more than half of the current science and engineering workforce is aged 40 or older and, if current trends continue, the United States will face a shortage of qualified professionals in the sciences and engineering (Pearce et al., 2004). With the number of White male engineering professionals not keeping pace with the number needed by the workforce, minority and female engineers are increasingly needed to fill the employment gap (Layne, 2009).

This study identifies the array of engineering recruitment strategies geared towards attracting women into engineering that are used by engineering schools in the Great Lakes region. The study also analyzes the relationship of recruitment strategies and enrollment trends of female undergraduates in engineering programs.

This study contributes to our understanding of recruitment strategies used to attract women into the field of engineering from a marketing perspective. Institutional marketing encompasses the marketing activities utilized by colleges and universities to persuade prospective students to enroll in a given college or university (Kotler & Fox, 1985). Marketing is a relatively new perspective to higher education (Kotler & Fox, 1985). The differences of institutional marketing within higher education are subtle, but because they are not focused solely on the customer, are significant. Often higher education institutions do not utilize marketing to its full capacity. Within a business environment, the customer is the focal point and solidifying the relationship with the customer is the main objective for any company trying to do business, stay in business,
and be profitable (Kotler & Armstrong, 2008; Kotler & Armstrong, 2010). In institutional marketing in higher education, the institution’s offerings are showcased and it is left up to the customer to translate the information (Kotler & Fox, 1985). The customer’s needs and wants are less of a focal point than demonstrating what the institution has to offer (Kotler & Fox, 1985). Bringing an understanding of marketing approaches in higher education is one of the contributions to literature of this study. Another contribution is expressed in the enhanced understanding this study brings of the ways marketing messages are shaped within recruitment initiatives that are designed to appeal specifically to women.

Little is known about the array of recruitment strategies being used in the higher education marketplace. This study contributes to practice by providing admissions directors and engineering department administrators with existing practices which can assist them to better formulate their recruitment strategies to prospective female engineering students in the future. The study further contributes to practice by providing admissions directors and engineering department administrators with ideas about the use of recruitment strategies to attract women into engineering programs. The information provided through this study can enable the admissions directors and engineering department administrators to become more efficient with their marketing budgets.

**Definition of Terms**

Terms used throughout this study include:

- Chilly climate: defined as “a psychological climate in which students of one sex are valued differently and therefore treated differently than are students of the opposite sex” (Serex & Townsend, 1999, p. 528).
• Learning Communities: defined as “classes that are linked or clustered during an academic term, often around an interdisciplinary theme, and enroll a common cohort of students. A variety of approaches are used to build these learning communities, with all intended to restructure the students, time, credit, and learning experiences to build community among students, between students and their teachers, and among faculty members and disciplines” (Washington Center website homepage, 2011).

• Living Communities: provide an environment for students from a particular major to live with other students and aim:
  - To help facilitate a smoother academic and social transition to college
  - To create strong academic skills to aid in academic success
  - To aid in the retention of students to the institution
  - To create avenues of learning about others different from oneself
  - To develop an openness to views different from one's own

  (Old Dominion University Website)

• Promotional mix: the “specific blend of advertising, sales promotion, public relations, personal selling, and direct-marketing tools the company uses to persuasively communicate customer value and build customer relationships” (Kotler & Armstrong, 2010, p. 402). The promotional mix categories are defined more specifically as follows:
  - Advertising: “any paid form of non-personal presentation and promotion of ideas, goods, or services by an identified sponsor”

o Personal selling: “personal interactions between a customer and the firm’s sales force for the purpose of making sales and building customer relationships” (Kotler & Armstrong, 2010, p. 402).

o Sales promotion: “short-term incentives to encourage the purchase or sale of a product or service” (Kotler & Armstrong, 2010, p. 402).

o Public relations: involves “building good relations with the company’s various publics by obtaining favorable publicity, building up a good corporate image, and handling or heading off unfavorable rumors, stories, and events” (Kotler & Armstrong, 2010, p. 402).

o Direct marketing: “direct connections with carefully targeted individual consumers to both obtain an immediate response and cultivate lasting customer relationships – the use of direct mail, the telephone, direct-response television, e-mail, the Internet, and other tools to communicate directly with specific consumers” (Kotler & Armstrong, 2010, p. 402).

• Recruitment: Komives et al. (1996) identify recruitment as an integral part of the admissions process where admissions officers “inform prospective students about the institution and its programs and solicit, accept, and screen applicants… In many cases, admissions officers target specific groups of students and actively recruit them because of their personal background, academic talents, or other abilities” (p. 437).
• Recruitment initiatives: used in this study as an umbrella term that embraces all kinds of programs put in place to entice students to enroll in institutions of higher education and more specifically in programs or majors.

• Recruitment materials: used in this study as tactics by which recruitment initiatives are implemented.

• Recruitment strategies: used in this study as the combination of recruitment initiatives and recruitment materials.

• Specialized recruitment: “specialized” recruitment strategies work specifically on women (Astin, 1997; Barletta, 2003; Carr, 2001; Cech et al., 2008; Chester & Chester, 2002; Heller & Rasmussen, 2001; Jaschik, 2010; Kuh et al., 2006; Ocif & Marshall-Goodell, 1996; Stinson, 1990; Trenor, 2007; Washington Center website, 2011; Wilkins et al., 2006).

• Traditional recruitment: marketing tools used to help make college and program decisions in today’s higher education environment. They include: postcards, invitations, DVDs, phone calls, high school visit days, campus visits, and websites (Gilman, 2006).

**Delimitations**

As researchers, we limit our studies to keep the research controllable (Baron, 2006). The sample for this study included 48 public and private higher education institutions in the Great Lakes region which offered on-campus student housing, had less than 10,000 students, and had engineering as a program of study. To collect information, the study used a questionnaire delivered via telephone interviews.
Limitations

Several limitations of this study include:

- The findings of the study are based on information collected from admissions directors and school of engineering administrators. Thus, findings of the study are based on the perceptions, experiences, and knowledge of these groups of recruitment specialists and do not necessarily encompass expertise of other kinds of recruitment officers.

- The findings of this study can be applied to the institutions within the sample and are not necessarily generalizable to all types of engineering institutions. These findings only apply to the institutions within the Great Lakes region.

- The engineering programs studied were an array of programs including the majors within the Integrated Postsecondary Education Data System (IPEDS) definition of engineering undergraduate programs (Table 6). There were a total of 81 different engineering majors within the list of programs studied. Although every precaution was taken to ensure all programs were included, the array of programs studied may not include all majors that possibly exist.

The researcher is a faculty member at Trine University. She has 15 years of experience in the marketing industry and eight years of experience in academia, teaching at the collegiate level. She teaches marketing courses to upper-level undergraduate students. The researcher’s background working with female students is as a mentor and advisor. She is an advisor for student groups which involve engineering students, and therefore is involved with their concerns about the limited availability of female enrollment strategies in the field of engineering. The researcher may have had
predetermined expectations regarding beliefs and what the anticipated results will be. She tried to withhold these judgments with the assistance of the training gained as a doctoral student.

Assumptions

Four major assumptions guided this study:

• Participants would provide accurate and complete information when surveyed;

• As admissions directors and school of engineering administrators, the respondents, would have detailed knowledge and understanding of the recruitment strategies and enrollment trends of their institution;

• There was a variety of different recruitment strategies used at the various institutions;

• The smaller schools with fewer marketing dollars would have to be more creative with their money.

Conclusion

The fact that 50% of the American population is female and a similar percentage of women are attending college is a wonderful testament to the progress of women in college over the past century. The progress has not, however, been replicated within the field of engineering. The percentage of female undergraduates within engineering programs in the United States was only 16.8% in 2008 (National Center for Education Statistics, 2009b), which marked a decline from 17.9% in 2006 (National Center for Education Statistics, 2007). Remarkably, in 2009 the number of women undergraduates in engineering programs continued to diminish. As NCES reported, the number of females enrolled in undergraduate degrees in engineering was only 13% (National Center
Social identity threat, lack of mentors, and scarcity of female role models in the career field of engineering have attributed to the low representation of women in engineering (Ethier & Deaux, 1994; Logel et al., 2009; Murphy et al., 2007; Starobin & Lannan, 2008; Trenor, 2007).

Recruitment is an important part of the college choice process. Recruitment strategies can be separated into two groups: traditional and specialized approaches. Traditional recruitment methods generally focus on generalized messages to men and women. “Specialized” recruitment methods work specifically on women (Barletta, 2003; Jaschik, 2010; Stinson, 1990; Trenor, 2007; Wilkins et al., 2006). Through these specialized recruitment methods, recruiters appeal to women in an attempt to bring them into certain programs, such as engineering. Martha Barletta (2003) studied the ways women react to marketing messages. Barletta’s (2003) research shows that “women cherish warm, close relationships, take pride in being needed, want to make the world a better place, and enjoy being recognized for their efforts” (pp. 77-78).

The outcome of this study could improve the understanding of recruitment strategies towards women into engineering programs. An increase in the number of women with engineering degrees will lead to a more diversified workforce in engineering, an increased intellectual pool, and more innovations in the field of engineering, and will help close the employment gap currently on the horizon. This study focused on recruitment strategies and their relationship to enrollment trends of females into undergraduate engineering programs.
Road-Map to Dissertation

The desire to understand the relationship between recruitment strategies and enrollment trends of females into undergraduate engineering programs was the motivation for this research project. Employers are trying to establish more diverse workplace environments to facilitate the ability to share information and ideas. The purpose of this study was to map what institutions do to recruit women into undergraduate engineering programs, and shed light on why and how these institutions use the recruitment strategies they use. In addition this study aimed to analyze a potential relationship of strategies geared specifically for women with enrollment trends of female undergraduates in engineering programs.

Chapter Two presents a comprehensive review of the literature. It discusses women in engineering, including trends of enrollment, evolution of women’s participation in engineering programs, and reasons for low enrollment of women in engineering programs. More specifically, the literature review examines some of the reasons why women have not pursued degrees in the field of engineering including social identity threat, and discussions of the chilly climate, a low sense of belonging, and social expectations for men and women. Lack of mentoring and its affects are discussed in this chapter as well. Scarcity of female role models is also revealed through the literature about reasons women have not pursued engineering degrees. The literature review also discusses the role of recruitment in college choice and the power of recruitment initiatives, including the historical evolution of recruitment, and the different types of recruitment strategies, including traditional and specialized recruitment strategies used to
recruit women. Finally, Chapter Two details the theoretical frameworks used to guide the study.

Chapter Three discusses the research design, including the participants and instrumentation, as well as the data collection and analysis. Chapter Four summarizes the results of the study. This section details the methodology used to answer each of the research questions and summarizes the findings to the research questions.

Finally, Chapter Five of the study offers a discussion and conclusions. The conclusion discusses the findings and implications, offers recommendations based on the findings, and suggests future research initiatives.
Chapter Two

Literature Review

Since the early 1970s, under-representation of women in scientific and engineering education and careers has been considered a pressing national issue for at least two reasons: (1) the potential contribution of women to the size, creativity, and diversity of the belief that scientific and engineering workforce, and (2) the principle of social equity, expressed in the belief that scientific careers should be “open to talent,” and not governed or constrained by personal factors, such as race and gender. (Fox, Sonnert, & Nikiforova, 2009, p. 334)

With 57.3% of the undergraduates receiving bachelor degrees being women (National Center for Education Statistics, 2009a), it would seem plausible that all fields would have similar percentages of women. While women continue to make strides within postsecondary education, as well as in the work place, only 16.8% of the students enrolled in engineering programs were female in 2008 (National Center for Education Statistics, 2008). The percentage of women enrolled in 2008 decreased from the 17.9% of female students enrolled in engineering programs during 2006 (National Center for Education Statistics, 2007). Unfortunately, in 2009 the percentage of females enrolled in undergraduate degrees in engineering declined to 13% (National Center for Education Statistics, 2009b).

Enrollment trends are influenced by institutions’ abilities to attract students to their programs. Recruitment strategies are used as ways to market colleges and universities to prospective students (Paulsen, 1990). Recruitment strategies, defined within this study as the combination of recruitment initiatives and recruitment materials, are used in different ways to construct the recruitment messages to prospective students.
The different recruitment strategies used by colleges and universities include: college
catalogs/viewbooks, letters, DVD/CDROMs, phone calls, campus visits, websites, social
media, high school visits, college fairs, marketing to high school personnel and parents,
financial aid, mentoring, learning communities, living communities, female-specific
financial aid, plus others specified by the institutions (Astin, 1997; Cech et al., 2008;
Chester & Chester, 2002; Gilman, 2006; Hossler, Bean & Associates, 1990; Jaschik,
2010; Kuh et al., 2006; Ocif & Marshall-Goodell, 1996; Putsche, Storrs, Lewis, &
Haylett, 2008; Stinson, 1990; Supiano, 2012; Trenor, 2007; Washington Center website,
2011; Wilkins et al., 2006).

This chapter explores the historical trends of women in engineering, the reasons
for the low numbers of women in engineering, the types of recruitment strategies used to
attract both women and men in engineering today, and the specialized recruitment
strategies developed specifically for women.

**Women's Entrance into Engineering**

Engineering began as a way of describing the mechanics of designing mechanical
military devices for warfare in the fifteenth century (Layne, 2009). Because of the
military orientation of the endeavors, women were automatically excluded from the
profession (Ambrose, Dunkle, Lazarus, Nair, & Harkus, 1997). It was not until the end of
the nineteenth century, when women were allowed into the engineering field. By the end
of the nineteenth century engineering had progressed into the civilian realm and had
grown in its complexity. Several engineering societies were formed, as men and women
alike were learning on the job or through apprenticeships (Layne, 2009). It was not until
1876 that the first women earned a college degree in engineering from an American
university. Elizabeth Bragg, who graduated with a degree in civil engineering from the University of California at Berkeley was the true pioneer of engineering (Layne, 2009).

Among engineering societies women were limited to “associate” ranks during the nineteenth century (Layne, 2009). They were not considered to be equal to their male counterparts. In 1927, Elsie Eaves was the first woman to obtain full membership in the American Society of Civil Engineers (Layne, 2009), which was thought to be a very “progressive” society at that time.

During World War I the need for women to enter the career field of engineering and other jobs to replace men who had gone into service was enormous (Layne, 2009). Women now had the opportunity to show their capabilities and demonstrate they were at par with their male counterparts. However after the war, the opportunities dissipated and there was no longer a need for skilled women to occupy jobs that “belonged” to men (Layne, 2009). “The situation was so severe for women in engineering according to the American Men of Science directory of 1921, there were no women at all in engineering” (Layne, 2009, p. 6).

By 1972, only 525 of the Bachelor of Science (B.S.) degrees in engineering fields were awarded to females; that equated to 1.2% of the total graduating class (Layne, 2009). With the difficulties women have endured, things have yet to radically change.

**Reasons for the Low Numbers of Women in Engineering Programs Today**

The low representation of women in engineering has been attributed to social identity threat, lack of mentoring, and scarcity of female role models in the career field of engineering (Ethier & Deaux, 1994; Logel et al., 2009; Murphy et al., 2007; Starobin & Lannan, 2008; Trenor, 2007). Each of these factors will be addressed below.
Social Identity Threat

Scholars have identified social identity threat as one of the reasons for the limited enrollment of women in engineering programs (Ethier & Deaux, 1994; Logel et al., 2009; Murphy et al., 2007). Social identity threat is often related to the way females are treated differently and made to feel inferior to men (Ethier & Deaux, 1994; Logel et al., 2009; Murphy et al., 2007). The chilly climate concept captures the negative way females have been treated in comparison to their male counterparts (Hall & Sandler, 1982; Serex & Townsend, 1999). Chilly climates can be exhibited through:

- Behaviors that communicate lower expectations for women
- Yielding to the influence of internalized stereotypes
- Excluding women for participation in meetings and conversations
- Treating men and women differently when their behavior or achievements are the same
- Giving women less attention and intellectual encouragement
- Discouraging women through politeness
- Singling out women
- Defining women by their sexuality
- Overt hostile behavior toward women

(Sandler, 1999, pp. 1 – 3)

Within engineering programs, women have felt social identity threat in part due to the chilly climate in the academic classroom setting. The chilly climate in the classroom inhibits the sense of belonging women need to feel in order to be successful in academe (Chow, 2004). Engineering is a field in which men tend to feel they are superior to women (Meinholdt & Murray, 1999). The expression of such attitudes can cause social intimidation in the classroom. Therefore getting women into engineering programs can be difficult given the male-domination of the programs.
Once females are in a four-year engineering degree program, they tend to feel different than their male counterparts when faced with academic intimidation and social identity threats (Ethier & Deaux, 1994; Logel et al., 2009; Murphy et al., 2007). Murphy, Steele, and Gross (2007) studied women’s reactions while the women were watching a video on an upcoming event in which the gender ratios were noticeably unbalanced in favor of men; the video offered both cognitive and physiological observations. Females displayed or reported to researchers feelings of isolation, low self-confidence, and social identity threat (Murphy et al., 2007). The researchers concluded that these feelings could lead to females not entering the field of engineering or actually leaving the major after they had entered (Murphy et al., 2007). Feelings of isolation, low self-confidence, and social identity threat can happen to otherwise self-assured females and those who display standard confidence tendencies. One interesting aspect of this study was the finding that there was a propensity for women to recall more detail-oriented things than men when viewing the video thus demonstrating their ability to figure out relational aspects of items and commit them to memory (Murphy et al., 2007). The women in this study also watched a gender-balanced video. After seeing both videos, the women reported feeling an elevated sense of belonging when they viewed the gender-balanced video than the unbalanced video (Murphy et al., 2007).

**Lack of Mentoring**

Students need mentoring through the entire college process (Savage, 2003). The college endeavor begins with the decision to attend college, investigating different institutions, finding a college or university of interest, applying, being accepted, and finding which major to enroll in. The college endeavor continues through the student’s
tenure at the college or university he or she has chosen (Liang, Tracy, Taylor, & Williams, 2002; McGuire & Reger, 2003; Savage, 2003). Mentoring plays an important role for females because of the support it provides in the classroom both in the formation of classes to take as well as in the ways to handle challenges the students may have to face (both in and outside of the classroom) (Marklein, 2008). Fully functioning mentoring programs help students with personal and academic concerns, and provide an outlet that creates a “safe place” for them to develop (Liang et al., 2002; McGuire & Reger, 2003).

There is currently a need for more mentoring for women (Liang et al., 2002; McGuire & Reger, 2003; Savage, 2003). Because of the benefits it can provide, “naturally occurring” mentoring relationships, such as those with family members and friends, are just as important as those which are formed through formal channels (Frehill, Brandi, Di Fabio, Keegan, & Hill, 2009; Savage, 2003).

There are many benefits to mentoring programs, but females in STEM fields are exposed to fewer mentoring programs than their male counterparts (Nolan, Buckner, Marzabadi, & Kuck, 2008). One of the reasons for few mentoring initiatives lies with the low numbers of female role models in the career field (Moskal, 2000).

**Scarcity of Female Role Models in the Career Field**

Another reason so few women enter the field of engineering is the scarcity of female role models within engineering careers (Heyman et al., 2002; Moskal, 2000). As students see women making advancements within the industry, it becomes apparent to them that there are fewer women in the career field of engineering. Lack of female role models has contributed, in part, to the low participation rates of women in engineering (Trenor, 2007). Engineering seems to have a public image from a female perspective
according to Julie Trenor (2007). There are few role models available in the public view, compared to other professional fields such as medicine and law. For example, female engineers are rarely portrayed in prime time television (Trenor, 2007).

Moreover, few of the women who graduate with an engineering degree continue into an engineering job. Less than 20% of female undergraduates hold engineering degrees and only 9% of those hold jobs within their major (National Science Foundation, 2000). Heyman, Martyna, and Bhatia (2002) maintained that historical remnants of sexism play a big part in these numbers. A study by Heyman, Martyna, and Bhatia (2002) investigated the beliefs of how one’s achievements influenced the ways females persisted in the engineering work environment. The scarcity of role models for women to look up to in the field of engineering made it difficult to not only make it through the programs themselves, but to also find positions in engineering once they have graduated (Heyman et al., 2002).

Studies (Armstrong, 1981; Frome & Eccles, 1998; Hyde, Fennema, & Lamon, 1990; Kimball, 1989) showed girls were better able to perform mathematical computations requiring the applications of algorithmic procedures than boys. Females may be qualified to do the jobs, but recruiting them into engineering programs has been problematic.

**Recruitment Strategies**

Pursuing a degree is a decision made with much consideration. The decision to pursue a degree involves the students becoming psychologically involved in the decision (Maringe & Gibbs, 2009). Recruiting is only a part of the college choice decision but is nevertheless an important one. According to David Chapman (1981), there are a number
of external influences that affect a student’s college choice: “(1) the influence of significant persons; (2) the fixed characteristics of the institution; and (3) the institution’s own efforts to communicate with prospective students” (p. 492). The aforementioned communication efforts on behalf of a given institution can include written information, campus visits, and information or contact from admissions personnel (Chapman, 1981). Recruitment strategies and the actions that follow (campus visits, overnight stays, etc.) are imperative to the enrollment success of institutions of higher education and their programs. The “task of the institution is to determine the needs and wants of target markets, and to satisfy them through…appropriate and competitively viable programs and services” (Kotler & Fox, 1985, p. 10).

Materials and initiatives are both used by institutions to help prospective students with their decision to enter a college (Townsley, 1993). Recruitment materials and initiatives used by admissions departments to increase enrollment and help the college or university remain solvent due to their effectiveness (Townsley, 1993). Kotler (1979) offers a different perspective. Kotler describes marketing as something colleges and universities should do, but only in conjunction with a complete market-oriented plan. In order to ensure that institutions are focusing their marketing efforts on the right target-market (individuals, in this case women), the right message must be identified. In other words, the utilized marketing strategies can be effective if targeted at the right individuals with the right message (Kotler, 1979). Engineering is no different than any other program in that it needs specific strategies to help recruit students. In order to make a college choice and also a program decision, recruitment strategies must be presented in ways that entice students.
Power of Recruitment Strategies Geared to Both Men and Women

Companies have become involved in the process of helping to encourage students to pursue an engineering degree. Annual programs bring students in close contact with the work of engineers. For example, the Exxon/Mobil summer camps have been designed in collaboration with universities. In such programs, middle school students experience hands-on learning, on-site company visits, and competitions between fellow students that stimulate forward thought processes. Male and female students are chosen, at equal ratios, for the Exxon/Mobil camps through recommendations from their teachers and guidance counselors (Exxonmobil, 2010). Students are encouraged to develop their skills through application as they progress through a week-long camp filled with interactive engineering-related experiences. The Exxon Mobil camp involves many individuals who create an interactive environment. A recent study (Watermeyer & Stevenson, 2010) on the 13- and 14-year-age group reported that “the role model may be seen as central to the process of challenging and changing perceptions, reconfiguring attitudes and setting subjects free” (p. 35).

Encouraging technically acute students, male and female, to pursue engineering degrees has also come to the attention of Canadian researchers, Lisa Anderson and Kimberly Gilbride (2003), who studied the Ryerson University Discover Engineering program. The program provides middle and high school students with insights into what engineers do while also giving them hands-on experiences. By providing these real-world experiences, universities hope to encourage students to pursue engineering degrees. By targeting middle and high school students with interactive activities, universities are able to engage these students and their interests early.
College choices are made in similar ways by men and women (Frisbee et al., 2000) and recruitment strategies are usually geared to appeal to both genders. According to Jill Boggs, Trine University’s Marketing Director, universities use similar recruiting strategies for both men and women because of the desire for marketing uniformity and budget constraints (personal communication, October 11, 2010). Traditionally recruitment has been done through the use of print materials, including college catalogs/viewbooks (Grove, 1992; Supiano, 2012). Some of the other types of recruitment strategies used to help make college and program decisions include: postcards, invitations, DVDs, phone calls, high school visit days, campus visits, and websites (Gilman, 2006). Any material sent to prospective students is meant to send a message about what the institution is like to the student (Grove, 1992). Information about colleges usually comes from four sources when a student is making a college choice:

- Personal (friends, parents, admissions counselors)
- Public (media, college guides)
- Institutions (college catalogs, college days/night)
- Experiential (campus visits)

(Grove, 1992, p. 27)

The history of recruiting is important to understand in order to gain a perspective of how institutions have developed their efforts to reach students. Before recruitment materials were implemented, the premise for attending college was to get a white-collar job (Goldin, 1998).

Historical and demographic influences have allowed admission and recruitment practices to evolve and develop over the past 400 years of American higher education. During the first 300 years, admission duties were performed by a variety of college personnel and were primarily an orientation function, absent of any screening or recruitment. College presidents of the eighteenth and nineteenth centuries performed a dual role
as recruiter and fundraiser. From the Civil War to World War II, America witnessed an increase in the number and variety of colleges. Enrollment growth ensued and denominational colleges were founded across the continent, while land-grant and state-supported universities brought a college education closer to the people. These actions translated into enrollment growth and recruitment efforts settled into an admissions role of screening and seeking a strong instructional fit for the student and college.

(Grandillo, 2010, p. 1)

As time progressed, recruitment strategies and their formulation became increasingly important to colleges and universities. Although changes have occurred, different types of recruiting methods can be traced to the 1920s (Swann, 1998). According to Grandillo (2010), recruitment involves the marketing principles used in all industries. Philip Kotler’s marketing concept of the 4P’s (product, price, place, and promotion) is being used to center messages to reach prospective students in new ways (Grandillo, 2010).

**Types of Recruitment Strategies**

**Traditional Recruitment Strategies**

Although the types of recruiting have changed through the years, many traditional methods are still used together with the influx of electronic and social media. According to Don Hossler (1999), there are two guiding principles to all recruitment activities. The first is personalization, and the second is timing. Students want and actually need to feel wanted by the university and proper timing of these strategies is imperative. Some of the types of traditional recruitment strategies used today include advertising (websites, television advertising), sales promotions (financial aid), personal selling (phone calls, campus visits, high school visits, college fairs, marketing to high school personnel and parents), direct marketing (college catalogs/viewbooks, letters, DVD/CDROMs, social
media), and public relations (news broadcasts) (Astin, 1997; Cech et al., 2008; Chester & Chester, 2002; Gilman, 2006; Grandillo, 2010; Hossler et al., 1990; Putsche et al., 2008; Supiano, 2012).

**Advertising.** Advertising, as described by Kotler and Armstrong (2010), is “any paid form of non-personal presentation and promotion of ideas, goods, or services by an identified sponsor” (p. 402). Technology drives much of the advertising in today’s marketing. Computers and online technologies are used by students today at extremely high rates (Day, Janus, & Davis, 2005). Electronic media makes it necessary for institutions to continually change their recruitment delivery methods in order to keep up with students’ changing desires.

**Websites.** The push towards technology has forced the traditional forms of marketing to change. Today’s high school students are savvy shoppers when it comes to researching colleges (Lindbeck & Fodrey, 2010). Websites are becoming increasingly important parts of recruiting (Grandillo, 2010). Electronic media is used by 81.2% of high school students as their primary source of data regarding college choice (Kiecker, 2005). Integrated marketing communications involve maintaining consistent messages across various media methods used within marketing or recruitment activities (Kerin, Hartley, Rudelius, 2011). Consistent marketing messages allow students to better identify and relate the recruiting messages to a particular university when they receive or see a message. Electronic media has exacerbated the integrated marketing communication push because students are now looking at websites in addition to other media. It is therefore important for institutions to have unified themes for all of the institution’s marketing and
recruitment efforts to remain consistent. For example, when a Hawaiian theme is used on the web, it needs to also be used on the print media surrounding a recruitment campaign.

**Television Ads.** “Despite an increase in entertainment choices, watching television remains as popular as ever. Television viewing is at an all-time high” (US Media International, 2011). College students spend three and a half hours per day watching television (Story, 2007). Students also text, use the Internet, watch streaming videos, and play video games (Story, 2007). The use of television and its related media (video games, Internet, streaming videos) are places recruitment messages can be positioned.

**Sales Promotion.** Sales promotions, as defined by Kotler and Armstrong (2010), are “short-term incentives to encourage the purchase or sale of a product or service” (p. 402). The product or service, in the case of this study, is the education the student (the customer) receives as a result of attending the college or university.

**Financial Aid.** Financial aid is another recruitment strategy used to encourage students to enroll (Grandillo, 2010; Hossler, 1999). The engineering field seems more prone to the need for financial aid. The “lack of affordability may be exacerbated for students in science-based programs where the time demands of coursework make employment during the academic year impractical” (May & Chubin, 2003, p. 33). Tuition has increased in recent years (Armario, 2012), so schools offering financial aid are more likely to attract students.

**Personal Selling.**

**Phone Calls.** Telecounseling is a way to contact students via the telephone to elicit an applicant, to answer any questions, or to invite the prospective student to a
campus visit (Gilman, 2006). Phone calls are either made by an admissions counselor or a current student. If the telecounseling is done by an admissions counselor, the objective is to advise the student of the application process, and the financial aid options, to answer any questions about the university or possible program majors, as well as to try to get the student to come to the campus for a visit (Gilman, 2006). If the phone call is made by student staff members, they would answer questions about student life and try to evoke a response from the prospective student to come for a campus visit (Gilman, 2006).

**Campus Visits.** Recruiters must work tirelessly to attract both genders. The ultimate goal of each recruitment strategy is to entice prospective male and female students and their families to visit the campus. Campus visits became popular in the 1970s (Swann, 1998). Campus visits are generally an easier recruitment tool because the admissions counselors have the opportunity to walk around campus, introduce the prospective student and their parents to current students and faculty members within their major as well as to financial aid counselors (Gilman, 2006; Winzenburg, 2006). Once on campus, it is much easier for the admissions personnel to “sell” the university (Leupold, McCarthy, Smith, Stuart, & Klopman, 2006). Alexander Astin, a scholar of higher education, was quoted saying, “the campus visit is the single most important reason high school seniors chose their college” (Swann, 1998, p. 48). During a campus visit, most prospective students will choose to meet a faculty member from the program they are most interested in studying (Winzenburg, 2006). According to Grandillo (2010), in the future campus visits will continue to be a staple of the recruitment process.

**High School Visits.** Generally, high school visits are a good source of information for students when they are uncertain about which college or university they want to
attend. They are also great informational sources for those students who are unsure of which program major they may want to pursue. Visits occur when universities go to high schools, generally during lunch or after school hours and set-up informational booths for students to visit. During high school visits college admissions counselors provide prospective students with information about the university and its environment (Gilman, 2006).

**College Fairs.** College fairs involve several colleges gathering during a certain time at the same place to recruit students who come to see which college may fit the student’s targeted needs and desires. College fairs are seen as a medium to high marketing priority by 94% of colleges according to Infographics (2011).

**Marketing to High School Personnel.** Recruiting strategies not only involve recruiting efforts targeted to students. It is important to consider where the students are getting their information and advice about college and program choices. It is important for colleges and universities to market to high school counselors in order to ensure information is getting into the hands of the high school students. When making a program choice, high school students often rely on the people who know their scholastic and personal/social capabilities best (Rayle, 2006). In most cases, the prospective student’s high school counselor is the one that is best able to assess the student’s scholastic and personal/social skills (Rayle, 2006).

**Marketing to Parents.** “Strong evidence indicates that college planning starts for many families well before the high school years and parents exert a heavy influence on those plans” (Flint, 1992, p. 689). Several factors may be considered when a student is selecting a college and in turn a program to study. Parents, immediate family, other
relatives, and friends are all contributors to these decisions (Oates, 2009). Unfortunately, some students enroll in programs because their parents are in that industry or a related one, have an endowment to a particular school’s program, or contribute money – or even because of the infamous “because I said so” (Oates, 2009). This “brainwash effect” has an affect over the effectiveness of recruitment strategies (Oates, 2009). As a student is more aware of what is expected of him or her, the effectiveness of the recruitment strategies diminishes. This needs to be considered as colleges prepare their recruitment messages. They not only need to reach out to students but to parents and other family members as well.

**Direct Marketing.** Direct marketing, as defined by Kotler and Armstrong (2010), is “direct connections with carefully targeted individual consumers to both obtain an immediate response and cultivate lasting customer relationships – the use of direct mail, the telephone, direct-response television, e-mail, the Internet, and other tools to communicate directly with specific consumers” (p. 402). Related to direct marketing is direct mail, which is still an effective way to communicate with prospective students (Grandillo, 2010). Direct mail is a form of written communication that has increased and continues to grow over the years (Grandillo, 2010). One reason why direct mail continues to grow is the relationship direct mail initiates with the student (Hossler, 1999). This initiation opens the door and invites the student in (Hossler, 1999).

**College Catalogs/Viewbooks.** One of the most traditional and impactful type of recruiting materials are college catalogs/viewbooks, which have been predominantly unisex in their formulation and delivery. For male and female students, as well as parents, readily accessible college catalogs/viewbooks are one of the most preferred information
sources (Paulsen, 1990; Supiano, 2012). College catalogs/viewbooks contain the courses offered by the university and descriptions thereof, as well as information about the mission, financial aid information, housing policies, and degrees and majors offered by the institution. Some in higher education believe that every university should “require each admission counselor, tour guide, faculty member, and security staff member to read the college view book. The marketing message in this publication should resonate through the campus” (Glass, 2004, p. 4).

**Letters to Prospective Students.** One form of direct mail is personalized letters, which are mailed to the students by the admissions department and considered vital to the recruiting process (Black, 1999). “Neva Black states that personalized letters to traditional students created by admissions staff are very important written communication tools” (Gilman, 2006, p. 9). The personalization of these letters is important because of the relationship the university is trying to form with the student (Hossler, 1999).

**DVDs/CD-ROMs.** DVDs and CD-ROMs are a bit cutting edge. They are a way to get a lot of information in front of the student and have played an important role in recruitment without the cost of traditional recruitment methods (Grandillo, 2010). DVDs and CD-ROMs allow interaction between the media and the student and, if done in a creative way, can be very effective. They also allow the student to reference the website, which is becoming increasingly popular to use (Grandillo, 2010), if a reference is placed directly within the DVD or CD-ROM.

**Social Media.** Social media is relatively new and involves interaction between various audiences. These audiences can include universities, including faculty, admissions counselors, and other staff members, students, parents, alumni, and friends.
When all combined these people (faculty, admissions counselors, and other staff members, students, parents, alumni, and friends) form a network of communication unparalleled with regard to the information they hold.

- 80% of college admissions officers report using Facebook as a tool in their recruiting process.
- The three social networks admissions officers use the most in their recruiting efforts are Facebook (82%), Twitter (56%), and YouTube (56%).
- 80% of admissions officers reported receiving a friend request from an applicant via Facebook or MySpace.

(Infographics, 2011, p. 1)

Social media continues to grow because of its knowledge-sharing power and ease of use. Students rely on social media and will continue to use it (Infographics, 2011).

**Public Relations.** Public relations, as defined by Kotler and Armstrong (2010), involves “building good relations with the company’s various publics by obtaining favorable publicity, building up a good corporate image, and handling or heading off unfavorable rumors, stories, and events” (p. 402).

**News Broadcasts.** According to Diddi and LaRose (2006), people select where to get their news based on certain criteria. The criteria people use to determine where to get their news includes: entertainment, social interaction, and escapism (Diddi & LaRose, 2006). This information is also true when considering public relations, as news broadcasts are included in what is considered public relations.

**Recruiting Women into Engineering Programs**

Little research has been done on effective recruitment techniques specifically created and directed to female students to entice them into engineering programs. Studies about specialized recruitment strategies include: Wilkins et al. (2006) who examined
mentoring over the Internet; Ocif and Marshall-Goodell (1996) who studied the effects of mentoring on female recruitment into engineering programs; Stinson (1990) who focused on social and living communities and their influence on the recruitment of women into engineering programs; and Carr (2001) who examined groups and how gathering and forming a sense of community created a better recruitment initiative for schools. In addition, with respect to specialized recruitment strategies, Astin (1997), Cech et al. (2008), and Heller and Rasmussen (2001), all studied female-focused financial aid and its positive contributions to the recruitment of females into engineering programs. The existing limited research demonstrates that recruiting materials, activities, and college initiatives (e.g., learning and living communities) can be presented in ways appealing to women, enticing them to choose an engineering program.

The Exxon/Mobil summer camps and the Discover program are two examples of programs that appeal to both girls and boys interested in engineering programs. Although these programs start before students are ready to make college decisions, they are being offered at times when students are beginning to make program choices. When it comes to program choices, females’ interest in the period of selecting a college are peaked more by mentoring, learning and living communities, as well as female-focused financial aid opportunities (Astin, 1997; Carr, 2001; Cech et al., 2008; Chester & Chester, 2002; Heller & Rasmussen, 2001; Jaschik, 2010; Kuh et al., 2006; Ocif & Marshall-Goodell, 1996; Stinson, 1990; Trenor, 2007; Washington Center website, 2011; Wilkins et al., 2006).
Specialized Recruitment Strategies

Recruiting strategies often combine traditional and specialized approaches in order to reach specific market segments. Literature indicates that “specialized” recruitment methods work specifically on women (Astin, 1997; Barletta, 2003; Carr, 2001; Cech et al., 2008; Chester & Chester, 2002; Heller & Rasmussen, 2001; Jaschik, 2010; Kuh et al., 2006; Ocif & Marshall-Goodell, 1996; Stinson, 1990; Trenor, 2007; Washington Center website, 2011; Wilkins et al., 2006). Through specialized recruitment methods, such as mentoring, learning communities, living communities, and female-focused financial aid, recruiters appeal to women in an attempt to bring them into certain programs.

Research shows women that “cherish warm, close relationships, take pride in being needed, want to make the world a better place and enjoy being recognized for their efforts” (Barletta, 2003, pp. 77-78). Some of the specialized recruitment methods colleges and universities use include mentoring before students enter college, marketing of the existing living and learning communities to prospective students, as well as offering female-focused financial aid. Each of these initiatives is targeted directly towards formulating a personal relationship with prospective students. When strategies are geared towards women, they are designed to appeal to their needs and predispositions.

Personal Selling.

Mentoring. Mentoring is the practice of an experienced person (mentor) helping a novice with regard to technical and sometimes psychological training (Chester & Chester, 2002). In exchange for the novice gaining experience, the mentor gains intrinsic values as
a person helping another human being. Different types of mentoring, either over the Internet or in person, are examples of specialized recruiting strategies geared towards women. “In addition, mentoring programs prove particularly useful for providing mentoring and socialization experiences for underrepresented minorities, who otherwise may not have such opportunities” (Single & Muller, 2003, p. 6). Mentoring has been positively linked to women’s representation in engineering programs (Cech et al., 2008).

A recent study (Wilkins et al., 2006) revealed that mentoring over the Internet was able to effectively assist young women in feeling more comfortable in engineering fields. Students were made to feel better about their skills because they were able to share their experiences and receive guidance from mentors in the field they were interested in (Wilkins et al., 2006). Jennifer Ocif and Beverly Marshall-Goodell (1996) also studied the effects of technology-based mentoring programs on female recruitment into engineering programs. They found that it was important for prospective female students to not only see other female students, but also female faculty as role models. Seeing female faculty members provides guidance for students on studies they may not be able to obtain from their peers (Ocif & Marshall-Goodell, 1996). The reason web-based mentoring was found effective in Ocif and Marshall-Goodell’s study could have been the high technological skill sets of the high school students who were included in the study. Mentoring helps women enter programs through the cohesion they develop with their mentors.

Mentoring programs done face-to-face are also effective recruitment strategies and are used when available. Willing and able participants from the college, as well as the mentor(s), and students together are able to create successful mentoring programs.
Although traditional single mentor programs, where one person fulfilled every need, was once the norm, increasingly several mentors working in conjunction to help a student be truly successful, especially in a field where students may be met with obstacles are the prevalent approach nowadays (Chester & Chester, 2002). These mentoring groups can also be known as mentoring teams and have been identified at schools, such as the University of Michigan, to encourage women in their engineering program (Chester & Chester, 2002).

The Society of Women Engineers (SWE) is an organization built on the foundation of helping women in engineering find the resources and support needed to be successful. The SWE chapters at universities and colleges across the country are an important part of the campus life for women involved in engineering programs. It provides a place for students to find mentors and role models both at the institution as well as in the workplace. SWE has a very interactive website (http://societyofwomenengineers.swe.org/index.php) which is beneficial for new and returning students.

Mentoring programs, both in person and over the Internet, can be used as a recruitment initiative by colleges. They can establish role models many young women in the field are looking for (Cobb et al., 2006). “A formal mentoring program seems particularly effective and distinctive…because it encourages relational mentoring model, in which mentors support rather than judge. Formal mentoring thus provides an additional and unique avenue for further connection to resources and education in academia” (Putsche et al, 2008, p. 526). Based on Martha Barletta’s study (2003) about
what women find appealing, mentoring helps encourage women to enter engineering by helping them develop close relationships with their mentors, role models, and peers.

**Learning and Living Communities.** Stephen Stinson (1990) studied a specialized recruitment initiative, social and living communities, and its influence on the recruitment of women into engineering programs. Stinson (1990) studied the success Rutgers University had when they introduced a dormitory that housed females enrolled in math and engineering programs. The university saw an increase in enrollment due to the new housing availability (Stinson, 1990). Usually “the young woman who expresses an interest in engineering will hear from a female junior in engineering” (Jaschik, 2010, p. 1) within the recruitment process. Students with similar interests tend to relate better and listen to the experiences of those who are currently experiencing what they are interested in. Admissions directors attempt to raise students’ interest in engineering programs by involving students already in the programs. Research shows that learning and living communities are important parts of the student life (Jaschik, 2010; Kuh et al., 2006; Stinson, 1990; Trenor, 2007; Washington Center website, 2011) and therefore are effective tools in recruitment initiatives. Schools that have learning and living communities as part of their student life are more attractive to female students (Kuh et al., 2006; Stinson, 1990; Washington Center website, 2011). Offices that serve as special resources for groups, such as women, can facilitate these types of social communities.

The University of Toledo has such a place, the Eberly Women’s Center, through which the school demonstrates willingness to provide resources to women. The Eberly Women’s Center provides a place to meet, computers, and other support services for female students. The Eberly Center would be considered a form of recruitment for the
University of Toledo. “Formal and informal events and having dedicated physical space are all highly correlated with women’s representation” in engineering programs (Cech et al., 2008, p. 13). Using Martha Barletta’s (2003) study, learning and living communities could be considered to help entice women into engineering programs by making them “feel warm, develop close relationships, take pride in being needed and making the world a better place” (pp. 77-78).

**Sales Promotion.**

**Female-Focused Financial Aid.**

Publicly-funded scholarships in the United States historically have been awarded based on the financial need of the student and his or her family, and with the goal of increasing access to college. Beginning with passage of the Higher Education Act of 1965, and in particular, establishment of Basic Educational Opportunity Grants in the 1972 Amendments, federally-funded student aid has been used in order to help achieve equality of postsecondary educational opportunity (Mumper, 1996). The State Student Incentive Grant program, also part of Title IV student aid programs, encouraged the development of state-funded scholarships. These state programs historically also used financial need as the primary criterion for awarding grants, and have grown to the extent that they now award almost $1 in aid for every $2 awarded in the federal Pell Grant program.

(Heller & Rasmussen, 2001, p. 1)

Need-based financial scholarships have been dwindling since the 1980s (Heller & Rasmussen, 2001). By contrast, merit scholarships have been increasing. In fact between 1982 and 2000, merit scholarships have increased 13.6% annually (Heller & Rasmussen, 2001). Scholarships, grants, and other forms of financial aid are set-up specifically for women. Financial aid packages are sometimes considered forms of specialty recruitment strategies because of their intent to persuade students to attend college or enroll in a
certain program (e.g., engineering). When these financial aid packages are directed specifically to females, they fall under specialized recruitment strategies.

Engineering institutions are prominent for offering women and minorities partial or full diversity scholarships as a form of recruitment (Astin, 1997). In fact according to Astin, “many engineering colleges attempt to recruit and retain women and minorities through full or partial diversity scholarships (Cech et al., 2008, p. 5). When institutions offer programs directed specifically to women or minorities, the programs are correlated with a high representation of women (Cech et al., 2008).

Theoretical Framework

Research on specialized recruitment strategies is still scarce in the field of higher education and as a result, this study was guided by two strands of research from the field of marketing. Within marketing, there are several models that focus on the way consumers purchase products or services. For example, when formulating recruitment strategies, an institution of higher education attempts to position itself within the mind of a consumer to increase enrollment. “Marketing mix” was initially used by Harvard Business School Professor Neil Borden in 1953. The marketing mix concept was then enhanced in 1960 by Jerome McCarthy, when McCarthy added the 4P’s (product, price, placement, and promotion) (Sattler, 2008). These two scholars revolutionized the marketing world by structuring the way individuals looked at how people bought goods. In higher education, recruitment is considered a marketing tool.

Within the marketing mix framework, the promotion part of the 4P’s is most useful in understanding recruitment. Promotion deals with the ways to transport the product (in this case an education) from the place (a university) to the consumer (a
In 1979, Philip Kotler revamped the model of the marketing mix from a promotional-based model to a consumer-oriented model (Lauerman, 2000). As research indicates, intentional effort must be made in order for something to be sold (Thomas, 2009). In the case of this study, recruitment strategies are used to enroll college students. In this respect the marketing mix model is useful in guiding efforts to understand ways to reach prospective students through recruitment strategies.

Various elements surround the promotional aspect of the 4P’s. The promotion elements, called the “promotional mix,” include: advertising, personal selling, sales promotion, public relations, and direct marketing (Kotler & Armstrong, 2008; Kotler & Armstrong, 2010); all of these elements are present within recruitment strategies. Promotion and its formats can also be described as:

…the function of informing, persuading, and influencing the customer's purchase decision. It is not just advertising and selling. There are many other options. You must consider the whole range of possibilities. The promotional mix, like the marketing mix, involves the blending of numerous variables. The blending of these variables to create a specific promotion mix must also match the other 4P’s. The purpose of marketing communications is the transmission of an idea about a product to intermediaries or to customers in a target market.

(Gho, 2006, p. 1)

The promotional mix is the “specific blend of advertising, sales promotion, public relations, personal selling, and direct-marketing tools the company uses to persuasively communicate customer value and build customer relationships” (Kotler & Armstrong, 2010, p. 402).

Advertising is a part of the promotional mix and is defined as “any paid form of non-personal presentation and promotion of ideas, goods, or services by an identified
sponsors” (Kotler & Armstrong, 2010, p. 402). The types of traditional recruitment strategies categorized under advertising are websites and television advertisements. Personal selling is another part of the promotional mix and entails “personal interactions between a customer and the firm’s sales force for the purpose of making sales and building customer relationships” (Kotler & Armstrong, 2010, p. 402). The types of traditional recruitment strategies categorized within personal selling include: phone calls, campus visits, high school visits, college fairs, marketing to high school personnel, and parents. The specialized recruitment strategies considered personal selling are mentoring, learning communities, and living communities. Sales promotion is part of the promotional mix and is the “short-term incentives to encourage the purchase or sale of a product or service” (Kotler & Armstrong, 2010, p. 402). The traditional recruitment strategy categorized as sales promotion is financial aid. The specialized recruitment strategy categorized as a sales promotion is female-focused financial aid.

Public relations is also part of the promotional mix and involves “building good relations with the company’s various publics by obtaining favorable publicity, building up a good corporate image, and handling or heading off unfavorable rumors, stories, and events” (Kotler & Armstrong, 2010, p. 402). The traditional recruitment strategy categorized as public relations is news broadcasts. Direct marketing, part of the promotional mix, is “direct connections with carefully targeted individual consumers to both obtain an immediate response and cultivate lasting customer relationships – the use of direct mail, the telephone, direct-response television, e-mail, the Internet, and other tools to communicate directly with specific consumers” (Kotler & Armstrong, 2010, p.
The traditional recruitment strategies considered direct marketing are college catalogs/viewbooks, letters, DVD/CD-ROMs, and social media.

The promotional aspect of the 4P’s was used as one of the theoretical frameworks for this study. The 4P’s guided the questionnaire design and helped formulate questions relating to what types of recruitment strategies are used to attract women into engineering programs. The promotional part of the 4P’s involved various elements of promotion as they related to recruitment into the questionnaire from literature (letters, phone calls, catalogs/viewbooks, mentoring, living/learning communities, etc.).

The second strand of research that guided this study came from Martha Barletta’s work. Martha Barletta studied the ways to market to women differently than to men or to the general public in her 2003 book *Marketing to Women*. Barletta’s (2003) work guided the female-specific questions within the questionnaire. According to Barletta (2003) the differences between the way men and women receive recruiting messages is yet to be truly discovered; however “…they [women] respond differently to marketing media and messages, languages, and visuals” (p. xxii). We know “women have a very different set of priorities, preferences, and attitudes” (Barletta, 2003, p. xxi). Because of the differences in priorities, preferences, and attitudes, it is the admissions director and school of engineering administrator’s job to formulate female-specific recruitment strategies to help enroll women into the male-dominated engineering programs.

Barletta created a model called the GenderTrends Marketing Model which helps:

1. Structure the complexities of gender differences into an organized view of female gender culture.
2. Show you how gender culture interacts with each of the 12 marketing elements /Positioning, People, Process, Plan, Product, Price, Place, Promotion, Proposal, Please, Project management, Punctuate (Simister, 2009) in the marketing mix.
3. Apply the resulting insights to the four stages of the consumer’s
purchase path [Problem recognition, Information search, Evaluation of
Alternatives, Product Choice (Solomon, 2011)].

(Barletta, 2003, p. 37)

When developing the GenderTrends model, Barletta hoped to help businesses reach and
cultivate more female customers (Barletta, 2003). There are four different components of
the GenderTrends model: the star, the circle, the compass, and the spiral path. Each of
these components is centered on the way in which women make decisions to purchase
items and or services. The circle and the compass encompasses a women’s response to
marketing contacts. The reason the circle and the compass were not chosen as the focus
of Barletta is because the marketing that she discusses involves specific ways women
respond to marketing messages. This study is focused on the way institutions are
delivering the messages. The way a university creates a message may or may not be
difference than the way a women sees and hears the message. The spiral path focuses on
“how women make purchase decisions” (Barletta, 2003, p. 99). The spiral path focuses
on the consumer purchase decision and how different it is for men and women.

The star was chosen because it explores the culture of femininity. The way
women think, act, and their needs. This was the part of the GenderTrends model that
allowed the researcher to see what women want and need in their specialized recruitment
strategies rather than just how they react to a message.

The first component of the GenderTrends model is the star. The star is the
component that was most useful in guiding the present study. The star takes into
consideration the gender differences between men and women. The star has four points,
including:
• Social values. Different beliefs and attitudes about how people should relate to each other.
• Life/time factors. Implications of the ways in which women’s roles differ from men’s.
• Synthesizer dynamics. Consistent differences in how women perceive and process.
• Communication keys. Different patterns and rituals of expressions.

(Barletta, 2003, p. 45)

These points are meant to direct marketers to specific aspects when attempting to reach women.

The first point of the star is the social values. Regarding women’s social values, Barletta (2003) discusses women’s need to work in groups and more specifically to work in a peer group. Compared to women, who like to work in groups, men prefer to work in a pyramid. When it comes to how much women like to be communal and men like to work independently, the difference, according to Barletta, is drastic and is thus emphasized through the social value point of the star (2003). Women believe that people are an extremely important part of life. Men, on the other hand, believe that people are important as a part of news stories, but not in and of themselves (Barletta, 2003). The fact that women hold people in such a high regards comes from their belief in social values and the thoughts that without social interaction, commerce cannot occur.

A life/time factor, which is the second point on the star, captures how lifestyles are changing in society (Barletta, 2003). Women perform double duty in today’s society and they are often forced to tackle multiple jobs at the same time. Marketers who are able to reach women as “multi-taskers” are able to build deeper, more meaningful, and longer lasting relationships with them as customers (Barletta, 2003). Women in the workforce have substantially change the way work gets done. Women used to feel guilty
about working, especially if they had children, today the number of guilt-ridden female
workers has been greatly reduced (Barletta, 2003). Women are the person in the
household in charge of the purchasing and finances (Barletta, 2003; Solomon, 2011).
This financial responsibility puts more pressure on women to be organized and multi-
task shopping, work, and family (Barletta, 2003). This multi-tasker role makes women
great focuses of marketers. Marketers want to attract women because of their financial
responsibilities, but also their multiple buying outlets (family, themselves, children,
households, food, etc.) (Barletta, 2003).

The third point on the star points to the synthesizer dynamics, which is the ability
women have to notice the smallest of details (Barletta, 2003). As busy as women are,
they still find time to notice the world around them. Women are also very decisive and
would rather have things just the way they want them or not have them at all (Barletta,
2003). When advertising to women, advertisements should be detailed to the point of
providing enough information about the product that the women will want to know more
and will react to the advertiser’s message (Barletta, 2003). Women will naturally want to
know more, but the advertisement has to provide enough detail that it pokes a reaction
from the women (Kotler & Keller, 2007).

The fourth and final point on the star is the communication keys. Women enjoy
details, while their male counterparts just like the headlines (Barletta, 2003). Men try to
solve problems while women just converse about subjects (Barletta, 2003). Women try
to describe a scenario as if they are telling a story. Women want to provide as much
detail as they would want to hear. To their male counter-parts, the task of listening to a
long story about how a woman found the perfect book, would not be entertaining. A man
wants the facts and in a shortened story (Barletta, 2003). When marketing to women, the fact that women want more detail and longer messages is important to know when formulating communication tools or, in this case, recruitment strategies.

Barletta’s (2003) research also shows that women “cherish warm, close relationships, take pride in being needed, want to make the world a better place, and enjoy being recognized for their efforts” (pp. 77-78). Furthermore, “…women will want even more information than you can cover in an ad…make it easy for them to access it by offering…a toll-free number, or by directing them to your Web site” (Barletta, 2003, p. 167). According to Barletta, the more information within the recruitment messages, the better. Barletta’s research was used to formulate the “how” and “why” questions on the questionnaire.

**Conclusion**

In summary, there are several recruitment methods used to attract prospective students into universities. The limited amount of research on effective recruitment strategies, specifically designed to entice female students into engineering programs, identified a deficiency in our understanding of the ways institutions recruit women. The need to address the low enrollment of women in engineering programs is due to the employment gap, lack of diversity in the field, and few role models within the industry. By increasing the number of women pursuing undergraduate engineering degrees, these societal issues will be minimized.
Chapter Three

Methodological Approach

This chapter details the purpose of the study, the research design, the participants, the research questions, the instrumentation, and the data analysis. The research design focuses on the respondents’ participation and ability to answer the questions judiciously. The research questions that were addressed are also compared to their equivalent questions on the questionnaire. The theoretical framework that guided the research was based on the promotional aspect of the 4P’s (Kotler, 1979; Kotler & Armstrong, 2008; Kotler & Armstrong, 2010) and Martha Barletta’s (2003) study about marketing to women. The theoretical framework helped design the questionnaire. The purpose of this study was to map what institutions do to recruit women into undergraduate engineering programs, and shed light on why and how these institutions use the recruitment strategies they use. In addition this study aimed to analyze a potential relationship of strategies geared specifically for women with enrollment trends of female undergraduates in engineering programs.

Research Design

This research study used a survey research design. Survey research is suitable for measuring respondent’s behaviors, attitudes, opinions, and perceptions (Fowler, 1992). This study utilized both quantitative and qualitative research methods to collect, analyze, and interpret data. This study sought to describe the respondents’ opinions about their institutions’ recruitment strategies and tested this qualitative research with quantitative correlations. In this study, information was also collected on recruitment strategies and enrollment of female students in undergraduate engineering programs.
One of the risks of survey research is the reliance of the researcher on self-reported data (Leedy & Ormrod, 2010). The reliance on self-reported data can lead to unreliable results based on the respondent’s interpretation of questions or desire to answer “the right way” to satisfy the researcher (Leedy & Ormrod, 2010). In this study, probing why and how within the questionnaire helped eliminate the respondent’s desire to answer the right way.

There are four types of survey research: face-to-face interviews, telephone interviews, written questionnaires, and Internet surveys (Leedy & Ormrod, 2010). Face-to-face interviews have the advantage of allowing the researcher to form a relationship. Forming a relationship with the respondent allows the researcher to gain cooperation to conduct research more efficiently (Leedy & Ormrod, 2010). Face-to-face interviews also have the advantage of having the highest response rate (Creswell, 2005; Forza, 2002; Leedy & Ormrod, 2010). One of the disadvantages of face-to-face interviews tends to be the cost involved. Face-to-face interviews are one of the most expensive types of interviews to implement (Forza, 2002; Leedy & Ormrod, 2010).

Telephone interviews require less time and expense, and the researcher has access to anyone he or she is able to call, which are all advantages of telephone interviews (Forza, 2002; Leedy & Ormrod, 2010). One disadvantage of telephone interviews is the low response rate, as people seem to avoid telephone surveys (Creswell, 2005; Forza, 2002; Leedy & Ormrod, 2010).

Written questionnaires that are mailed to the interviewees have the advantage of being relatively inexpensive, compared to travel costs involved when conducting face-to-face interviews (Creswell, 2005; Forza, 2002; Leedy & Ormrod, 2010). Written
questionnaires can also be mailed to anyone, so respondents can be easily reached (Creswell, 2005; Leedy & Ormrod, 2010). One of the disadvantages of written questionnaires includes a low response rate (Forza, 2002; Leedy & Ormrod, 2010). Another disadvantage of written questionnaires concerns the various levels of writing and reading capabilities of the respondents. The variations in the respondents’ reading and writing skills can also vary the level of responses (Leedy & Ormrod, 2010).

When using Internet surveys, all ethical standards must be upheld and documentation should be no less than when conducting face-to-face, telephone, or written questionnaires (Leedy & Ormrod, 2010). The main advantage of Internet surveys is that they enable anyone in the world to use a sample from anywhere for his or her research (Creswell, 2005; Leedy & Ormrod, 2010). Often, depending on the tool being used, the questionnaire will change based on the respondents’ previous answer (Leedy & Ormrod, 2010). The disadvantages of Internet surveys coincide with the large sample size. The vast sample may lead to overload and segmenting the target population may be difficult (Leedy & Ormrod, 2010). Another disadvantage of Internet surveys is that computer usage will vary among respondents. Those who respond to Internet surveys will have drastically different profiles than those who do not, based on their computer usage (Leedy & Ormrod, 2010).

This study utilized telephone interviews. Telephone surveys were used to examine the recruitment strategies used by universities and to determine whether any relationships existed between recruitment strategies used and the number of females enrolling in undergraduate engineering programs. Enrollment information was collected directly from the institutions’ enrollment department. Enrollment information consisted of total (male
and female) undergraduate enrollment for academic years 2005 and 2010, and female undergraduate enrollment in engineering programs for academic years 2005 and 2010.

Survey research was best suited for this study due to the objective of mapping what institutions do to recruit women into undergraduate engineering programs, and understanding why and how these institutions use the recruitment strategies they use. Survey research attempts to describe and explain circumstances occurring in the present by using surveys to answer questions about a certain situation (Creswell, 2005). This study collected information on available recruitment strategies geared for women directly from admissions directors and engineering department administrators.

**Participants**

The study included all public and private higher education institutions in the Great Lakes region with less than 10,000 students that offer engineering as one of their undergraduate programs, and have student housing.

The Great Lakes region consists of Illinois, Indiana, Michigan, Ohio, and Wisconsin. Cultures and nationalities of institutions within the Great Lakes region are represented at comparable percentages equal to the US (United States Census Bureau, 2011). The sample was also selected due to its geographic proximity to the researcher. If a respondent were to request a face-to-face interview, it would be more realistic the interview would take place.

The institutions participating in this study were chosen according to three criteria. Institutions with less than 10,000 students were chosen because small schools have more significant financial considerations to contemplate when they create their recruitment strategies (Biemiller & Brainard, 2011; Townsley, 1993). The financial considerations
often create more creative recruitment activities. Engineering as one of their undergraduate programs was chosen as another criteria. Focusing on engineering schools allowed the researcher to center attention on institutions directing recruitment initiatives towards students interested in engineering degrees. A list of the engineering programs within the definition used by the Integrated Postsecondary Education Data System is included in Appendix A.

Student housing was used as the third criterion for the selection of the participating institutions. Student housing was used as a way to try to ensure full-time students were used as the reference for responses to the questionnaire. When the admissions directors and engineering department administrators were answering questions about recruiting for their programs, full-time students were the students the researcher wanted the respondents to consider, therefore the housing criteria was used. The number of colleges and universities that matched these three criteria in IPEDS was 48 (see Appendix B).

The respondents to the questionnaire were the admissions directors and school of engineering administrators within each institution. Admissions directors and school of engineering administrators were chosen because of their knowledge of the recruitment strategies used with prospective students. The researcher contacted each university’s engineering school asking for the person in charge of the recruiting efforts. Once that person was identified, contact was made to introduce the study and explain the need the administrator’s participation.
**Instrumentation**

This research project involved telephone interviews with admissions directors and school of engineering administrators. A questionnaire provided in Appendix D was used to guide the interviews. The questionnaire contained open-ended and close-ended questions, all of which were guided by the theoretical framework and findings in the literature. Some of the literature indicated that recruitment strategies consisted of different types of tools currently being used by institutions of higher education. Enrollment information was also collected from the institution’s enrollment department. Information on the total (male and female) undergraduate enrollment for academic years 2005 and 2010 and female undergraduate enrollment for engineering programs for academic years 2005 and 2010 was collected.

**Pre-testing**

Pre-testing the questionnaire helped clarify questions and reduce errors. Two types of people were targeted for the pre-test: a colleague and a sample respondent (Forza, 2002). A faculty member in the School of Business at Trine University was used to assist with determining whether the purpose of the study was being accomplished and whether questions on the questionnaire addressed the study’s research questions (Dillman, 1978; Flora, 2002). The rationale for utilizing a respondent in the pre-test was to confirm whether questions were organized so the outcome could be reviewed to ensure it produced data that was being sought (Flora, 2002). The test respondent was an admissions director at a university not within the sample.
Questions on the Questionnaire

Each question on the questionnaire was linked to a research question. The first question detailed what the respondent’s role was regarding recruiting engineering students. Once the researcher had established the respondent’s role, she decided whether that respondent was the appropriate person or not. In the several cases when the person was not the appropriate individual, the researcher inquired who the appropriate person was, contacted that person and started the interview again.

The second set of questions focused on the recruitment strategies employed by the institutions. The questions focused first on the traditional strategies used by the institutions and then on the specialized strategies. Question two was close-ended and asked about the recruitment strategies the university used within the last five years. This question was guided by Philip Kotler’s 4P’s (1979) from the theoretical framework. The promotional part of the 4P’s brought the recruitment strategies, which literature indicated as the most prevalent, into the questionnaire. The recruitment strategies were segmented into groups based on their use. The recruitment strategies are listed below in their respective categories:

- Advertising: websites, television advertising
- Sales promotions: financial aid
- Personal selling: phone calls, campus visits, high school visits, college fairs, marketing to high school personnel and parents
- Direct marketing: college catalogs/viewbooks, letters, DVD/CDROMs, social media (including Facebook, Twitter, MySpace)
- Public relations: news broadcasts

Compiled from: (Gilman, 2006; Hossler et al., 1990; Kotler & Armstrong, 2008; Kotler & Armstrong, 2010).
Next, questions three and four were open-ended and focused on the specific traditional and specialized recruitment strategies used on women. Question three asked if any of the traditional recruitment strategies used were targeted specifically to enroll women into their engineering programs. The question also provided space to probe for reasons why and how these particular recruitment strategies were used differently than others to appeal specifically to women. Question three was guided by Kotler’s 4P’s (1979) and Barletta’s (2003) research findings to try and uncover what kinds of methods were being used to attract women, versus a general audience, and why these certain methods were used.

Question four probed why and how each of the specialized recruitment strategies which appealed specifically to women was used. RQ1, RQ2, and RQ3 were answered by Questions three and four.

RQ4 was addressed by Questions five and six. These two questions on the questionnaire inquired about which recruitment strategies the admissions director or engineering school administrator believed were the most effective at bringing women into their engineering programs. Question five asked the admissions directors and engineering department administrators to rank the recruitment strategies their institution uses in order of effectiveness (from not at all effective to very effective). Question six, which was a close-ended question, inquired about which recruitment strategies the respondent believed were most strongly related to increases in female enrollment in engineering programs at their institution.

To answer RQ5, the researcher also collected enrollment data, on total (male and female) undergraduate enrollment for academic years 2005 and 2010 and female
undergraduate enrollment for the engineering department for academic years 2005 and 2010 (from the institution’s website or the school’s enrollment department).

There was also a set of questions about the institution’s enrollment strategy. The multi-part question addressed if the institution’s enrollment strategy was:

- Long-term or short-term
- Integrated or stand-alone
- Continuous or ad-hoc
- Goal-setting or just-recruit-as-many-as-possible

The last set of questions in the questionnaire documented the characteristics of the institution. All of these questions were close-ended. The first five questions were basic demographic questions about the university being represented by the interviewee. The seventh, eighth, and ninth questions were about the interviewee. The tenth allowed the researcher to record the interviewee’s name. The eleventh question recorded the interviewee’s title.

**Data Collection**

Interviews were conducted during fall of 2011, during the months of November and December. The data collection was done through telephone interviews with admissions directors and school of engineering administrators. The recruitment strategies data consists of information from the promotional categories previously mentioned and outlined in Chapter Two, including: advertising, sales promotions, personal selling, direct marketing, public relations, mentoring, learning communities, living communities, female-focused financial aid, and other methods (Astin, 1997; Cech et al., 2008; Chester & Chester, 2002; Gilman, 2006; Hossler at el., 1990; Jaschik, 2010; Kuh et al., 2006;
Ocif & Marshall-Goodell, 1996; Putsche et al., 2008; Stinson, 1990; Trenor, 2007; Wilkins et al., 2006). The data collected allowed the researcher to analyze a potential relationship between promotional strategy categories and the enrollment trends of females into undergraduate engineering programs.

**Qualitative Methods of Data Collection and Analysis**

This research project was an innovative study that collected information about what types of engineering recruitment strategies geared towards women have been undertaken by institutions. Questionnaires are the standard mechanism of data-gathering in the survey research design and were used in this study.

Qualitative methods of data collection and analysis allowed the researcher to explore directors’ and administrators’ opinions and experiences. “Because understanding is the primary goal of qualitative research” (p. 12), the researcher will need to ensure the directors’ responses are written to “describe the meaning” (Bloomberg & Volpe, 2008, p. 12). In order to capture insider details about the recruitment strategies use and design, information was gathered from the admissions directors and school of engineering administrators regarding their recruitment strategies, how and why they were being used within their institutions.

The interviews revealed how and why schools use the specific types of recruitment strategies. The admissions directors and school of engineering administrators had insights into what strategies were used and what worked. Contact was made by first telephoning the school to find out who the appropriate person was and then contacting that person directly. The interviews were conducted via telephone. The interviews were conducted in a relaxed atmosphere where the admissions directors and school of
engineering administrators felt free to express his or her feelings and also felt open to share information (Bloomberg & Volpe, 2008). The researcher was able to probe the why and how questions sensitively so the respondent did not feel pressured.

**Quantitative Methods of Data Collection and Analysis**

Explanatory research is a type of correlation design in which two variables co-vary (Creswell, 2005). Co-vary means “changes in one variable are reflected in changes in the other” (Creswell, 2005, p. 327). The quantitative portion of the study explored the possible correlations among two or more variables (Leedy & Ormrod, 2010). Based on the purpose and the descriptive nature of the research questions, the quantitative portion of this study was classified as correlation research. Correlation research “examines the extent to the differences in which one characteristic or variable are related to differences in one or more other characteristics or variables” (Leedy & Ormrod, 2010, p. 183). The quantitative part of the study examined the trends of enrollment compared to the recruitment strategies used. Institutions use various recruitment strategies and this study analyzed enrollment trends over the last five years. The research aimed to explore the relationship between recruitment strategies and enrollment trends of female students pursuing undergraduate engineering degrees.

The variables used for the correlations included enrollment of females into engineering programs in 2005 and 2010 as well as promotional categories used during this period. The promotional categories that were identified included: advertising, personal selling, sales promotion, direct marketing, and public relations. The variables reflected the positive/negative trends of females in engineering programs, hence the effectiveness of each category.
The correlation analysis posed the following hypothesis:

H₀: Recruitment strategies do not have a relationship with enrollment trends of females in undergraduate engineering programs.

H₁: Recruitment strategies have a relationship with enrollment trends of females in undergraduate engineering programs.

**Data Analysis**

All information collected via the telephone interviews was recorded. Careful notes were taken during the survey interviews to ensure all data was collected. A tape recorder was used in addition to the hand-written notes of the researcher to ensure all pertinent data was collected.

The qualitative responses to the open-ended questions on the survey needed to be coded before they could be analyzed. The researcher used a coding method to convert the qualitative responses from the questionnaire into logical data (Creswell, 2005). Once the information was coded, similar codes/words were grouped together (Creswell, 2005). These codes were uploaded into a computer database, Microsoft Excel™. This software program allowed the information to be sorted into categories or themes. Categories are groups of codes that are put together because they are the “most frequently discussed, are unique or surprising, have the most evidence to support them, or those you might expect to find when studying the phenomenon” (Creswell, 2005, p. 239). The categories were in turn analyzed to provide insights regarding why and how the recruitment strategies have been specifically designed for women.

Descriptive statistics was used to capture the information collected by the close-ended questions. The descriptive statistics allowed the research to describe the findings
and view the data in terms of median, mode, and mean before calculating the correlations. Since correlation is a type of descriptive statistic, this is what was used in the data analysis. Determining the nature of the relationship between the recruitment strategies and the enrollment of female students in undergraduate engineering programs allows institutions to learn from one another. The correlation calculations were performed in Microsoft Excel™. Appendix C provides a view of the data sheet.

A perceptual interval scale was used to rate how often the recruitment strategy was used. Each strategy was rated on a scale ranging from not used at all (0) to used very often (1 or more times per month). Each respondent answered how frequently his or her institution used the recruitment strategy based on the college or university’s own usage patterns.

An interval scale was also used to measure how effective the admissions directors and engineering department administrators believed each of the recruitment strategies. The scale ranged from very effective (4) to not at all effective (0).

The final scale was a ranking scale. The question asked the participant to rank which recruitment strategies, in his or her opinion, was:

- The top three recruitment strategies that the institution uses
- The bottom one recruitment strategy the institution uses.

**Conclusion**

This section discussed the purpose of the study, the research design, the participants, the research questions, the instrumentation, and the data analysis that were conducted.
Chapter Four

Findings

Chapter four summarizes the results of the study. The study focused on discovering the types of recruitment strategies designed to appeal to women institutions in the Great Lakes region used and the reasons for the use of these strategies. Furthermore, the study sought to understand the ways specialized recruitment strategies were structured and attempted to see if there was any relationships between the recruitment strategies and the enrollment of females into undergraduate engineering programs. The following section details the findings of each of the research questions. Research question one examined what types of recruitment strategies geared towards women have been undertaken by institutions of higher learning. Research question two investigated why institutions have chosen to use these types of recruitment strategies. Research question three asked how were these recruitment strategies structured to appeal to women. Research question four gathered data from the perspective of the admissions directors and engineering department administrators about what types of recruitment strategies were more strongly related to an increase in female enrollment trends in engineering programs as viewed through the eyes of admissions directors and engineering department administrators. Finally, research question five investigated if there was a relationship between the recruitment strategies and enrollment trends of female students pursuing undergraduate engineering degrees.

The participating institutions were public and private institutions in the Great Lakes region with less than 10,000 students, with student housing, and with engineering as a program of study. The Great Lakes region included Indiana, Illinois, Michigan, Ohio,
and Wisconsin. The list of institutions was generated from the IPEDS on February 24, 2011. The original estimated number of institutions that responded to the identified criteria was 48.

Additional data analysis confirmed that nine institutions on that list did not have engineering programs. As a result, the number of eligible institutions was reduced to 39. Actual contact was made with 21 institutions, which yielded a response rate of 53.9%. The respondents from the 21 participating institutions were interviewed via telephone during November and December of 2011. The 21 institutions included public and private ones located in Indiana, Illinois, Ohio, Michigan, and Wisconsin.

Respondents included administrators from the college of engineering or the admissions department of the 21 institutions. The pool of respondents included: a vice president of enrollment management, directors and assistant directors of admissions, a director of enrollment strategies, a director of recruiting and strategic initiatives, deans and assistant deans of the school of engineering, chairs of the school of engineering, a dean of academic affairs, and a department head (see Figure 3). Each of the respondents was responsible for the recruitment initiatives of engineering students. Both male and female respondents were interviewed. The researcher made 168 phone call attempts to obtain the 21 responses gathered. These attempts involved no answers, leaving messages, or direct contact. Messages were returned by two of the institutions; others required additional follow-up. The interviews, on average, lasted 30 to 40 minutes. All respondents were forthcoming with information and were excited about the prospect of this study. Each administrator that was interviewed expressed a desire to know more about the subject of recruiting women into engineering programs.
Additional contact was made with each school’s institutional research department to determine enrollment numbers of undergraduate students and female undergraduate students in engineering programs. Enrollment numbers for 2005 and 2010 were used in the correlation analysis between recruitment strategies and enrollment trends. Enrollment numbers were collected by telephone calls and follow-up email requests to the colleges and universities. On average, two to three phone calls were made for every institution. All but one school was able to provide data. This one institution chose not to participate in this part of the survey, refusing to disclose enrollment data.
Overall Recruitment Strategies

The recruitment strategies used to attract students into engineering programs were grouped into segments based on Kotler and Armstrong’s (2008, 2010) five promotional mix categories and also related academic literature:

- Advertising: websites, television advertising
- Sales promotions: financial aid
- Personal selling: phone calls, campus visits, high school visits, college fairs, marketing to high school personnel and parents
- Direct marketing: college catalogs/viewbooks, letters, DVD/CDROMs, social media (including Facebook, Twitter, MySpace)
- Public relations: news broadcasts
  (Gilman, 2006; Hossler et al., 1990; Kotler & Armstrong, 2008; Kotler & Armstrong, 2010).

![Graph: Traditional Recruitment Strategies Used]

*Figure 4. Traditional Recruitment Strategies (Grouped into Five Promotional Mix Categories) Used to Enroll Students Into Engineering Programs.*

The recruitment strategies shown in Figure 4 include the number of traditional recruitment strategies, when grouped into their respective categories, used by the
universities surveyed. Traditional recruitment strategies are those which are directed to both male and female prospective students.

The most common traditional recruitment strategies (see Table 1) were websites, which fall under the category of advertisements, and prospective students visiting campus, a form of personal selling. The second most popular types of recruitment strategies included financial aid (sales promotion), phone calls to prospective students (personal selling), marketing to high school personnel (personal selling), and letters to prospective students (direct marketing). The third, fourth, and fifth were: colleges visiting high schools, college fairs hosted by colleges, and social media (Facebook, Twitter, and My Space), which are all forms of personal selling. News broadcasts (public relations), college catalogs/viewbooks (direct marketing), marketing to parents (personal selling), and DVD/CDROMs (direct marketing) were used fewer times by the participating institutions (see Table 1). The least popular traditional recruitment strategy was television advertising, which was categorized as an advertisement.
Table 1.

**Usage of Traditional and Specialized Recruitment Strategies**

<table>
<thead>
<tr>
<th>Male/Female Recruitment Strategies</th>
<th>Female-focused Recruitment Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Websites</td>
<td>Financial aid</td>
</tr>
<tr>
<td>TV advertising</td>
<td>Phone calls to students</td>
</tr>
<tr>
<td>Financial aid</td>
<td>Prospective students</td>
</tr>
<tr>
<td>Phone calls to parents</td>
<td>College visiting high school</td>
</tr>
<tr>
<td>Marketing to High school</td>
<td>College fairs hosted by parents</td>
</tr>
<tr>
<td>Marketing to parents</td>
<td>Marketing to High School</td>
</tr>
<tr>
<td>College Catalogs</td>
<td>Letters to prospective students</td>
</tr>
<tr>
<td>DVDs/CDROMs</td>
<td>Social Media (Facebook, News Broadcasts/PR)</td>
</tr>
<tr>
<td>Mentoring</td>
<td>Record Number</td>
</tr>
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<td>Summer camps</td>
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<tr>
<td>Career day for girls</td>
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<tr>
<td>Outreach program</td>
<td>0</td>
</tr>
<tr>
<td>Saturday female visit</td>
<td>0</td>
</tr>
</tbody>
</table>

- **Note**: 0 stands for “not used” as a recruitment strategy and 1 stands for “used” as a recruitment strategy.

Female-focused Recruitment Strategies

- Financial aid: 1
- Phone calls to prospective students: 0
- College visiting high school: 1
- Marketing to parents: 0
- Marketing to High School: 1
- Letters to prospective students: 0
- Social Media (Facebook, News Broadcasts/PR): 0
- Mentoring: 0
- Summer camps: 0
- Career day for girls: 0
- Outreach program: 0
- Saturday female visit: 0

206 | 43

Note. 0 stands for “not used” as a recruitment strategy and 1 stands for “used” as a recruitment strategy.
Table 1 documents the findings of the study. The Record Number is the number assigned to the institution that provided the data. The data was sorted according to the five literature-based promotional categories listed in the Overall Recruitment Strategies section of the study (Chapter Four).

Of the 21 institutions surveyed, six did not have any type of a female-focused strategy for enrolling females into their engineering program. There were variations between male/female recruitment strategies and female-focused recruitment strategies (see Table 1). Two hundred and six recruitment strategies were used by all the different institutions for male/female recruitment, while 43 recruitment strategies were used by the institutions to attract females specifically. Institution-specific recruitment strategies are those which universities create individually to be specific to their institution. The specialized recruitment strategies used by the institutions who participated in the survey are detailed in the Research Question One Findings.

**Research Question One Findings**

Research question one examined: “What types of recruitment strategies geared towards women have been undertaken by the institutions of higher learning?” Several recruitment strategies geared to women were used by the institutions surveyed, including:

- Phone calls to prospective female students
- Prospective female students visiting campus
- Colleges visiting high schools
- Letters to prospective female students
- DVDs/CDROMs
- Mentoring programs
- Learning communities for females
- Living communities for females
- Female-focused financial aid

These recruitment strategies were directed specifically to women with the intent to attract them into the institution’s engineering program.

![Graph showing specialized recruitment strategies](image)

**Figure 5.** Specialized Recruitment Strategies Used by Surveyed Institutions to Enroll Females Into Undergraduate Engineering Programs.

All the specialized recruitment strategies used by the surveyed institutions are detailed in Figure 5. The most prevalent specialized recruitment strategy used was mentoring. Ten of the 15 (66.7%) institutions using female-focused recruitment strategies had some type of mentoring program on their campus. The institutions utilized mentoring programs as part of their recruitment strategies. Many of the institutions involved the Society for Women Engineers or Women In Science and Engineering in their mentoring programs. The institutions involved SWE or WISE by having older female students
mentor younger students and by having alumni serve as role models and mentors. The older female students demonstrated the mentoring program to prospective female students during their visit days. Of the 10 institutions which indicated that they used mentoring as a recruitment strategy to attract females into their engineering programs, eight indicated mentoring was used regularly (more than one time per semester) or very often (one or more times per month). Seven of these institutions also reported that mentoring was a moderately effective or a very effective recruitment strategy.

Six out of 15 (40%) institutions using female-focused recruitment strategies shared they had living or learning communities. Learning and living communities were also utilized for recruitment purposes. The universities, which reported using living and learning communities as recruitment initiatives to attract females, indicated they were used regularly (more than one time per semester) or very often (one or more times per month) by all six institutions. Two respondents felt the living and learning communities were neither effective nor ineffective.

Financial aid was another specialized recruitment strategy often used to attract females. Five out of the 15 (33.3%) institutions using specialized recruitment strategies used some type of female-focused financial aid to attract incoming freshmen women into engineering programs. Female-focused financial aid was reported as a recruitment strategy being used more than one time per semester or once per year by three out of five (60%) universities. 75% of the institutions that utilized female-focused financial aid reported it as a moderately effective or a very effective recruitment strategy.

Finally, another specialized recruitment strategy used by several participating institutions was prospective students visiting campus. Five out of the 15 (33.3%)
institutions used some type of female-focused campus visit. A female-focused campus visit involves a current female student or female staff member taking the prospective female student on the campus tour. The visit is usually coordinated by a female admissions counselor as well. Campus visits were reported as a specialized recruitment strategy being used more than once per month by three out of five (60%) and more than one time per semester by two out of five (40%) universities. The institutions that utilized female-focused campus visits reported it as a moderately effective or a very effective recruitment strategy 100% of the time.

Additional recruitment strategies geared to enroll prospective female students were also collected by the researcher from the participants. The additional specialized recruitment strategies given by the participating institutions were institution-specific recruitment strategies. Listed below are examples of specialized recruitment strategies included in the institution-specific category:

- Career day for girls
- Summer camps
- An opportunity for junior and sophomore female students to participate in workshops for high school students
- Overnight programs
- Days where only prospective female students were invited to campus to showcase numerous majors (although not engineering-specific, it focused on women)

Some strategies were mentioned multiple times by the respondents, such as summer camps and overnight stays.
One of the current traditional recruitment strategies is social media. None of the surveyed institutions used social media as a specialized recruitment strategy. Some of the schools indicated that social media was handled by the university and the engineering school did not have the budget to maintain their own social media sites (Facebook, Twitter, MySpace, etc.).

Figure 6 shows the specialized recruitment strategies identified in this study grouped into their respective promotional mix categories. The advertising category, or one of the five promotional categories, did not emerge as one which was used by the participating institutions. The advertising category would have included websites and television advertising. Administrators reported that websites were handled without regard to gender. The administrators also indicated that they did not have any gender-specific television advertising.

![Specialized Recruitment Strategies](chart)

*Figure 6. Specialized Recruitment Strategies (Grouped Into Promotional Mix Categories) Used to Enroll Female Students Into Engineering Programs.*
Research Question Two Findings

Research question two asked: “Why have institutions chosen to use these recruitment strategies?” Each institution reported different reasons for the choice of the recruitment strategies they utilized; however they were all trying to attract females into their engineering program. The institutions altered their traditional recruitment strategies to direct them specifically towards women with great care about how the messages were being received by the target market (females).

Categories were used to group the reasons institutions used the specialized recruitment strategies they chose. The categories were determined by the way the institutions anticipated the prospective students would react to the recruitment strategies. For example, students look at certain factors (such as availability of financial aid, whether the institution forms a relationship with the student, or whether the institution’s recruitment initiatives are exciting, etc.) when they are considering an institution for enrollment. Categories were separated by how the universities expected prospective students to react to the institution’s recruitment strategies. Responses were grouped into the following categories:

- Informer and recipient
- A combination
- Form a relationship
- Offer financial aid
- Provide Information
- Provide a good first impression
- Build excitement
The institutions’ responses to why they used the recruitment strategies they did were uploaded into a Microsoft Excel™ spreadsheet. The responses from each participating institution were then grouped into categories based on key words. The key words are listed within each category’s summary in Figure 7.

![Figure 7](image)

**Figure 7.** Categories for Reasons Institutions Used The Chosen Specialized Recruitment Strategies.

Some universities reported that their choice of the recruitment strategies was the opportunity the strategies offered to involve women on both sides. Women were both hosting the events and women were receiving the information. This approach was categorized as “informers and recipients” for the purpose of this study. Key words including “support they receive,” “partner outside the classroom,” “support,” “build confidence,” and “meet often,” were used to create the “informers and recipients”
category. Sixteen universities were classified in this category. These institutions’ recruitment strategies included: mentoring and Saturday female visit days. “Seeing current students being successful helps,” stated one university administrator (personal interview, November 17, 2011). Another institution indicated, “having all girls on campus for visit days helps them see they are not alone” (personal interview, December 14, 2011).

The next category was “form a relationship.” This categorization captured a second rationale for the use of the recruitment strategies institutions used. Key words, including “make the relationship easier to build,” “form a relationship,” “build better relationships,” “start outreach programs early,” and “relate better,” were used to create the “form a relationship” category. Ten institutions used “form a relationship” as a reason why they utilized the specialized recruitment strategy they were using. Phone calls to students, outreach programs, and organizing overnight visits were the specialized recruitment strategies used under the “form a relationship” category. Regarding phone calls to prospective students, one university stated, “we start to form a relationship with them” (personal interview, November 10, 2011). Another university stated, “we start outreach programs early…middle school” (personal interview, November 28, 2011). And yet another stated, “girls seem to bond when they come for an overnight stay. It seems to work” (personal interview, November 28, 2011).

Five institutions were grouped in the “offer financial aid” category for indicating they used financial aid as a recruitment strategy. Key words, including “NSF,” and “grants,” were used to create the “offer financial aid” category. Given the current tuition increases, using financial aid today seems necessary (Armario, 2012). One institution
reported that “financial aid is offered to minorities and females at a higher rate through National Science Foundation (NSF) grants” (personal interview, December 7, 2011).

The “provide information” category encompassed recruitment strategies which aimed at sharing information about the engineering program. Key words including “mailed directly,” “receive it,” and “focus,” were used to create the “provide information” category. Four institutions were categorized as using “provide information” as a rationale for the choice of strategies. The specialized recruitment strategies in this category were much more direct and informative for prospective students. The recruitment strategies in the “provide information” category included: email and direct marketing (including direct mail). One participating institution provided rationale that included “they are able to receive it where-ever they are now” (personal interview, November 28, 2011).

Three institutions were classified as using “a good first impression” as a recruitment strategy rationale. Key words such as “from the start,” “visit high schools,” and “prospective students,” were used to create the “provide a good first impression” category. Institutions whose responses were grouped here were the ones which were trying to reach females while they were in high school and early in their decision-making process. These recruitment strategies included websites, summer camps, conferences, and visits to high schools. One institution indicated, “we hold summer camps and hope that by attending one, students will want to come back and attend college here when they reach 18” (personal interview, December 7, 2011).

The responses that fell under the “build excitement” rationale category included funding robotic competitions and having happy students. Key words, including “happy
students” and “female-friendly,” were used to create the “build excitement” category. Two institutions were classified in this category. As one respondent from these schools shared, “if we have happy students and prospective students see this, they will want to come to school here” (personal interview, November 29, 2011).

The “a combination” category is a mix of the “provide a good first impression,” “form a relationship,” and “provide information” categories. The responses of 10 institutions were grouped into this category. Campus visits were the recruitment strategy used by six of the 10 (60%) institutions classified within this category. “Campus visits are one of our strongest recruitment tools. If we can get them on campus they will most likely visit faculty members or even a class…this is good because it gets them to become tied to the university” (personal interview, November 28, 2011).

**Research Question Three Findings**

Research question three asked: “How are these recruitment strategies structured to appeal to women?” Specialized recruitment strategies that were specifically directed towards women involved women in active roles. Examples of these recruitment strategies include: campus visits, mentoring, female-focused financial aid, living/learning communities, summer camps, and conferences. Women were involved as both the provider as well as recipient of information at many institutions when these recruitment strategies were used.

The campus visits were usually conducted by female students. “Female students give our prospective students tours and when they come to campus they make them feel better about the school and the program” (personal interview, November 10, 2011). At one respondent’s institution, female faculty members give campus tours to prospective
female students (personal interview, November 23, 2011). These faculty campus tours allow the prospective student to see a role model and interact on a different level than when the tour is being given by a current student.

Mentoring programs were the specialized recruitment strategy that was the most prevalent and was tailored specifically to women. Research shows that “women cherish warm, close relationships, take pride in being needed, want to make the world a better place, and enjoy being recognized for their efforts” (Barletta, 2003, pp. 77-78). When strategies are geared towards women, they are designed to appeal to their needs and predispositions. Mentoring, as conveyed by Chester and Chester (2002), was found to have a positive effect on recruiting females into engineering programs. Although Chester and Chester (2002) studied face-to-face mentoring programs, online mentoring programs were found to have similar success (Wilkins et al., 2006). Ten out of the 15 (66.7%) participating institutions using female-focused recruitment strategies used mentoring. All but one of the institutions using mentoring programs as a recruiting strategy had positive enrollment growth. SWE chapters are heavily involved in the mentoring process, as demonstrated by six out of the 10 (60%) universities that used mentoring as a recruitment strategy. Junior and senior students, who are SWE members, are matched with younger students whom they mentor through their freshmen and sophomore years. Women In Science and Engineering (WISE) were involved at one university to help foster their mentoring program. The large number of schools using mentoring as a strategy was fascinating, but what institutional administrators had to say about mentoring was even more interesting:

Sometimes prospective students see current students and what they are doing as inspiration into what they want to be. We found when we
formalized a program to pair women together from the start of their college enrollment they were much more likely to be successful at graduating with engineering degrees (personal interview, November 28, 2011).

We have had a formalized mentor program for a few years now and it has been very successful. The girls from the Society of Women Engineers run it and it pairs older students with younger ones to help them through the formative years of the curriculum. Then once they graduate they come back as alumni to be role models. It works out very well (personal interview, December 7, 2011).

Our mentoring program has helped students completed their degrees within the program they started in because of the support they receive (personal interview, December 12, 2011).

Our WISE members help with our mentoring program which is a helpful draw for prospective students (personal interview, November 23, 2011).

Mentoring is such an important part of engineering. Women in engineering have a tough road and so mentoring programs are a must (personal interview, December 5, 2011).

SWE was also active in recruiting from the very start at one institution, sending out letters to prospective students inviting them to campus for a visit. Having a female engineering student send out the letter provides a better chance of forming a relationship with the prospective student (Coles & Blacknall, 2011; Huddleston, Jr., 2000; Keller, 1991).

Female-focused financial aid packages were offered at five institutions. “Financial aid is offered to minorities and females at a higher rate through NSF grants” (personal interview, December 7, 2011). The NSF grants allowed universities to use financial aid as a recruitment strategy geared specifically towards women. Two of the institutions that
used financial aid as a specialized recruitment strategy had female financial directors. These female financial directors were able to work with the female students and provide information about the female-focused financial aid packages that were available to the prospective students. Female financial directors allowed the institutions to build closer relationships with the prospective female students by helping the students during a time of extreme need (Armario, 2012).

Living and learning communities were different for females than for males. Not every institution had female-only floors or communities. When a student was eligible to participate in the living/learning community and the institution had one to offer, it was used as a recruitment initiative. Living communities are dorms or campus apartments where only women live. Learning communities are cohorts, where women who are in a similar field of study (e.g., engineering) sign-up for the same classes, study together, and sometimes live in the same building. The women that use these living and learning communities form relationships by: rooming together, eating together, studying together, watching television together, playing games together, and socializing with each other. The women at one of the living communities were able to interact with the director of the community facilitating the programs directly because this director actually had an office on-site and was available to answer questions from the students Monday through Friday (personal interview, December 12, 2011). The director of another one of the learning communities was the founder of the program and was currently “leading the program” (personal interview, December 8, 2011).

Career day for girls was one institution’s way of enabling girls to see what opportunities the engineering field has to offer. The career day for girls strategy was
institution-specific, and was tailored specifically to women. Only females were invited to attend the career day for girls. Also female role models from industry were brought in so the prospective female students could see what a successful career for women looked like. The current college students helped facilitate the career fair. Providing opportunities for the current female college students to be role models at the career day for girls helped further develop relationships with the university (Coles & Blacknall, 2011; Huddleston, Jr., 2000; Keller, 1991).

Overnight stays were one of the recruitment strategies that institutions reported to be very successful due to the current students’ “ability to bond” with the prospective student (personal interview, November 18, 2011). The overnight stays were not necessarily changed specifically for women, but the institutions reported that the bonds seemed to be stronger for females than for males. As a result, overnight visits were considered a stronger recruitment strategy when used to enroll women.

Outreach programs were successful at one university so much so that current students partake in the activities as well. “One student even holds classes (STEMing with “name of student”) to attract high school students to the university” (personal interview, November 17, 2011). STEMing with “name of student” is a unique program that allows high school female students to actively interact with a current student of the university by attending a class that the student teaches. This particular current student teaches the class on her own time, using the knowledge that she has acquired in her undergraduate classes and relaying that information to prospective students in an attempt to generate excitement about STEM fields. Outreach programs are being tailored to females by reaching them with different messages (female role models, seminars high school juniors/seniors were
invited to, female faculty members lead programs, etc.). These recruitment strategies reached high school students and brought them to the university for events so that they became familiar with the institution. As one institution shared,

Our robotics competition, which is held each spring, enables middle school students to experience engineering and the college atmosphere for three days. They have a good time and the faculty that host it really enjoy it too (personal interview, November 28, 2011).

A Saturday female visit day was used by one institution, but the university used the recruitment strategy in an innovative way. The event started with special invitations, directed specifically towards women that were designed with soft colors and prints. Only women were invited to the Saturday event. The lunch for the female visit day was tailored towards women’s appetites and included salads, croissant sandwiches, quiche, fresh fruit, and delicate desserts (e.g., chocolate, petit fours, etc.). The takeaways for the prospective students were pastel lanyards that matched the colors of the invitations with the university’s name stitched on them. Everything throughout the day was focused on the target market, women. Although this particular recruitment strategy was not used to attract students to engineering specifically, the school was primarily focused on engineering (40%) and therefore many of the institution’s prospective students were interested in engineering.

**Research Question Four Findings**

Research question number four asked: “What types of recruitment strategies are more strongly related to an increase in female enrollment trends in engineering programs through the eyes of admissions directors and engineering department administrators?” From the perspective of those leading the recruitment efforts, seven directors and
administrators reported campus visits were strongly related to the increase in the enrollment of females in their engineering programs (see Figure 8). Three institutions’ personnel said that websites were the recruitment strategy most strongly related to increases in female enrollment in their engineering programs. Two interviewees indicated phone calls to prospective students as the recruitment strategy most strongly related to increases of female students in their engineering programs. One institution reported financial aid, colleges visiting high schools, and marketing to parents were the recruitment strategies most strongly related to increases in female enrollment in the school’s engineering programs.

Overall visiting campus was thought to be the most influential strategy to convince a prospective student to attend a university. Building relationships and summer camps were also seen as important and can actually be seen as parallel. Summer camps bring students to a university at a younger age, with the intent of developing a relationship with that student. The long-term hope is that that student will one day attend that institution.
Figure 8. Types of Recruitment Strategies Strongly Related to Increases in Female Enrollment Trends According to Recruitment Administrators.

**Research Question Five Findings**

Research question number five asked: “Is there a relationship between recruitment strategies and enrollment trends of female students pursuing undergraduate engineering degrees?” Correlation analysis was conducted using the results collected from 20 institutions. One university chose not to provide enrollment data for the survey and therefore could not be included in the correlation calculations.

According to the collected data, enrollment numbers of females into engineering programs increased from 2005 to 2010 at every institution that used specialized
recruitment strategies except at one institution. One university experienced a decline of 19% in enrollment of females into engineering programs from 2005 to 2010. Total enrollment (male and female students in all undergraduate programs) grew by 8% at the same university that experienced a decline in female engineering enrollment from 2005 to 2010.

The female enrollment numbers for three institutions that did not use any female-specific recruitment strategies showed significant growth in their enrollment numbers of females into engineering programs; these schools, however, had relatively small enrollment numbers. For example, one institution increased its female enrollment from 2 to 4 women (+100%), another increased female enrollment from 12 to 24 women (+100%), and yet another increased from 11 to 36 women (+227%). Other two institutions that did not use female-specific recruitment strategies showed modest growth in female enrollment (23% and 48%); these two universities had modest enrollment numbers (26 to 32 women and 23 to 34 women respectively). Two universities with large female enrollment (254 women and 129 women) that did not use any female-specific recruitment strategies experienced a decline (-18% and -31% respectively).

Kotler identified five promotional categories including advertising, sales promotion, personal selling, direct marketing, and public relations. The specialized recruitment strategies identified in this study fell under four out of the five promotional categories (see Figure 6). The four that were used by the participating institutions were: sales promotion, personal selling, public relations, and direct marketing. The specialized recruitment strategy that was considered part of the sales promotion category was female-focused financial aid. The specialized recruitment initiatives that fell under the second
promotional category, personal selling, included: phone calls to prospective female students, prospective female students visiting campus, colleges visiting high schools, mentoring for female students, living and learning communities for female students. The most prevalent specialized recruitment initiatives used by the institutions surveyed were mentoring (10 institutions used) and campus visits (5 institutions used). The third promotional category was public relations. Public relations included career day for girls and a conference; both of these strategies were used by one institution. The fourth promotional category was direct marketing. Direct marketing included letters to prospective female students and DVDs/CDROMs. Letters to prospective female students were used by only two institutions and DVDs/CDROMs were used by only one institution.

The researcher also collected data on female enrollments at each of the surveyed institutions. Data was collected through each school’s institutional research department. All institutions but one provided information on their female enrollment numbers for years 2005 and 2010. Table 2 documents the enrollment percentage change, alongside the number of specialized recruitment strategies these institutions used during the time period 2005-2010.
The correlation analysis between female-specific recruitment strategies and enrollment of females into engineering programs indicated no significant relationship. As a result of the correlation analysis, the researcher is unable to reject the null hypothesis -
**H₀:** Recruitment strategies do not have a relationship with enrollment trends of females in undergraduate engineering programs.

Table 3.

*Correlations between Female-Specific Recruitment Strategies and Enrollment of Females into Engineering Programs*

<table>
<thead>
<tr>
<th>Record Number</th>
<th>Sales Promotion</th>
<th>Personal Selling</th>
<th>Public Relations</th>
<th>Direct Marketing</th>
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<tr>
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<th>Correlation female %change (t)</th>
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<td></td>
<td>-0.98</td>
<td>-1.10</td>
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</table>
Chi-Square analysis was used to investigate whether certain specialized recruitment strategies were used more often than others by enrollment officers and whether certain specialized recruitment strategies were considered more effective than others. Chi-square analysis allows the researcher to understand whether observed differences were significant or due to chance (Newmark, 1988). Chi-square analysis utilizes frequency distribution to answer some of the research questions. The majority of admissions directors and school of engineering administrators using specialized recruitment strategies reported that they were effective (Table 5).

Table 4.

*Chi-square Table of Usage of Specialized Recruitment Strategies*

<table>
<thead>
<tr>
<th>Recruitment strategy usage</th>
<th>Infrequently</th>
<th>Frequently</th>
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<tbody>
<tr>
<td>Observ</td>
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<td>26</td>
</tr>
<tr>
<td>Expected</td>
<td>21.50</td>
<td>21.50</td>
</tr>
</tbody>
</table>

*p-value* 0.86

*Has to be below .05 to be significant. This is not significant*
Table 5.

*Chi-square Table of Effectiveness of Specialized Recruitment Strategies*

<table>
<thead>
<tr>
<th>Recruitment strategy effectiveness</th>
<th>Ineffective</th>
<th>Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observ</td>
<td>12</td>
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<tr>
<td>Expected</td>
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<td>21.50</td>
</tr>
<tr>
<td>p-value*</td>
<td>0.00</td>
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</tbody>
</table>

*Has to be below .05 to be significant. This is significant*

**Female Enrollment Strategy**

To fully understand the universities and their enrollment strategy objectives, it is important to analyze the institutions’ overall female student enrollment strategies. The questionnaire included questions about the strategies the universities used to attract females into their undergraduate programs (see Figure 9, Figure 10, Figure 11, and Figure 12). These questions asked about general enrollment strategies, and not specifically about the institution’s engineering program.

The planning time of an institution’s enrollment strategy was the focus of the first enrollment strategy question (see Appendix A). Short-term enrollment included those strategies that were centered on gaining immediate enrollment without regard to long-term growth. A short-term enrollment strategy for women addressed an immediate need to fill seats in the classrooms. By contrast, a long-term enrollment strategy would
encompass long-term growth that looked beyond five years and made plans accordingly. A long-term enrollment strategy for women would include summer camps and outreach programs. The question asked whether the school’s enrollment strategy for women was long-term or short-term. Sixteen institutions indicated that their enrollment strategy for women was long-term and three universities said that their enrollment strategy was short-term (see Figure 9).

![Figure 9. Percentage of Institutions Surveyed Using Long-Term Versus Short-Term Enrollment Strategy for Women.](image)

A second way to characterize existing enrollment strategies is to distinguish between a stand-alone and an integrated enrollment strategy. An integrated enrollment strategy is conducted in unison with the other enrollment strategies the university had in place. An integrated enrollment strategy works with other parts of the enrollment strategy (a marketing theme that runs will be shown on letters sent to prospective students, on the website where a prospective student can sign-up to visit campus, on a billboard on the
highway, in a magazine ad, and in the brochure handed out at a college fair). The stand-alone enrollment strategy works by itself. Institutions were asked whether their enrollment strategy was integrated or stand-alone (see Figure 10). Sixteen institutions identified their strategy as integrated and three universities said their enrollment strategy was a stand-alone strategy.

![Chart showing percentage of institutions using integrated or stand-alone enrollment strategy for women.](chart)

*Figure 10.* Percentage of Institutions Surveyed Using Integrated Versus Stand-Alone Enrollment Strategy for Women.

Next, recruitment strategies for women in undergraduate programs can be continuous or ad-hoc. A continuous enrollment strategy continues to function throughout the year. A continuous enrollment strategy is one that the university creates and continues to invest in. The continuous enrollment strategy becomes part of what individuals actually use to identify the university. Ad-hoc enrollment strategy, by contrast, is a strategy that is used when needed. An ad-hoc enrollment strategy is used to create excitement around events, but does not resonate with the general population. It is not
identified as being a part of that institution. Fifteen institutions indicated the enrollment strategies they use were continuous (see Figure 11). Four institutions said the enrollment strategies they used were ad-hoc.

![Pie chart showing percentages of institutions using continuous versus ad-hoc enrollment strategies]

*Figure 11. Percentage of Institutions Surveyed Using Continuous Versus Ad-Hoc Enrollment Strategy for Women.*

Finally, the difference between a goal-setting enrollment strategy and just-recruit-as-many-as-possible enrollment strategy is another way to distinguish how universities recruit prospective students. A goal-setting enrollment strategy is one that has a distinct goal in mind. When goal-setting is in place while recruiting, the institution has a goal of reaching a certain number of enrollees. When an institution is using the just-recruit-as-many-as-possible enrollment strategy, it is trying to get as many students as possible to enroll. Twelve institutions reported using a goal setting enrollment strategy for females and seven reported using a just-recruit-as-many-as-possible approach (see Figure 12).
One institution stated that “ensuring quality is a factor” (personal interview, November 29, 2011) when the university reported that it used the just-recruit-as-many-as-possible enrollment strategy.

![Figure 12. Percentage of Institutions Surveyed Using Goal-Setting Versus Just Recruit As Many As Possible Enrollment Strategy for Women.](image)

From the 21 institutions studied, two institutions indicated they did not have an enrollment strategy for women. One institution explained its lack of an enrollment strategy for women with their current high enrollment of women (personal interview, December 1, 2011). The other university did not have a formalized strategy (personal interview, December 6, 2011).

**Conclusion**

Chapter four summarizes the findings of the research conducted within this study. The study collected data from admissions directors and engineering school administrators who were experts in the field of recruitment of students into engineering programs. The findings offer institutions and researchers insights into existing specialized recruitment
strategies for women. Information about institutions’ enrollment strategies was collected and analyzed. The information from the enrollment strategies allows participating institutions to understand what their peer institutions’ strategies are.
Chapter Five

Discussion and Recommendations

Under-represented groups have been difficult to recruit into the field of engineering. Recruitment is a way to represent and promote a college or university truthfully to those who are seeking information about it (National Association for College Admission Counseling, 2009). Nationally, the 16.8% of women enrolled in undergraduate engineering programs in 2008 (National Center for Education Statistics, 2008) was a decrease from the 17.9% of female students enrolled in engineering degree programs in 2006 (National Center for Education Statistics, 2007). In 2009, the percentage of female undergraduates pursuing engineering degrees in the U.S. continued to decline to only 13% (National Center for Education Statistics, 2009b). The low representation of women in undergraduate engineering programs had been attributed primarily to social identity threat, lack of mentoring, and scarcity of female role models in the career field of engineering (Ethier & Deaux, 1994; Logel et al., 2009; Murphy, Steele, & Gross, 2007; Starobin & Lannan, 2008; Trenor, 2007).

The purpose of this study was to map what institutions do to recruit women into undergraduate engineering programs, and shed light on why and how these institutions use the recruitment strategies they use. In addition this study aimed to analyze a potential relationship of strategies geared specifically for women with enrollment trends of female undergraduates in engineering programs. The research questions were as follows:

- **RQ₁**: What types of recruitment strategies geared towards women have been undertaken by institutions of higher learning?
- **RQ₂**: Why have institutions chosen to use these recruitment strategies?
• RQ3: How were these recruitment strategies structured to appeal to women?

• RQ4: What types of recruitment strategies were more strongly related to an increase in female enrollment trends in engineering programs as viewed through the eyes of admissions directors and engineering department administrators?

• RQ5: Was there a relationship between recruitment strategies and enrollment trends of female students pursuing undergraduate engineering degrees?

This chapter discusses the findings of the study, summarizes the implications to literature, theory, and practice, discusses the limitations and recommendations for future research, and offers a conclusion to the study.

**Summary of Main Findings**

1. This study identified 14 types of traditional recruitment strategies used by the surveyed institutions of higher education. A traditional recruitment strategy can be used to recruit both men and women. This study also identified 18 types of female-focused recruitment strategies used to recruit women into engineering programs.

2. Social media was not used as a specialized recruitment strategy by any of the surveyed schools. The institutions reported that social media initiatives were handled at the university level because of budgetary and time constraints. The social media messages were directed to prospective students, both men and women, interested in the university, and not specifically to prospective female engineering students.
3. The three most prevalent specialized recruitment strategies were mentoring, female-focused financial aid, and prospective females visiting campus. The unifying aspect of these specialized recruitment strategies that the study identified was that with each one, the prospective student developed a relationship with an individual at the university who helped guide the student through a given process. This relationship-building aspect of the specialized recruitment strategies was identified for the first time by this study as a core component of female-focused recruitment initiatives. The importance of relationships for women is strongly documented in literature (Barletta, 2003) and recruitment strategies are embracing it as a specialized approach.

4. Financial aid was one of the specialized recruitment strategies used and found to be critical. Given the rise in student debt, there is an increasing need for financial aid (Armario, 2012), especially for engineering students where studies are more costly than in other fields. Financial aid is very important for engineering students also because of the long study hours and therefore limited amount of time available for students to work (May & Chubin, 2003).

5. Ten of the 15 (66.7%) institutions using female-focused recruitment strategies used some type of mentoring program as a recruitment strategy. Mentoring programs were, at one time, used mostly for retention. Recent literature and this study demonstrate the increased use of mentoring programs used as recruitment strategies. Many of the institutions involved the Society for Women Engineers or Women In Science and Engineering in their mentoring programs. The institutions involved SWE or WISE by having older female students mentor younger students.
and by having alumni serve as role models and mentors. Both SWE and WISE had a strong presence on these campuses.

6. Women are underrepresented in engineering, and traditional recruitment strategies are not specific enough and are not yielding the desired increase of female students in engineering. Institution-specific specialized recruitment strategies were found to be more appealing to women. The study found that most institutions use a few or no specialized recruitment strategies (see Table 2). Table 2 shows the number of specialized recruitment strategies used by each surveyed school and the associated female enrollment percentage change between 2005 and 2010.

7. The study identified that the majority of institutions, which use specialized recruitment strategies, tried to link these recruitment efforts to their overall recruitment strategy, including building the specialized approaches within their long-term recruitment plans.

8. Guided by Kotler and Armstrong’s work (2008, 2010), the study grouped the identified specialized recruitment strategies under four of the five promotional categories developed by Kotler and Armstrong. No specialized recruitment strategies were found under the category of advertising.

9. The study identified three specific reasons for the use of the specialized recruitment strategies as reported by those leading the recruitment initiatives: form a relationship with the prospective student, provide information to her, and provide a good first impression. All three rationale for the use of specialized recruitment strategies align with Barletta’s (2003) work.
10. The 18 specialized recruitment strategies that emerged from this study represent, for the first time, an extensive compilation of female-focused recruitment strategies used by engineering schools. Included in the 18 specialized recruitment strategies, the study also documented a set of 9 institution-specific recruitment strategies which were developed and used by individual institutions. In this way, the study documents the effort to create and utilize recruitment strategies to appeal specifically to women – an effort that seems to be on the rise amongst engineering programs. The nine institution-specific recruitment strategies accounted for 50% of the specialized recruitment strategies reported by the participating universities.

11. This study contributed to literature by also identifying core elements of the specialized recruitment strategies including:

a. an emphasis on linking the prospective student with a particular individual at the institution and thus helping form a relationship with the institution,

b. an effort to appeal to women’s needs and wants and structure a marketing message that would be “seen” and “heard” by the women applicant (Barletta, 2003) including bringing women together (e.g., Saturday visit days, overnight stays), which appeals to women’s preference to work in groups, designing rich programs that would appeal to women as multi-taskers, and paying careful attention to every detail in the marketing/recruitment message, and

c. involving as many women to deliver the message in the process of recruitment as possible.

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12. The study also collected the opinions of those heading recruitment initiatives regarding what specialized recruitment strategies they found to be most effective. Although mentoring and financial aid were found to be most often used, campus visits (used by 5 institutions) were pronounced to be most effective by the recruiters.

13. The study found that admissions directors and engineering department administrators used specialized recruitment strategies regularly or very often at the institution’s that utilized such strategies, and that these individuals found the recruitment strategies used to be moderately or very effective. Although the admissions directors and engineering department administrators found these strategies to be beneficial, it is possible that technology and a changing generation could be in need of new recruitment strategies.

**Summary and Discussion of Research Question One Findings**

Research question one from the study asked: “What types of recruitment strategies geared towards women have been undertaken by institutions of higher learning?” This question aimed to collect information about the types of recruitment strategies that the participating institutions used to attract women into their engineering programs.

Eighteen types of specialized recruitment strategies emerged as strategies used to recruit women in this study:

- Phone calls to prospective female students
- Prospective female students visiting campus
- Colleges visiting high schools
• Letters to prospective female students
• DVDs/CDROMs
• Mentoring programs
• Learning communities for females
• Living communities for females
• Female-focused financial aid

Included in the 18 specialized recruitment strategies identified, the researcher also documented a set of nine institution-specific strategies which were used by individual institutions. These institution-designed specialized recruitment strategies included the following:

• Career day for girls
• Summer camps
• An opportunity for junior and sophomore female students to participate in workshops for high school students
• Overnight programs
• Days where only prospective female students were invited to campus to showcase numerous majors (although not engineering-specific, it focused on women)

Some strategies were mentioned multiple times by the respondents, such as summer camps and overnight stays.

Traditional recruitment strategies are used to recruit men and women. The present study found that five of the traditional strategies were also geared towards women. The following three were the ones that were found to be the most prevalent traditional
recruitment strategies: prospective students visiting campus, financial aid, and phone calls to prospective students. These three traditional recruitment strategies were also used as specialized recruitment strategies. Specialized recruitment strategies are used to recruit appeal specifically to women. It was interesting that the institutions chose to utilize the same recruitment strategy for both male/female and female-only recruiting efforts into their engineering programs. Prior research shows us that prospective students visiting campus, financial aid, and phone calls to prospective students are effective unisex recruitment strategies (Armario, 2012; Astin 1997; Gilman, 2006; Grandillo, 2010; Heller & Rasmussen, 2001; Kuh et al., 2006; Swann, 1998; Trenor, 2007). The universities that used traditional strategies for women tailored the marketing message to appeal directly to women. The institutions surveyed used prospective female students visiting campus, female-focused financial aid, and phone calls to prospective female students to attract women into engineering.

The specialized recruitment strategies that were most prevalent amongst the surveyed institutions were mentoring, female-focused financial aid, and prospective female students visiting campus. The impressive aspect of these specialized recruitment strategies was that with each one, the prospective student developed a relationship with an individual at the university who helped guide the student through a given process (find a mentor, obtain financial aid, or attend a campus visit) (Armario, 2012; Astin 1997; Cech et al., 2008; Coles & Blacknall, 2011; Gilman, 2006; Grandillo, 2010; Heller & Rasmussen, 2001; Huddleston, Jr., 2000; Keller, 1991; Kuh et al., 2006; Ocif & Marshall-Goodell, 1996; Swann, 1998; Trenor, 2007; Wilkins et al., 2006).
Mentoring was the most prevalent specialized recruitment initiative. Ten out of the 15 (66.7%) participating institutions used mentoring as a specialized recruitment initiative. Researchers (Liang et al., 2002; Marklein, 2008; McGuire & Reger, 2003; Nolan et al., 2008; Savage, 2003) specify that lack of mentoring was one of the reasons women avoid engineering as a degree program. Literature also reports that mentoring can be done face-to-face (Chester & Chester, 2002) or over the Internet (Ocif & Marshall-Goodell, 1996; Wilkins et al., 2006) effectively. Scholars indicate that mentoring is important to young women (Chester & Chester, 2002; Ocif & Marshall-Goodell, 1996; Wilkins et al., 2006). The prevalence of strategies that used mentoring as a recruitment tool is an important finding of the study that indicates the willingness of institutions to utilize marketing approaches that research finds to be effective on women. When a prospective student would come to campus the students from SWE or WISE (if they were involved) or a faculty member would participate in the campus visit. The current student would inform the prospective student about the mentoring program and its benefits (which included higher program graduation rates). The benefits of building a relationship between a current student or faculty member and potential students were meaningful to the prospective students (Coles & Blacknall, 2011; Huddleston, Jr., 2000; Keller, 1991). The findings from this study contribute to literature (Chester & Chester, 2002; Ocif & Marshall-Goodell, 1996; Wilkins et al., 2006) in an important way, confirming the centrality of mentoring initiatives to women. Moreover, the findings go beyond literature to document the importance of mentoring not only as a retention tool, but also as a marketing tool.
Female-focused financial aid emerged as the second most used specialized recruitment strategy, used at five of the 15 (33.3%) institutions which used female-focused recruitment strategies. The five institutions that offer female-only scholarships or grants do so with specific guidelines from agencies. The National Science Foundation (NSF) is a governmental agency that is funded by the federal government. The funding agency was important because the institutions needed to have a financial representative on staff that understood the application process in order to assist the prospective students. Due to tuition increases (Armario, 2012) in recent years, financial aid has become an important recruitment tool. The findings of this study confirm findings of prior research on the importance of financial aid as a recruitment tool (Armario, 2012; Astín, 1997; Cech et al., 2008; May & Chubin, 2003).

Prospective female students visiting campus was another specialized recruitment strategy that emerged in this study. Female campus visits tied with female-focused financial aid as the second most used specialty recruitment strategy, used at five of the 15 (33.3%) institutions which used female-focused recruitment strategies. These five schools had initiatives that included the involvement of current female students showing prospective female students around or of female faculty showing prospective female students around campus. Campus visits are considered one of the most popular recruiting methods by university admissions personnel (Gilman, 2006; Leupold et al., 2006; Swann, 1998). The female-specific campus visits were aimed at making prospective female students feel welcome and comfortable. This study confirms prior research findings on the importance of the unisex campus visits (one of the most popular traditional strategies). Furthermore the findings of this study go beyond existing research in
identifying and documenting the existence and importance of female-focused campus visits as a specialized recruitment tool.

In addition, the study found a whole array of recruitment strategies designed specifically by individual institutions. There were nine institution-specific specialized recruitment strategies that emerged from the interview respondents. The nine institution-specific specialized recruitment strategies account for 50% of the specialized strategies reported by the participating universities. These nine institution-specific recruitment strategies included: career day for girls, summer camps, an opportunity for junior and sophomore female students to participate in workshops for high school students, overnight programs, Saturday female visit day, and “changing the message of each recruitment piece to be centered on women” (personal interview, November 18, 2011). The identification of a variety of institution-specific initiatives that appealed to women is an important contribution of this study to existing research on recruitment strategies. These findings point to a growing recognition on behalf of engineering colleges and universities of the power of specialized approaches that appeal directly to women and the importance of efforts that showcase programs and events that are attractive to women.

Some institution-specific specialized recruitment strategies were mentioned multiple times by the respective university respondents, such as summer camps and overnight stays. One university designed a Saturday female visit day, which they used as a specialized recruitment strategy. Although all prospective female students were invited to the Saturday visit day, most of the female students that attended were prospective engineering students. The Saturday female visit day was organized specifically for prospective female students. The event was structured so that it spoke to women, and
used materials and techniques that appeal to women including choice of invitation colors, kinds of foods, etc. The university that sponsored the Saturday female visit day has repeated the event for 3 years.

The overview of the overall enrollment strategies used by the institutions surveyed provided a more in-depth view of what the schools were trying to accomplish with their marketing efforts. For example, 16 of the 21 (76%) reported that they used a long-term enrollment strategies such as summer camps and outreach programs. In addition, integrated enrollment strategies were prevalent in 84% of the institutions (16). The integration of specialized engineering strategies are indicated to create a consistent marketing message for the universities. Next, 12 of the 21 (63%) reported that they used a goal-setting enrollment strategy versus a “just recruit as many as possible” approach. This goal-setting shows the importance of enrollment growth to these institutions’ engineering school.

Kotler identified five promotional categories advertising, sales promotion, personal selling, direct marketing, and public relations. There were only four out of the five used within the specialized recruitment strategies. The four that were used by the participating institutions were: sales promotion, personal selling, public relations, and direct marketing.

The specialized recruitment strategy that was considered part of the sales promotion category was female-focused financial aid. According to Kotler and Armstrong (2010) sales promotions are an “incentive to encourage the purchase or sale of a product or service” (p. 402). Female-focused financial aid is used by participating
institutions as a recruitment strategy, which can incentivize women to enroll in an engineering program.

The specialized recruitment initiatives that were within the second promotional category, personal selling, included:

- phone calls to prospective female students
- prospective female students visiting campus
- colleges visiting high schools
- mentoring for female students
- living communities for female students
- learning communities for female students
- summer camps

Amongst those, the most prevalent specialized recruitment initiatives used by the institutions surveyed were mentoring (10 institutions used) and campus visit (5 institutions used). Kotler reports that “[personal selling] involves personal interaction between two or more people, so each person can observe the other’s needs and characteristics…” (Kotler & Armstrong, 2008, p. 414). For example, phone calls to students involves an admissions staff or faculty member calling a prospective student and answering questions, providing information about the university or program, and attempting to persuade the student to visit the campus. The personal interaction Kotler and Armstrong (2008) described is demonstrated in each of the recruitment initiatives used by the participating institutions. However, the present study’s findings add an additional aspect to Kotler and Armstrong’s work on personal selling, the female participation.
The third promotional category was public relations. Public relations included career day for girls and conferences because they were free to the participants. These activities were hosted by the universities in order to promote goodwill to the community within which they exist. Two institutions participated in these events, one hosted a career day for girls and one hosted a conference.

The fourth promotional category was direct marketing. Direct marketing included letters to prospective female students, DVDs/CDROMs, overnight programs, outreach programs, and Saturday visit days. Letters to prospective female students (2 institutions used) and DVDs/CDROMs (1 institution used) did not have many responses. Kotler explains that direct marketing is a way to speak and interact with a customer [prospective student]. According to Kotler and Armstrong (2010), the direct marketing category has limited interaction. Letters to prospective students and DVD/CDROMs do not promote interaction between individuals at the institution and prospective students. However, few institutions used the other direct marketing tools, but they impacted several prospective students at one time (outreach programs and Saturday female visit days). More than one student was targeted with the institutions message at the same time during each of those events.

**Summary and Discussion of Research Question Two Findings**

Research question two asked: “Why have institutions chosen to use these recruitment strategies?” The three main categories that emerged from the institution’s spoken rationales were “informers and recipients,” “form a relationship,” and “a combination.”
The “informers and recipients” category can be described as women hosted events and women received the information being disseminated. Sixteen universities were classified as “informers and recipients.” The women who host the events (informers) do so with the intention of providing information and establishing relationships with the recipients (prospective students). The informers are most likely faculty, alumni, current students, or staff members who have a vested interest in enrolling these prospective students into the institution. Barletta’s research about how “women cherish warm, close relationships, take pride in being needed, want to make the world a better place, and enjoy being recognized for their efforts” (2003, pp. 77-78) corroborates with the “informers and recipients” category. Barletta (2003) and the “informers and recipients” category both focus on the way women formed relationships, took pride in being needed, tried to create a better place for people, and attempted to get recognition. While relationships are important, the true focus of life for women is people (Barletta, 2003).

The second category was “form a relationship.” The 10 institutions that were classified in this category explained that they built one-on-one relationships through various types of communications (phone calls to students, outreach programs, connected a student with a faculty member, and organized overnight visits). Barletta’s (2003) research provides insights into women’s thought processes. Women think very differently than men and relationships are very important to women in everything they do (Barletta, 2003). People are seen as ways to survive and make life a better way to live, rather than just part of everyday life (Barletta, 2003). Overnight visits were very successful. Faculty interaction with prospective female students was discussed by one institution who participated in this study. The importance of faculty interaction can also be found in
literature (Winzenburg, 2006). The research findings of this study confirmed findings from Barletta’s (2003) work.

The “a combination” category is a mix of the “provide a good first impression,” “form a relationship,” and “provide information” categories. Ten institutions were grouped in the “a combination” category. Six of the 10 responses used campus visits, which was classified as personal selling. Barletta’s research about how “women cherish warm, close relationships, take pride in being needed, want to make the world a better place, and enjoy being recognized for their efforts” (2003, pp. 77-78) corroborates with the “a combination” category. Barletta (2003) and the “a combination” category could be viewed as depicted in Table 6.

Table 6.

Institution-Derived Categories Related to Barletta’s Classifications of Women’s Motivations.

<table>
<thead>
<tr>
<th>Category</th>
<th>Barletta</th>
</tr>
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<tr>
<td>“form a relationship”</td>
<td>“cherish warm, close relationships”</td>
</tr>
<tr>
<td>“provide information”</td>
<td>&quot;take pride in being needed&quot;</td>
</tr>
<tr>
<td>“provide a good first impression”</td>
<td>&quot;want to make the world a better place&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;being recognized for their efforts&quot;</td>
</tr>
</tbody>
</table>

Barletta, 2003, pp. 77-78

The research findings of this study confirm findings from Barletta’s (2003) work. Campus visits were shown to establish relationships, provide information, and provide a good impression.

Summary and Discussion of Research Question Three Findings

Research question three asked: “How are these recruitment strategies structured to appeal to women?” Mentoring, female-focused financial aid, and prospective female
students visiting campus were the most prevalent specialized recruitment initiatives used by participating institutions. Research documents that the relationships prospective students developed with staff members at the universities are important. The individuals at the institutions help guide the students by assisting them: find a mentor, obtain financial aid, or attend a campus visit (Armario, 2012; Astin 1997; Cech et al., 2008; Coles & Blacknell, 2011; Gilman, 2006; Grandillo, 2010; Heller & Rasmussen, 2001; Huddleston, Jr., 2000; Keller, 1991; Kuh et al., 2006; Ocif & Marshall-Goodell, 1996; Swann, 1998; Trenor, 2007; Wilkins et al., 2006).

One of the specialized recruitment initiatives previously discussed was the Saturday female visit day designed by one particular institution. The Saturday event was designed around the needs and wants of women. The invitations, foods, and even the lanyards as takeaways were all designed with the prospective female students in mind. The lanyards were a sound marketing idea, because the prospective students had something with the university’s name on it to take back to their home town. This could induce word-of-mouth advertising (Kotler & Armstrong, 2010). This study corroborates Martha Barletta’s (2003) research about the ways women react to marketing messages. Barletta’s (2003) identified four important aspects (the four point star) that provide enough detail to get the receiver to the next level of communication with the advertiser (Barletta, 2003). First, bringing women into groups (first part of the star, social values). Second, appeal to women “multi-taskers” by doing a lot of interactive group Saturday visits. Third, think through all details because women notice them. Fourth, the way to communicate with women is through conversations that include personal rapport. Much of these aspects were found throughout other types of specialized recruitment strategies.
Kotler and Armstrong (2008) described the reaction of one-on-one relationships and the importance of these relationships when marketing a product or service. Kotler and Armstrong (2010) also describe how vital it is to create a relationship. The student will become attached to a university or program if a relationship can be established. This study found that each of the most prevalent specialized recruitment strategies involved the prospective student developing a strong relationship with the institution.

Although Kotler and Armstrong’s work has identified relationship building as an important aspect of marketing, this study adds a particular nuance to the aspect of relationship-building in the context of college and university recruitment. This study demonstrates that it is not only the relationship the prospective student builds with the administrator that is important; it is the relationship between the student and the whole university that is at the heart of recruitment. Indeed, prospective students develop a relationship with an individual at the school who would help guide the student through a given process (finding a mentor, obtaining financial aid, or attending a campus visit) (Armario, 2012; Astin 1997; Cech et al., 2008; Coles & Blacknall, 2011; Gilman, 2006; Grandillo, 2010; Heller & Rasmussen, 2001; Huddleston, Jr., 2000; Keller, 1991; Kuh et al., 2006; Ocif & Marshall-Goodell, 1996; Swann, 1998; Trenor, 2007). The importance of building relationships was best summarized by one university administrator as “any time current students talk to and relate to prospective students” (personal interview, December 12, 2011).

**Summary and Discussion of Research Question Four Findings**

“What types of recruitment strategies are more strongly related to an increase in female enrollment trends in engineering programs through the eyes of admissions
directors and engineering department administrators?” asked research question number four. The number one response of the admissions directors and engineering department administrators (7 out of 15 institutions that used female-focused strategies) was that prospective students visiting campus was the most effective strategy. Campus visits emerged as a prevalent recruitment strategy in the findings under research question one. Prospective students visiting campus also showed up as a significant part of the admissions directors and engineering department administrators’ opinion as most effective recruitment strategy, as seen in research question four. This result confirms prior research on unisex campus visits. Alexander Astin, a scholar of higher education, was quoted saying, “the campus visit is the single most important reason high school seniors chose their college” (Swann, 1998, p. 48). Campus visits are generally an easier recruitment tool because admissions counselors have the opportunity to walk around campus with prospective students (Gilman, 2006). During this time admissions counselors can introduce the prospective students and their parents to current students and faculty members within the student’s major as well as to financial aid counselors (Gilman, 2006). Once on campus, it is much easier for the admissions personnel to “sell” the university (Leupold, McCarthy, Smith, Stuart, & Klopman, 2006). The opportunity to showcase the institution directly and to establish a relationship with the prospective student are some of the reasons why so many of the admissions directors and engineering department administrators believed that campus visits were more strongly related to increases in female enrollment trends in engineering programs.
Summary and Discussion of Research Question Five Findings

Research question number five asked: “Is there a relationship between recruitment strategies and enrollment trends of female students pursuing undergraduate engineering degrees?” Correlational analysis was used to analyze the results of this research study. The research was not able to find any significant relationship between recruitment strategies and enrollment trends of female students pursuing undergraduate engineering degrees.

However, one interesting finding that emerged was that in the data collected, the relationships between enrollment trends and specialized recruitment strategies seemed to be negative. The results from the data analysis indicated, within the parameters of this study, that when specialized recruitment strategies were used, all institutions, except one, experienced an increase in enrollment. The institutions in this study that used more specialized recruitment strategies saw an increase in enrollment; the increase in enrollment was insignificant.

The chi-square analysis revealed that admissions directors and school of engineering administrators used specialized recruitment strategies frequently (see Table 4) and believed they were effective (see Table 5). Although the admissions directors and school of engineering administrators believe these strategies are beneficial, it is possible that technology and a changing generation could be in need of new recruitment strategies.

Implications for Research

Six of the 21 institutions participating in this study did not use any form of specialized recruitment strategies. This finding is alarming to the researcher considering the low enrollment of female undergraduates in engineering programs (13%) (National
Center for Education Statistics, 2009b). None of these six institutions had high numbers of women in their engineering programs as a justification for the lack of effort to utilize female-focused recruitment strategies. Amongst the institutions that utilized female-focused recruitment strategies, female enrollment varied and high numbers of women in some of these institutions did not seem to deter the institutions from employing specialized recruitment strategies geared for women. For example, one of these institutions had 51% women in their engineering programs yet still utilized specialized recruitment strategies to attract females into their engineering programs. The participating institution testimonials from this study demonstrate the importance of specialized recruitment strategies.

Considering the use of recruitment strategies in higher education from a marketing perspective, the study confirms major findings from prior research (Kotler & Fox, 1985). Within a business environment, the customer is the focal point and solidifying the relationship is the main objective for any company trying to do business, stay in business, and be profitable (Kotler & Armstrong, 2010). Marketing is a relatively new perspective to higher education (Kotler & Fox, 1985). Institutional marketing are the marketing activities utilized by colleges and universities to persuade prospective students to enroll (Kotler & Fox, 1985). The differences of institutional marketing in higher education are subtle, but because they are not focused on the customer, are significant. Higher education institutions do not always utilize marketing to its full capacity. The customer’s needs are less of a focal point than demonstrating what the institution has to offer (Kotler & Fox, 1985). Within higher education, the institution’s offerings are showcased and it is left up to the customer to translate the information (Kotler & Fox,
1985). Bringing an understanding of marketing approaches in higher education is one of the contributions to literature of this study.

Sales promotion, personal selling, public relations, and direct marketing were four out of five of the promotional categories identified in Kotler and Armstrong’s *Principles of Marketing* (2010), which were being used by the institutions that utilized specialized recruitment strategies to attract women into their engineering programs. Kotler identified the promotional categories based on the relationship between the way people make decisions about products and the relationship these consumers have with these products. In the case of the institutions of higher education, the methodology was to center the promotion category identifications around the way the institutions recruit to their institution (product), and the way prospective students (consumers) react to the recruitment strategies the institutions use. Considering recruitment strategies from a promotional category and marketing perspective, the study adds to literature by creating a link between Kotler and Armstrong’s promotional categories and specialized recruitment strategy usage and effectiveness.

The link between Kotler and Armstrong and Barletta’s work involves usage patterns of specialized recruitment strategies. Kotler and Armstrong are explicit in their description of how individuals use marketing materials to make decisions. Barletta looks at the usage of marketing materials from the female perspective. Kotler and Armstrong, and Barletta look at the marketing messages in similar ways, however Barletta adds the female deeper relationship-driven perspective. Barletta’s work both complemented and limited the study. The knowledge sought was an understanding of what recruitment strategies would be attractive to women who were looking into engineering degree
programs. The way Barletta complemented the research was to define what ways “The Star” looked at interactions from a women’s perspective. Barletta’s “Star” factor looked at how women view relationships and what aspects in life are important to them.

**Implications for Practice**

Little is known about the array of recruitment strategies being used by institutions of higher education. This study contributes to practice by providing admissions directors and engineering department administrators with insights on existing recruitment practices to better formulate their recruitment strategies to prospective female engineering students.

Institutions in the Great Lakes region can utilize some of the strategies identified by this study or perhaps create their own institution-specific specialized recruitment strategies. Several suggestions, outlined below, provide institutions with ways to implement programs that may benefit the university’s engineering programs.

The predominance of mentoring, female-focused financial aid, and prospective female students visiting campus as specialized recruitment strategies serves as an indication of best practices. Prospective students develop relationships with individuals at the institutions. The individuals at the institutions help guide the students by assisting them with finding a mentor, obtaining financial aid, or attending a campus visit. These relationships with people at the university are important when entering college, while in college, and even upon graduation (Coles & Blacknall, 2011; Huddleston, Jr., 2000; Keller, 1991). “The average tuition at a four-year public university climbed 15% between 2008 and 2010” (Armario, 2012, p. 1). This tuition increase is alarming and further
justifies the importance of relationships, mentoring, and financial aid programs in higher education.

**Limitations and Recommendations for Future Research**

One limitation of this study is that findings are based on information collected from admissions directors and school of engineering administrators. Thus, findings of the study are based on the perceptions, experiences, and knowledge of these groups of recruitment specialists, and do not necessarily encompass the expertise of other types of recruitment officers.

Another limitation is the findings can be applied to the institutions within the Great Lakes region sample and cannot be generalized. Moreover, conclusions from this study are also applicable to the studied institutions and cannot be generalized to all kinds of engineering schools.

The 81 engineering programs studied here were an array of programs identified within the Integrated Postsecondary Education Data System (IPEDS) definition of engineering undergraduate programs (Appendix A). Although every precaution was taken to ensure all engineering programs were included, the array of programs studied may not have included all majors that possibly exist.

The present study indicated the strong need for future research on enrollment strategies for women. A follow-up study with a larger sample size would help authenticate the information collected and would achieve significance in the correlations that were attempted. A larger sample size would increase the number of schools and allow more information to be collected.
Along with the larger sample size, a sample that is representative of a broader geographical area of institutions could also be used so that wider generalizations could be attempted. The current study researched the Great Lakes region. If a larger sample were to be undertaken, a broader geographic region could be represented in this sample, possibly the entire United States.

Future research can also focus on an important aspect related to recruitment strategies: the efficiency of marketing budgets. Some of the findings within this study and future studies could provide recruitment institutions with ideas and methods to utilize that will allow them to use their allotted marketing budgets more efficiently.

Future research can also focus on the star in Barletta’s work and on its components (social values, life/time factors, synthesizer dynamics, and communication keys) (Barletta, 2003). These components are meant to direct marketers to specific aspects when attempting to reach women. University recruiters can use the guiding components of the star to build lasting relationships with these women. Developing relationships can lead to enrollment, successful alumni relationships, mentoring, and role model opportunities.

Finally, future research can undertake to explore student or customer perceptions and how students will respond to the other components in Barletta’s model. There are four different components of the GenderTrends model: the star, the circle, the compass, and the spiral path. Each of these components is centered on the way in which women make decisions to purchase items and or services. In future research, the circle, the compass, and the spiral path could be further explored to see how they can effect women’s recruitment into engineering programs.
Conclusions

From 1876 when Elizabeth Bragg earned the first female civil engineering degree from the University of California at Berkeley (Layne, 2009) to 2009 when only 13% of the undergraduates enrolled in engineering programs were female (National Center for Education Statistics, 2009b), the road for females into engineering has not become much easier. The path to encouraging women to enter the engineering industry has not been an easy one to create. Institutions are working hard to establish relationships with females at younger ages in order to encourage increasing numbers of prospective students into engineering programs, and to bolster their self-confidence in the ability to achieve in engineering. Institutions are also encouraging women, once they have come to campus, by showing the programs the colleges offer (mentoring, living/learning communities, female-focused financial aid). The literature reveals that mentoring, living/learning communities, and female-focused financial aid work. According to the institutions that are using mentoring, living/learning communities, and female-focused financial aid, these strategies are creating benefits for women.

There also needs to be an intensive national push around women pursuing engineering degrees. Exxon Mobil has done a lot of advertising on television and has summer camps every year; however, more companies and people need to get involved in order for the message to resonate with the youth of today. If young women can begin to see the opportunities that exist in the field of engineering, then the opportunities will be available to women to explore once these women reach college age. The more women enroll and eventually graduate with engineering degrees, the more females will eventually enter the field of engineering. Women will, in turn, become role models and
mentors to those females entering the field of engineering, and the field will become a fuller, more diverse environment. Bringing more women into the field of engineering through innovative, relationship-driven recruitment strategies are important ways to open the path to engineering to women.
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Thomas, E. N. (2009). Between the lines: What predominantly white institutions say in their recruitment literature to attract minority students. (Master’s Thesis).


Appendix A

Engineering Degrees

<table>
<thead>
<tr>
<th>Engineering Degree</th>
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<tbody>
<tr>
<td>Aeronautical/Aerospace Engineering Technology/Technician</td>
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<tr>
<td>Aerospace, Aeronautical and Astronautical/Space Engineering</td>
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<tr>
<td>Agricultural Engineering</td>
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<tr>
<td>Architectural Engineering</td>
</tr>
<tr>
<td>Architectural Engineering Technology/Technician</td>
</tr>
<tr>
<td>Assistive/Augmentative Technology and Rehabilitation Engineering</td>
</tr>
<tr>
<td>Automotive Engineering Technology/Technician</td>
</tr>
<tr>
<td>Biochemical Engineering</td>
</tr>
<tr>
<td>Bioengineering and Biomedical Engineering</td>
</tr>
<tr>
<td>Biological/Biosystems Engineering</td>
</tr>
<tr>
<td>Ceramic Sciences and Engineering</td>
</tr>
<tr>
<td>Chemical and Biomolecular Engineering</td>
</tr>
<tr>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>Chemical Engineering Technology/Technician</td>
</tr>
<tr>
<td>Chemical Engineering, Other</td>
</tr>
<tr>
<td>Civil Drafting and Civil Engineering CAD/CADD</td>
</tr>
<tr>
<td>Civil Engineering Technology/Technician</td>
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<tr>
<td>Civil Engineering, General</td>
</tr>
<tr>
<td>Civil Engineering, Other</td>
</tr>
<tr>
<td>Combat Systems Engineering</td>
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<tr>
<td>Computer Engineering Technologies/Technicians, Other</td>
</tr>
<tr>
<td>Computer Engineering Technology/Technician</td>
</tr>
<tr>
<td>Computer Engineering, General</td>
</tr>
<tr>
<td>Computer Engineering, Other</td>
</tr>
<tr>
<td>Computer Hardware Engineering</td>
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<tr>
<td>Computer Software Engineering</td>
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<tr>
<td>Construction Engineering</td>
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<tr>
<td>Construction Engineering Technology/Technician</td>
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<tr>
<td>Drafting/Design Engineering Technologies/Technicians, Other</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering Technologies/Technicians, Other</td>
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<tr>
<td>Electrical, Electronic and Communications Engineering Technology/Technician</td>
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<tr>
<td>Electrical, Electronics and Communications Engineering, Other</td>
</tr>
<tr>
<td>Electromechanical Engineering</td>
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<tr>
<td>Electromechanical Technology/Electromechanical Engineering Technology</td>
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<tr>
<td>Engineering Acoustics</td>
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<tr>
<td>Engineering Chemistry</td>
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<tr>
<td>Engineering Design</td>
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<tr>
<td>Engineering Mechanics</td>
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<tr>
<td>Engineering Physics/Applied Physics</td>
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<tr>
<td>Engineering Science</td>
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<td>Engineering Degree</td>
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<tr>
<td>-----------------------------------------------------------------------------------</td>
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<td><strong>Engineering Technologies and Engineering-Related Fields, Other</strong></td>
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<td><strong>Engineering, General</strong></td>
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<td><strong>Engineering, Other</strong></td>
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<td><strong>Engineering/Industrial Management</strong></td>
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<tr>
<td><strong>Engineering-Related Fields, Other</strong></td>
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<td><strong>Engineering-Related Technologies, Other</strong></td>
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<td><strong>Environmental Engineering Technology/Environmental Technology</strong></td>
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<td><strong>Environmental/Environmental Health Engineering</strong></td>
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<tr>
<td><strong>Forest Engineering</strong></td>
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<tr>
<td><strong>Geological/Geophysical Engineering</strong></td>
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<tr>
<td><strong>Geotechnical and Geoenvironmental Engineering</strong></td>
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<tr>
<td><strong>Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician</strong></td>
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<tr>
<td><strong>Industrial Engineering</strong></td>
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<tr>
<td><strong>Laser and Optical Engineering</strong></td>
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<tr>
<td><strong>Manufacturing Engineering</strong></td>
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<td><strong>Manufacturing Engineering Technology/Technician</strong></td>
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<tr>
<td><strong>Materials Engineering</strong></td>
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<td><strong>Mechanical Engineering</strong></td>
</tr>
<tr>
<td><strong>Mechanical Engineering Related Technologies/Technicians, Other</strong></td>
</tr>
<tr>
<td><strong>Mechanical Engineering/Mechanical Technology/Technician</strong></td>
</tr>
<tr>
<td><strong>Mechatronics, Robotics, and Automation Engineering</strong></td>
</tr>
<tr>
<td><strong>Metallurgical Engineering</strong></td>
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<tr>
<td><strong>Mining and Mineral Engineering</strong></td>
</tr>
<tr>
<td><strong>Naval Architecture and Marine Engineering</strong></td>
</tr>
<tr>
<td><strong>Nuclear Engineering</strong></td>
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<tr>
<td><strong>Nuclear Engineering Technology/Technician</strong></td>
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<tr>
<td><strong>Ocean Engineering</strong></td>
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<tr>
<td><strong>Paper Science and Engineering</strong></td>
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<tr>
<td><strong>Petroleum Engineering</strong></td>
</tr>
<tr>
<td><strong>Plastics and Polymer Engineering Technology/Technician</strong></td>
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<td><strong>Polymer/Plastics Engineering</strong></td>
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<td><strong>Pre-Engineering</strong></td>
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<tr>
<td><strong>Surveying Engineering</strong></td>
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<td><strong>Systems Engineering</strong></td>
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<tr>
<td><strong>Telecommunications Engineering</strong></td>
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<tr>
<td><strong>Textile Sciences and Engineering</strong></td>
</tr>
<tr>
<td><strong>Transportation and Highway Engineering</strong></td>
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<tr>
<td><strong>Water Resources Engineering</strong></td>
</tr>
<tr>
<td><strong>Welding Engineering Technology/Technician</strong></td>
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</table>

Note. Adapted from [http://nces.ed.gov/collegenavigator/?s=IL+IN+MI+OH+WI&p=14+15&l=5&ct=1+2&ex=10000&hs=1](http://nces.ed.gov/collegenavigator/?s=IL+IN+MI+OH+WI&p=14+15&l=5&ct=1+2&ex=10000&hs=1)
### Appendix B

#### Colleges and Universities Studied

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<tr>
<th>Name</th>
<th>Address</th>
<th>General information</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrews University</td>
<td>Berrien Springs, Michigan 49104</td>
<td>(800) 253-2874</td>
<td><a href="http://www.andrews.edu">www.andrews.edu</a></td>
</tr>
<tr>
<td>Benedictine University</td>
<td>5700 College Rd, Lisle, Illinois 60532-0900</td>
<td>(630) 829-6000</td>
<td><a href="http://www.ben.edu">www.ben.edu</a></td>
</tr>
<tr>
<td>Bradley University</td>
<td>1501 W Bradley Ave, Peoria, Illinois 61625-0001</td>
<td>(309) 676-7611</td>
<td><a href="http://www.bradley.edu">www.bradley.edu</a></td>
</tr>
<tr>
<td>Calvin College</td>
<td>3201 Burton SE, Grand Rapids, Michigan 49546</td>
<td>(616) 526-6000</td>
<td><a href="http://www.calvin.edu">www.calvin.edu</a></td>
</tr>
<tr>
<td>Case Western Reserve University</td>
<td>10900 Euclid Ave, Cleveland, Ohio 44106</td>
<td>(216) 368-2000</td>
<td><a href="http://www.case.edu">www.case.edu</a></td>
</tr>
<tr>
<td>Cedarville University</td>
<td>251 N. Main Street, Cedarville, Ohio 45314-0601</td>
<td>(937) 766-2211</td>
<td><a href="http://www.cedarville.edu">www.cedarville.edu</a></td>
</tr>
<tr>
<td>Central State University</td>
<td>1400 Brush Row Rd, Wilberforce, Ohio 45384-1004</td>
<td>(937) 376-6011</td>
<td><a href="http://www.centralstate.edu">www.centralstate.edu</a></td>
</tr>
<tr>
<td>Hope College</td>
<td>141 E 12th St, Holland, Michigan 49423</td>
<td>(616) 395-7000</td>
<td><a href="http://www.hope.edu">www.hope.edu</a></td>
</tr>
<tr>
<td>Illinois Institute of Technology</td>
<td>3300 S Federal St, Chicago, Illinois 60616</td>
<td>(312) 567-3000</td>
<td><a href="http://www.iit.edu">www.iit.edu</a></td>
</tr>
<tr>
<td>Indiana Institute of Technology</td>
<td>1600 E Washington Blvd, Fort Wayne, Indiana 46803-1228</td>
<td>(800) 937-2448</td>
<td><a href="http://www.indianatech.edu">www.indianatech.edu</a></td>
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<tr>
<td>Indiana State University</td>
<td>210 N 7th St, Terre Haute, Indiana 47809</td>
<td>(812) 237-6311</td>
<td><a href="http://www.indstate.edu">www.indstate.edu</a></td>
</tr>
<tr>
<td>John Carroll University</td>
<td>20700 North Park Blvd, University Heights, Ohio 44118-4581</td>
<td>(216) 397-1886</td>
<td><a href="http://www.jcu.edu">www.jcu.edu</a></td>
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<tr>
<td>Kettering University</td>
<td>1700 University Avenue, Flint, Michigan 48504-6214</td>
<td>(800) 955-4464</td>
<td><a href="http://WWW.KETTERING.EDU">WWW.KETTERING.EDU</a></td>
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<tr>
<td>Lake Superior State University</td>
<td>650 W Easterday Ave, Sault Ste Marie, Michigan 49783</td>
<td>(906) 632-6841</td>
<td><a href="http://www.lssu.edu">www.lssu.edu</a></td>
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<td>Lawrence Technological University</td>
<td>21000 West Ten Mile Road, Southfield, Michigan 48075-1058</td>
<td>(248) 204-4000</td>
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<td>Madonna University</td>
<td>36600 Schoolcraft Rd, Livonia, Michigan 48150-1176</td>
<td>(734) 432-5300</td>
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<td>Marietta College</td>
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<td>(414) 288-7710</td>
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<tr>
<td>Michigan Technological University</td>
<td>1400 Townsend Drive, Houghton, Michigan 49931-1295</td>
<td>(906) 487-1885</td>
<td><a href="http://www.mtu.edu">www.mtu.edu</a></td>
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<tr>
<td>Milwaukee School of Engineering</td>
<td>1025 N Broadway, Milwaukee, Wisconsin 53202-3109</td>
<td>(800) 332-6763</td>
<td><a href="http://www.msoe.edu">www.msoe.edu</a></td>
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<td>Northern Michigan University</td>
<td>1401 Presque Isle Avenue, Marquette, Michigan 49855</td>
<td>(906) 227-1000</td>
<td><a href="http://www.nmu.edu">www.nmu.edu</a></td>
</tr>
<tr>
<td>Northland College</td>
<td>1411 Ellis Avenue, Ashland, Wisconsin 54806-3999</td>
<td>(715) 682-1699</td>
<td><a href="http://www.northland.edu">www.northland.edu</a></td>
</tr>
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<td>Northwestern University</td>
<td>633 Clark St, Evanston, Illinois 60208</td>
<td>(847) 491-3741</td>
<td><a href="http://www.northwestern.edu">www.northwestern.edu</a></td>
</tr>
<tr>
<td>Oberlin College</td>
<td>70 N Professor St, Oberlin, Ohio 44074</td>
<td>(440) 775-8411</td>
<td><a href="http://www.oberlin.edu">www.oberlin.edu</a></td>
</tr>
<tr>
<td>Ohio Northern University</td>
<td>525 S. Main St, Ada, Ohio 45810-1599</td>
<td>(419) 772-2000</td>
<td><a href="http://www.onu.edu">www.onu.edu</a></td>
</tr>
<tr>
<td>Olivet Nazarene University</td>
<td>One University Avenue, Bourbonnais, Illinois 60914-2271</td>
<td>(815) 939-5011</td>
<td><a href="http://www.olivet.edu">www.olivet.edu</a></td>
</tr>
<tr>
<td>Purdue University-Calumet Campus</td>
<td>2200 169th St, Hammond, Indiana 46323-2094</td>
<td>(219) 989-2400</td>
<td><a href="http://www.calumet.purdue.edu">www.calumet.purdue.edu</a></td>
</tr>
<tr>
<td>Roosevelt University</td>
<td>430 S Michigan Ave, Chicago, Illinois 60605-1394</td>
<td>(312) 341-3500</td>
<td><a href="http://www.roosevelt.edu">www.roosevelt.edu</a></td>
</tr>
<tr>
<td>Rose-Hulman Institute of Technology</td>
<td>5500 Wabash Avenue, Terre Haute, Indiana 47803-3999</td>
<td>(812) 877-1511</td>
<td><a href="http://www.rose-hulman.edu">www.rose-hulman.edu</a></td>
</tr>
<tr>
<td>Saginaw Valley State University</td>
<td>7400 Bay Rd, University Center, Michigan 48710</td>
<td>(989) 964-4000</td>
<td><a href="http://www.svsu.edu">www.svsu.edu</a></td>
</tr>
<tr>
<td>Shawnee State University</td>
<td>940 Second St, Portsmouth, Ohio 45662</td>
<td>(740) 354-3205</td>
<td><a href="http://WWW.SHAWNEE.EDU">WWW.SHAWNEE.EDU</a></td>
</tr>
<tr>
<td>Siena Heights University</td>
<td>1247 E. Siena Heights Dr, Adrian, Michigan 49221</td>
<td>(517) 263-0731</td>
<td><a href="http://www.sienaheights.edu">www.sienaheights.edu</a></td>
</tr>
<tr>
<td>Taylor University</td>
<td>236 W Reade Ave, Upland, Indiana 46989-1001</td>
<td>(765) 998-2751</td>
<td><a href="http://www.taylor.edu">www.taylor.edu</a></td>
</tr>
<tr>
<td>The University of Findlay</td>
<td>1000 N Main St, Findlay, Ohio 45840-3653</td>
<td>(419) 422-8313</td>
<td><a href="http://www.findlay.edu">www.findlay.edu</a></td>
</tr>
<tr>
<td>Trine University</td>
<td>1 University Ave, Angola, Indiana 46703-1764</td>
<td>(260) 665-4100</td>
<td><a href="http://www.trine.edu">www.trine.edu</a></td>
</tr>
<tr>
<td>University of Dayton</td>
<td>300 College Park, Dayton, Ohio 45469</td>
<td>(937) 229-1000</td>
<td><a href="http://www.udayton.edu">www.udayton.edu</a></td>
</tr>
<tr>
<td>University of Detroit Mercy</td>
<td>4001 W McNichols Rd, Detroit, Michigan 48221-3038</td>
<td>(313) 993-1000</td>
<td><a href="http://www.udmercy.edu">www.udmercy.edu</a></td>
</tr>
<tr>
<td>University of Evansville</td>
<td>1800 Lincoln Avenue, Evansville, Indiana 47722</td>
<td>(812) 488-2000</td>
<td><a href="http://www.evansville.edu">www.evansville.edu</a></td>
</tr>
<tr>
<td>University of Michigan-Flint</td>
<td>303 E Kearsley, Flint, Michigan 48502-1950</td>
<td>(810) 762-3000</td>
<td><a href="http://www.umflint.edu">www.umflint.edu</a></td>
</tr>
<tr>
<td>University of Notre Dame</td>
<td>Notre Dame, Indiana 46556</td>
<td>(574) 631-5000</td>
<td><a href="http://www.nd.edu">www.nd.edu</a></td>
</tr>
<tr>
<td>University of Rio Grande</td>
<td>218 N College Ave, Rio Grande, Ohio 45674</td>
<td>(740) 245-7206</td>
<td><a href="http://www.rio.edu">www.rio.edu</a></td>
</tr>
<tr>
<td>University of Southern Indiana</td>
<td>8600 University Blvd, Evansville, Indiana 47712</td>
<td>(812) 464-8600</td>
<td><a href="http://www.usi.edu">www.usi.edu</a></td>
</tr>
<tr>
<td>University of Wisconsin-Platteville</td>
<td>1 University Plz, Platteville, Wisconsin 53818-3001</td>
<td>(608) 342-1421</td>
<td><a href="http://www.uwplatt.edu">www.uwplatt.edu</a></td>
</tr>
<tr>
<td>University of Wisconsin-Stevens Point</td>
<td>2100 Main St, Stevens Point, Wisconsin 54481</td>
<td>(715) 346-4301</td>
<td><a href="http://www.uwsp.edu">www.uwsp.edu</a></td>
</tr>
<tr>
<td>University of Wisconsin-Stout</td>
<td>712 S. Broadway St., Menomonie, Wisconsin 54751</td>
<td>(715) 232-1431</td>
<td><a href="http://www.uwstout.edu">www.uwstout.edu</a></td>
</tr>
<tr>
<td>University of Wisconsin-Whitewater</td>
<td>800 W Main St, Whitewater, Wisconsin 53190-1790</td>
<td>(262) 472-1234</td>
<td><a href="http://www.uww.edu">www.uww.edu</a></td>
</tr>
<tr>
<td>Valparaiso University</td>
<td>US Highway 30 and Sturdy Road, Valparaiso, Indiana 46383</td>
<td>(219) 464-5000</td>
<td><a href="http://www.valpo.edu">www.valpo.edu</a></td>
</tr>
<tr>
<td>Wilberforce University</td>
<td>1055 N Bickett Rd, Wilberforce, Ohio 45384-1001</td>
<td>(937) 376-2911</td>
<td><a href="http://www.wilberforce.edu">www.wilberforce.edu</a></td>
</tr>
</tbody>
</table>

Note. Adapted from
### Appendix C

#### Sample Correlation Table

| Record Number | m/Websites | m/TV | m/Fraud | m/Phone | m/Visiting campus | m/Visiting hs's | m/College | m/College Facebook | m/Letters | m/DVD/CDROMs | m/Social Media | m/New/ Bottlenecks | m/New/ PR | f/Websites | f/TV | f/Fraud | f/Phone | f/Visiting campus | f/Visiting hs's | f/College | f/College Facebook | f/Letters | f/DVD/CDROMs | f/Social Media | f/New/ Bottlenecks | f/New/ PR | 2005 Total Enrollment | 2010 Total Enrollment | % change | 2005 Female Enrollment in Engineering Programs | 2010 Female Enrollment in Engineering Programs | % change |
|---------------|------------|------|---------|---------|------------------|----------------|---------|---------------------|---------|--------------|----------------|---------------------|----------|-----------|-----|--------|---------|-------------------|----------------|---------|---------------------|---------|--------------|----------------|---------------------|----------|----------------|----------------|--------------------------------|--------------------------------|---------|
|               |            |      |         |         |                  |                |         |                      |         |              |                |                      |          |           |     |        |         |                   |                |         |                      |         |              |                |                      |          |               |               |                                      |                                      |         |
Appendix D
Questionnaire Guide

What is your role with regard to recruiting engineering students?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What recruitment strategies have you used within the past 5 years to recruit students into your engineering programs?

<table>
<thead>
<tr>
<th>Media</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Websites</td>
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</tr>
<tr>
<td>TV advertising</td>
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</tr>
<tr>
<td>Financial aid</td>
<td></td>
</tr>
<tr>
<td>Phone calls to prospective students</td>
<td></td>
</tr>
<tr>
<td>Prospective students visiting campus</td>
<td></td>
</tr>
<tr>
<td>Colleges visiting high schools</td>
<td></td>
</tr>
<tr>
<td>College fairs hosted by colleges</td>
<td></td>
</tr>
<tr>
<td>Marketing to high school personnel</td>
<td></td>
</tr>
<tr>
<td>Marketing to parents</td>
<td></td>
</tr>
<tr>
<td>College catalogs/Viewbooks</td>
<td></td>
</tr>
<tr>
<td>Letters to prospective students</td>
<td></td>
</tr>
<tr>
<td>DVDs/CDROMs</td>
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</tr>
<tr>
<td>Social Media (Facebook, Twitter, My Space)</td>
<td></td>
</tr>
<tr>
<td>News broadcasts/PR</td>
<td></td>
</tr>
<tr>
<td>others (please describe):</td>
<td></td>
</tr>
</tbody>
</table>

________________________________________________________________________

Which of the ones mentioned above have you adapted to be specifically directed to attract women into your engineering program?

A) __________________________________________

Why?
________________________________________________________________________
________________________________________________________________________

How was it used differently?
________________________________________________________________________
________________________________________________________________________

How often did/are you using them?
_____ Never
_____ Sporadically/rarely (1x/2 years)
_____ Somewhat regularly (2x/year)
How often did/are you using them?

- Never
- Sporadically/rarely (1x/2 years)
- Somewhat regularly (2x/year)
- Regularly (1x/yr)
- Often (more than 1x/semester)
- Very often (1x+/month)

How effective do you think they are?

- Not at all effective
- Moderately ineffective
- Neither effective nor ineffective
- Moderately effective
- Very effective

B) ________________________________
Why?
________________________________________________________________________
________________________________________________________________________

How was it used differently?
________________________________________________________________________
________________________________________________________________________

How often did/are you using them?

- Never
- Sporadically/rarely (1x/2 years)
- Somewhat regularly (2x/year)
- Regularly (1x/yr)
- Often (more than 1x/semester)
- Very often (1x+/month)

How effective do you think they are?

- Not at all effective
- Moderately ineffective
- Neither effective nor ineffective
- Moderately effective
- Very effective

C) _______________________________________________________________________
Why?
________________________________________________________________________
________________________________________________________________________
How was it used differently?

________________________________________________________________________

________________________________________________________________________

How often did/are you using them?

_____ Never
_____ Sporadically/rarely (1x/2 years)
_____ Somewhat regularly (2x/year)
_____ Regularly (1x/yr)
_____ Often (more than 1x/semester)
_____ Very often (1x+/month)

How effective do you think they are?

_____ Not at all effective
_____ Moderately ineffective
_____ Neither effective nor ineffective
_____ Moderately effective
_____ Very effective

Which of the following have you implemented as new programs directed towards women to entice them into your engineering programs?
Mentoring
Why?

________________________________________________________________________

________________________________________________________________________

How was it used differently?

________________________________________________________________________

How often did/are you using them?

_____ Never
_____ Sporadically/rarely (1x/2 years)
_____ Somewhat regularly (2x/year)
_____ Regularly (1x/yr)
_____ Often (more than 1x/semester)
_____ Very often (1x+/month)

How effective do you think they are?

_____ Not at all effective
_____ Moderately ineffective
Neither effective nor ineffective
Moderately effective
Very effective

Learning Communities
Why?

How was it used differently?

How often did/are you using them?
Never
Sporadically/rarely (1x/2 years)
Somewhat regularly (2x/year)
Regularly (1x/yr)
Often (more than 1x/semester)
Very often (1x+/month)

How effective do you think they are?
Not at all effective
Moderately ineffective
Neither effective nor ineffective
Moderately effective
Very effective

Living Communities
Why?

How was it used differently?

How often did/are you using them?
Never
Sporadically/rarely (1x/2 years)
Somewhat regularly (2x/year)
Regularly (1x/yr)
Often (more than 1x/semester)
Very often (1x+/month)
How effective do you think they are?
_____ Not at all effective
_____ Moderately ineffective
_____ Neither effective nor ineffective
_____ Moderately effective
_____ Very effective

Female-focused Financial Aid
Why?
________________________________________________________________________
________________________________________________________________________
How was it used differently?
________________________________________________________________________
________________________________________________________________________
How often did/are you using them?
_____ Never
_____ Sporadically/rarely (1x/2 years)
_____ Somewhat regularly (2x/year)
_____ Regularly (1x/yr)
_____ Often (more than 1x/semester)
_____ Very often (1x+/month)

How effective do you think they are?
_____ Not at all effective
_____ Moderately ineffective
_____ Neither effective nor ineffective
_____ Moderately effective
_____ Very effective

Others (please describe):
________________________________________________________________________
________________________________________________________________________
Why?
________________________________________________________________________
________________________________________________________________________
How was it used differently?
________________________________________________________________________
________________________________________________________________________
How often did/are you using them?
_____ Never
_____ Sporadically/rarely (1x/2 years)
_____ Somewhat regularly (2x/year)
_____ Regularly (1x/yr)
_____ Often (more than 1x/semester)
_____ Very often (1x+/month)

How effective do you think they are?
_____ Not at all effective
_____ Moderately ineffective
_____ Neither effective nor ineffective
_____ Moderately effective
_____ Very effective
Please rank the top 3 most effective and the bottom 1 recruitment strategies.

<table>
<thead>
<tr>
<th>Used</th>
<th>Media</th>
<th>Rank</th>
</tr>
</thead>
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<tr>
<td>☐</td>
<td>Websites</td>
<td></td>
</tr>
<tr>
<td>☐</td>
<td>TV advertising</td>
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<tr>
<td>☐</td>
<td>Financial aid</td>
<td></td>
</tr>
<tr>
<td>☐</td>
<td>Phone calls to prospective students</td>
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<td>☐</td>
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<td>College fairs hosted by colleges</td>
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<tr>
<td>☐</td>
<td>Marketing to high school personnel</td>
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</tr>
<tr>
<td>☐</td>
<td>Marketing to parents</td>
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<td>☐</td>
<td>College catalogs/Viewbooks</td>
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<td>☐</td>
<td>Letters to prospective students</td>
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<td>☐</td>
<td>DVDs/CDROMs</td>
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<td>Social Media (Facebook, Twitter, My Space)</td>
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</tr>
<tr>
<td>☐</td>
<td>News broadcasts/PR</td>
<td></td>
</tr>
</tbody>
</table>

What is your overall enrollment strategy for women? Is it long-term (vs. short-term); integrated (vs. stand-alone); continuous (vs. ad-hoc); goal-setting (vs. just recruit as many as possible)?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
In your opinion, which recruitment strategies do you believe are most strongly related to increases in female enrollment of engineering programs at your institution?

<table>
<thead>
<tr>
<th>Used Media</th>
<th>Strongly Related?</th>
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<td>Websites</td>
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<td>News broadcasts/PR</td>
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<tr>
<td>Mentoring</td>
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<tr>
<td>Learning Communities</td>
<td></td>
</tr>
<tr>
<td>Living Communities</td>
<td></td>
</tr>
</tbody>
</table>

Others (please describe):

________________________________________________________________________
________________________________________________________________________

To be filled out by interviewer

University _____________________________________________________________
Address _____________________________________________________________
City/State/Zip________________________________________________________
Email ________________________________________________________________
Phone # ______________________________________________________________
Respondent’s name ___________________________________________________
Respondent’s title at the university ___________________________________