

January 2011

# Investigating the Role of the Internet in Women and Minority STEM Participation: A Case Study of Two Florida Engineering Programs

Arland Nguema Ndong

University of South Florida, [angueman@usf.edu](mailto:angueman@usf.edu)

Follow this and additional works at: <http://scholarcommons.usf.edu/etd>

 Part of the [American Studies Commons](#), [Engineering Commons](#), [Higher Education and Teaching Commons](#), and the [Other Computer Sciences Commons](#)

## Scholar Commons Citation

Nguema Ndong, Arland, "Investigating the Role of the Internet in Women and Minority STEM Participation: A Case Study of Two Florida Engineering Programs" (2011). *Graduate Theses and Dissertations*.  
<http://scholarcommons.usf.edu/etd/3734>

This Dissertation is brought to you for free and open access by the Graduate School at Scholar Commons. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact [scholarcommons@usf.edu](mailto:scholarcommons@usf.edu).

Investigating the Role of the Internet in Women and Minority STEM

Participation: A Case Study of Two Florida Engineering Programs

by

Arland Nguema Ndong

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
Department of Anthropology  
College of Arts and Sciences  
University of South Florida

Major Professor: Kathryn M. Borman, Ph.D.  
Antoinette T. Jackson, Ph.D.  
Jacqueline H. Messing, Ph.D.  
Donald Dellow, Ph.D.  
Maya A. Trotz, Ph.D.

Date of Approval:  
November 2, 2011

Keywords: higher education, STEM recruitment and retention, race, gender, Websites

Copyright© 2011, Arland Nguema Ndong

## DEDICATION

I dedicate this dissertation to my wife, Sidonie, and to our three lovely children, Lizzie, Lindsay, and Lucas Elijah. Having all four of you by my side during the course of this endeavor has taught me that writing a dissertation is a must-be-love moment. I could not have done it without you.

The support of family members and friends in the U.S. and around the world cannot be overlooked. All of you have been a part of this effort to remind me that it is the journey – not the destination – that matters.

## ACKNOWLEDGMENTS

I am grateful to my major professor, Dr. Kathryn M. Borman, and to all the members – past and present – of the Alliance for Applied Research in Education and Anthropology (AAREA) for their financial, material, and emotional support.

I am also grateful to all of those who have worked relentlessly to provide insightful feedback on the progress of this work. I would, particularly, like to acknowledge all of the members of my doctoral dissertation committee as well as the Review Committee of the National Science Foundation's Doctoral Dissertation Improvement Grant.

## TABLE OF CONTENTS

List of Tables .....	iii
List of Figures .....	v
Abstract .....	viii
Chapter One: Introduction .....	1
1.1 Statement of the Research Problem .....	1
1.2 Concepts Operationalization .....	19
1.3 Context (Research Sites) .....	28
1.4 The Internet from an Anthropological Perspective .....	37
1.5 Chapters Organization .....	46
Chapter Two: Background .....	49
2.1 Core Anthropological Concepts .....	49
2.2 Anthropology, Higher Education, and Issues in STEM Fields .....	58
2.3 Anthropology and Online Communities .....	62
2.4 Higher Education, the Internet Revolution, and Internet Marketing .....	63
Chapter Three: Method .....	71
3.1 Research Design .....	71
3.1.1 Samples .....	75
3.1.1.1 Reflections from the Field .....	81
3.1.1.2 The Initial Sample .....	83
3.1.1.3 The Incremental Sample .....	85
3.1.1.4 Creating the USF Sample .....	85
3.1.1.5 Creating the UF Sample .....	94
3.2 Data Collection Techniques .....	102
3.2.1 Focus Groups .....	103
3.2.2 Structured In-depth Interviews .....	104
3.2.3 Demographic Information Sheets .....	105
3.2.4 Content Analysis of Websites .....	106
Chapter Four: Findings .....	109
4.1 Guiding Approach .....	109
4.1.1 Cultural Reproduction Theories .....	111
4.1.2 Public Relations Theories .....	114
4.2 Major Themes .....	117
4.2.1 Internet Marketing .....	119

4.2.1.1 Internal and External Communications .....	120
4.2.1.2 Global Outreach .....	123
4.2.2 Usefulness of Information.....	139
4.2.2.1 Program of Study Data.....	141
4.2.2.2 Day-to-Day Information Needs .....	146
4.2.3 Climate and Websites .....	153
4.2.3.1 Gender Issues .....	156
4.2.3.2 Race and Ethnicity .....	163
Chapter Five: Discussion .....	175
5.1 Marketing Engineering Programs Online .....	175
5.2 Relevance of Web-based Information .....	182
5.3 Engineering School Climate and Websites.....	187
Chapter Six: Recommendations.....	196
6.1 The Streamline Approach .....	196
6.1.1 Intentionality .....	199
6.1.2 Organization.....	200
6.1.3 Consistency .....	201
6.2 Limitations .....	206
6.3 Implications for Policy and Practice .....	208
6.4 Ethical Concerns .....	211
6.5 Future Research .....	213
Chapter Seven: Conclusion.....	216
7.1 How Theory Informs the Research Questions .....	216
7.2 Summary of Findings and Inferences .....	217
References .....	226
Appendix A: Student Focus Group Protocol .....	251
Appendix B: Faculty Interview Protocol .....	252
Appendix C: Administrator Interview Protocol.....	253

## LIST OF TABLES

Table 3.1: Number of Visits per University Websites Monitored .....	72
Table 3.2: USF Pre-Civil Engineering Undergraduates by Academic Level and by Race and Ethnicity .....	78
Table 3.3: USF Pre-Civil Engineering Undergraduates by Academic Level and by Gender .....	79
Table 3.4: UF Civil Engineering Undergraduates by Gender and by Race and Ethnicity .....	79
Table 3.5: Study Respondents by University and by Race and Ethnicity .....	84
Table 3.6: Study Respondents by University and by Gender .....	84
Table 3.7: USF Pre-Civil Engineering Students by Race and Ethnicity and by Gender .....	91
Table 3.8: USF Civil Engineering Professors by Race and Ethnicity and by Gender .....	92
Table 3.9: USF Administrators by Race and Ethnicity and by Gender .....	93
Table 3.10: UF Civil Engineering Undergraduate Students by Race and Ethnicity and by Gender .....	97

Table 3.11: UF Civil Engineering Professors by Race and  
Ethnicity and by Gender .....99

Table 3.12: UF Administrators by Race and Ethnicity and by Gender .....99

## LIST OF FIGURES

Figure 3.1: Engineering Building II, University of South Florida. Hall of Flags a.k.a “Fish Bowl” .....	86
Figure 3.2: Students of the Society of Hispanic Professional Engineers showcase in the “Fish Bowl” .....	90
Figure 3.3: Principal Investigator “hanging out” in Weil Hall during the course of fieldwork .....	95
Figure 3.4: Engineering students engaged in hands-on activities. Poster on display in Weil Hall .....	96
Figure 3.5: Distribution of Respondents by Race and Ethnicity and by University.....	101
Figure 3.6: Distribution of Respondents by Gender and by University.....	101
Figure 4.1: Responses for Use of Websites as Marketing Tools by University.....	120
Figure 4.2: USF College of Engineering’s old homepage .....	124
Figure 4.3: USF College of Engineering’s updated homepage .....	125
Figure 4.4: UF Department of Civil and Coastal Engineering’s homepage .....	130

Figure 4.5: USF Department of Civil and Environmental Engineering's old homepage .....	134
Figure 4.6: USF Department of Civil and Environmental Engineering's updated homepage .....	134
Figure 4.7: Responses for Websites as Information Providers by University.....	140
Figure 4.8: UF Department of Civil and Coastal Engineering elective courses Web page .....	143
Figure 4.9: Responses for Use of Websites for Civil Engineering Program Selection by University .....	145
Figure 4.10: UF College of Engineering admissions Web page.....	147
Figure 4.11: Responses for Websites as Diversity Promoters by University.....	154
Figure 4.12: UF College of Engineering Web page showcasing the first female Engineering Dean at UF .....	158
Figure 4.13: USF College of Engineering Web page showcasing an award winning female engineering professor .....	159
Figure 4.14: Poster supporting women educators in engineering in the University of Florida Civil and Coastal Engineering Department's hallways.....	162
Figure 4.15: UF CCE minority undergraduate students doing fieldwork.....	168
Figure 4.16: USF CEE undergraduate student featured on 'USF Profiles' for his outstanding work.....	169

Figure 4.17: USF College of Engineering homepage showcasing minority civil engineering students and professors .....170

Figure 6.1: Streamline Model of Student Recruitment and Retention.....199

## ABSTRACT

Despite our awareness of the fascination modern humans have with the Internet, little is known about how and why colleges and universities create and maintain Websites. At the most general level, in this case study, I hypothesize that university Websites serve as communication and marketing tools in attracting students. At the most specific level, I postulate that civil engineering programs with Web pages depicting images of women and minorities would be more successful in recruiting and retaining women and students of color than civil engineering programs with Web pages displaying fewer or no images of women and minorities. The primary goal of this case study was to examine the relationships between Website information content and the recruitment and retention of women and minority pre-civil engineering students. The second, but equally important, goal was to investigate the reason(s) why, despite efforts to recruit and retain individuals from disenfranchised populations into STEM majors, students from these groups not only remain underrepresented in engineering, but leave this discipline at a much higher rate than their non-minority male counterparts. This case study focused on two Florida state university civil engineering programs and drew on ethnographic research methods. I used interviews, focus groups, Web pages, demographic sheets, and observations to examine the relationships between Website content and access to undergraduate civil engineering programs for women and students of color. The study sample involved 40 respondents, including pre-civil engineering students, civil engineering professors, and university administrators. Research findings suggested that

Internet marketing has become a key strategy used by civil engineering programs in recruiting and retaining students from underrepresented groups. Additionally, the study revealed that both prospective and pre-civil engineering students use departmental Websites for communication and enrollment purposes. Last, but certainly not least, the study found that online climate is a significant factor in the recruitment and retention of women and students of color in civil engineering programs.

## CHAPTER ONE: INTRODUCTION

### 1.1 STATEMENT OF THE RESEARCH PROBLEM

This study is both an educational anthropology and media anthropology project mixing research techniques of traditional ethnography with Website content analysis methods to provide a critical, in-depth understanding of problems of access to engineering schools, especially for students from historically underserved groups. In this study, I was primarily interested in examining the relationships between Website information content and the recruitment and retention of pre-engineering or undergraduate students who declared a major in civil engineering. I gave special attention to women as well as racial and ethnic minority students' applications and enrollment patterns in the University of South Florida (USF) and the University of Florida (UF). Within these institutions, I focused on the Department of Civil and Environmental Engineering (CEE) and the Department of Civil and Coastal Engineering (CCE)<sup>1</sup>. I was equally interested in knowing the reason(s) why, despite efforts to recruit and retain individuals from disenfranchised populations into STEM<sup>2</sup> majors, students from these groups not only remain underrepresented in engineering, but leave this discipline at a much higher rate than their non-minority male counterparts. The extent to which

---

<sup>1</sup> It must be noted that as of fall of 2011, the Department of Civil and Coastal Engineering at the University of Florida no longer exists as an independently run academic department. The Department of Civil and Coastal Engineering and the Department of Environmental Engineering Sciences (EES) have now become a joint program to be housed in the first school within the UF College of Engineering, the Engineering School for Sustainable Infrastructure and Environment (ESSIE).

<sup>2</sup> STEM stands for science, technology, engineering, and mathematics. This acronym also includes the biological and agricultural sciences; physical sciences; earth, atmospheric and ocean sciences; computer sciences; social sciences; psychology;; and science technologies.

Websites and USF and UF's sociocultural climates intersect was central to study analysis. Research shows that non-traditional students switch out of science and engineering partly because of the persistence of certain sociocultural practices within these fields (Borman et al. 2010; Cross & Vick 2001; Tinto 1993; Tyson, Smith, & Nguema Ndong 2010). Research participants at both USF and UF reported that if the two institutions' Colleges of Engineering's Websites depict images of women and minorities, they would get a chance to help attract students from these groups into civil engineering. This postulate implies that Web pages on the Internet not only serve recruitment purposes, but support retention efforts. Presumably, the USF CEE and the UF CCE Departments' Web pages convey the message to potential students that they have an opportunity to be accepted and to thrive in these engineering departments. Before I proceed with the discussion, it is crucial to define the notions of "recruitment" and "retention" from a higher education perspective.

The 2011 Webster Dictionary defines "recruitment" as the process of including new individuals in a population or subpopulation. The same source maintains that "retention" involves the act of allowing something or someone to remain in place. In the higher education context, recruitment and retention involve integrating students in colleges and universities with the intent to help them stay. Recruitment and retention have been presented as complex concepts which are simultaneously difficult to comprehend and to define (Cook 2009; Cook & Rushton 2009; Crosling, Thomas, & Heagney 2008; Hamlen 1992). As Rushton (2009) has suggested, "It is easy to think of recruitment and retention as two separate processes. You recruit students, and then you retain the ones that have been recruited. But the reality is that the two should be

inextricably linked” (Rushton 2009:215). In a sense, colleges and universities have focused on retaining the students they have recruited rather than recruiting the students they can retain (Cook 2009). In any case, there is a considerable overlap between recruitment and retention activities. With that said, recruiting and retaining minorities, especially African Americans, is an even more complex endeavor as the college attrition rates of students from this group are among the highest (Cross & Vick 2001; Hamlen 1992; Jones 2001; Lang & Ford 1992). Whether applied off- or online, recruitment and retention efforts at the higher education level impact the academic and social lives of students, including students from underrepresented groups.

Recruiting minorities through the Web would involve using Web pages with specific information about women or African American or Latino students, for instance. By the same token, an online approach to minority retention would suggest drawing on Web pages with information relating to specific educational services (which may or may not be made available by the institution). These services would be designed to support non-traditional students in their adjustment to college life such as undergraduate advising, tutoring, mentoring, or cultural types of academic services (i.e., cultural centers, student organizations, fraternities, and sororities). The recruitment and retention of women and racial and ethnic minority students in the USF and UF Civil Engineering Departments intersect deeper social, cultural, political, and historical issues that the Websites of these two institutions, even carefully designed, cannot mask or silence. I am, therefore, arguing that the online climate reflected on USF and UF Colleges of Engineering’s respective Web pages is a significant factor in recruiting and retaining historically underrepresented groups in civil engineering. Consequently, displaying pictures of women and racial and

ethnic minorities on the USF and the UF Departments of Civil Engineering's Websites does not necessarily guarantee that students from these groups will apply or enroll or feel as if they belonged to the culture of the above mentioned engineering departments.

On the other hand, in order to get a sense of problems of attrition in engineering, this case study drew on a sample of 17 University of South Florida students who switched from USF Engineering into another major to validate research findings (see discussion in Chapter 3). One ultimate goal in this dissertation was to examine the root causes of STEM field attrition while investigating civil engineering women and students of color as agential subjects. In doing so, I offered a brief discussion of group categorization processes in the United States as well as a historical analysis of segregation in higher education in the state of Florida. This allowed me to examine the extent to which Web pages on the Internet deprive women and students of color of their personal life experiences and cultural values. Furthermore, I suggest ways of streamlining recruiting and retention strategies and practices in civil engineering programs because it is one thing to attract women and racial and ethnic minorities into STEM fields and it is quite another to retain them. Being aware that constructs of race and ethnicity and gender suggest the existence of complex societal issues and that race and ethnicity and gender affect individuals in many different ways in different social strata, I thought it appropriate to offer a perspective which, without overlooking complexities of race and ethnicity and gender in educational settings, aims at balancing recruitment and retention resources, practices, and strategies in civil engineering departments. As I propose in Chapter 6, a streamline approach to recruiting and retaining students from traditionally

underrepresented groups in engineering programs is one option that can make a difference.

In an effort to understand the relationships between online, Web-based information (i.e., written texts or images), applications and enrollment patterns, and the recruitment and retention of women and racial and ethnic minority students in civil engineering programs, this study attempts to answer two overarching research questions:

1. Do applicants to civil engineering undergraduate programs use Web-based materials to select the USF Civil and Environmental Engineering and the UF Civil and Coastal Engineering programs? If so, what kinds of information are both appealing and informative?
2. What are the implications of providing more prominence and visibility to women and minority students, professors, and administrators on the USF and UF's Colleges of Engineering and Civil Engineering Departments' Websites? Based on analysis of data derived from qualitative interviews, focus groups, observations, background sheets, school artifacts, and the relevant literature, I hypothesize that Websites can serve as marketing tools in attracting civil engineering students and that civil engineering programs with Web pages depicting images of women and minorities would be more successful in recruiting and retaining women and students of color than civil engineering programs with Web pages displaying fewer or no images of women and minorities. However, I also posit that recruitment efforts represent only the tip of the iceberg and that more work needs to be done at a deeper level. I am arguing that recruitment strategies must be coupled with appropriate retention efforts in order to provide assistance to students during their freshman and sophomore years because

oftentimes women and minority students enter engineering with “engineering eligible<sup>3</sup>” status (NACME 2008) but end up leaving engineering at much higher rates than do their White male counterparts (Cross & Vick 2001; Kaenzig 2011; Seymour & Hewitt 1997; Tinto 1993; Tyson et al. 2010). In Chapters 5 and 6, I further discuss this point and offer practical examples and recommendations in relation to the matter at hand.

The University of South Florida academic policies and procedures clarify the enrollment process for undergraduate students in the USF College of Engineering. According to the University of South Florida 2011-2012 Undergraduate Catalog, all students must officially declare a major or a pre-major before they register for upper level college coursework starting in junior year. In USF Engineering, first time in college (FTIC) students are classified as engineering pre-majors if they have completed 36 or fewer credits when they declared a major. Students who have completed more than 36 credits are classified as regular engineering majors. On the other hand, transfer students<sup>4</sup> who have completed 75 or fewer credits are considered engineering pre-major. On the other hand, transfer students who have completed 75 or more credits of college coursework can be allowed to register for further credit coursework in USF Engineering provided that they have initially declared a major (USF Undergraduate Catalog 2011). An important detail is that until FTIC and transfer students have completed their designated number of credits, respectively 36 and 75 or more credits, students within these two categories cannot be allowed to move on to upper levels of college coursework (i.e., junior and senior years). Technically, during their freshman and sophomore years,

---

<sup>3</sup> A student is considered engineering eligible if he or she has successfully completed all required rigorous courses in high school.

<sup>4</sup> At the most general level, the pool of undergraduate students who transfer into USF Engineering essentially comes from local community colleges, including Hillsborough Community College and its four campuses.

undergraduate students in USF Engineering are considered “pre-engineering students”. On the other hand, upon entering the University of Florida as freshmen, students are encouraged to declare the major they feel they are most likely to pursue, including engineering majors. In the course of their first few terms, students have the opportunity to take courses to explore multiple academic areas. Additionally, because a significant number of students change majors during their freshman or sophomore years, exploring multiple areas of interest early helps students confirm their choice of major or identify a more suitable program of study. According to the University of Florida 2011-2012 Undergraduate Catalog, freshmen with no major preference can declare one of three exploratory categories (i.e., humanities and letters, social and behavioral sciences, or science and engineering) for the first three fall/spring terms. Exploratory students are advised by the Academic Advising Center and affiliated with the College of Liberal Arts and Science (UF Undergraduate Catalog 2011). In the first three terms, undecided students still have the option to explore potential programs of study by taking one or more of the critical-tracking courses for several majors. At the University of South Florida and the University of Florida, students entering engineering programs are not considered full engineering students until they satisfactorily complete a number of required coursework. However, while USF undergraduate students who have entered USF Engineering and declared a major are called “pre-engineering students”, UF students in the same situation are referred to as “engineering students”. In this analysis, I refer to USF student participants who volunteered their time in this study as “pre-engineering” or “pre-civil engineering” students.

Besides this, it must be noted that it is a part of anthropology's mission to be a historical and comparative discipline (Foley et al. 2001; Hunt 2007). In this study, I do offer a historical (and somewhat comparative too) analysis of two distinct civil engineering programs (as I discuss later), that is one which is twenty-five years old or so (i.e., the University of South Florida) versus one that is one hundred years old (i.e., the University of Florida). However, I do not argue that the structural organization of Civil and Environmental Engineering (CEE) is the same as that of Civil and Coastal Engineering (CCE)<sup>5</sup>. In this dissertation, I describe a case study that drew on an ethnographic research. The research was carried out over a 12-month period in the Civil Engineering Departments of the University of South Florida and the University of Florida. I analyzed 8 focus groups with 23 pre-civil engineering or undergraduate students, 17 structured, in-depth interviews with 8 civil engineering professors and 9 university administrators, 40 demographic sheets (collected from each of the aforementioned groups of respondents), and dozens of different university and department Websites which entailed a total of 92 visits. Additionally, I analyzed relevant school artifacts, including college magazines, photographs, posters, as well as field notes compiled through non-participant observations. The total study sample was n=40. This case study also drew on incremental qualitative data from the *Switchers Study* – a sub-study of the larger National Science Foundation-funded Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP). In fact, the STEP project and the *Switchers Study* provided the inspirational background for this research (as I discuss later). It is important to

---

<sup>5</sup>In general, civil engineering departments pursue the same research and teaching agendas. Differences in denominations often imply that an engineering department may focus on certain sub-fields of engineering more than others. While UF Civil Engineering focuses on coastal work, USF Civil Engineering stresses environmental engineering as a whole.

underline that the incremental or *Switchers* sample built upon a study of 288 students who declared engineering as their major or pre-major at the University of South Florida between May 2002 and August 2006. A total of 17 students who had switched from USF Engineering into another major were recruited from this pool of 288 students to participate in retrospective interviews. The purpose of this fixed increment was not only to enhance the overall study sample (i.e., from  $n=40$  to  $n=57$ ), but to document the perceptions of students who leave engineering to enter other majors. As I outline in Chapter 3, the initial goal of this research was to recruit at least 80 participants. But data collection deadlines and, more particularly, difficulty recruiting undergraduate or pre-civil engineering students caused me to keep the overall study sample to 40 participants.

My interest in this research was initially developed between fall of 2007 and spring of 2008, during the course of my work with Professor Kathryn Borman and others at the Alliance for Applied Research in Education and Anthropology (AAREA) – a research unit housed in the Department of Anthropology at the University of South Florida. As I outline earlier, I was involved with a project supported by the National Science Foundation’s (NSF) Science, Technology, Mathematics and Engineering Talent Expansion (STEP) program. During the course of our work on this project, investigating the recruitment and retention of undergraduate chemistry and engineering students, I determined that I would undertake a dissertation research on some aspect of the engineering programs investigated that the STEP project was not necessarily addressing: the relationships between Web-based, online information (written texts or images) and pre-civil engineering or undergraduate student applications and enrollment patterns. I thought it would be interesting to examine two programs in civil engineering, one housed

at the University of Florida and the other at the University of South Florida<sup>6</sup>. At that time, I also determined that analysis of study data would build upon two streams of theoretical positions critical in social science research, including reproduction theories – coupled with critical race theory (CRT) and feminist theories – and dialogic public relations theories. Reproduction theories and public relations “dialogic loop” theories are the driving sets of ideas behind this study. With that said, it is important to outline why study civil engineering and not another engineering program.

One reason for choosing civil engineering is because this discipline has been facing important challenges over the years. Relatedly, civil engineering professor, Hojjat Adeli (2009), once observed that civil engineering as a discipline is facing difficulty attracting students and securing resources; this has caused some civil engineering departments in U.S. colleges and universities (i.e., Tulane University and Union College) to “shut down their civil engineering programs entirely” (Adeli 2009:1). A report released in the fall of 2006 by the Commission on Professionals in Science and Technology (CPST) corroborates this finding showing trends of decline in interest and participation in engineering disciplines in the U.S., albeit statistical evidence that “the total number of U.S. degrees awarded in STEM fields increased 258 percent in the last four decades, from 239,333 in 1966 to 616,463 in 2004” (CPST 2006). It is quite paradoxical that the numbers of degrees awarded in STEM fields in the U.S. are on the rise (the numbers have almost tripled in forty years), while civil engineering programs at some U.S. colleges are shutting down. The data presented above may well mask a

---

<sup>6</sup> The STEP project was investigating five different engineering programs in five universities across the state of Florida, including the University of South Florida (USF), the University of Florida (UF), Florida State University (FSU), Florida Atlantic & Mechanical University (FAMU), Florida International University (FIU), and Embry-Riddle Aeronautical University (ERAU).

number of disturbing truths, including persisting differences in STEM participation among engineering programs and disproportionate graduation rates in STEM fields between men and women students and between white and non-white students.

The Civil and Environmental Engineering Department at the University of South Florida and the Civil and Coastal Engineering Department at the University of Florida were selected because the two programs are among the nation's top fifty civil engineering departments with the lowest numbers of women and racial and ethnic minority tenured and tenure-track faculty (Nelson 2005; Nelson & Rogers 2004; Nelson & Bremman 2010). In fact, in the United States, civil engineering is one of the engineering disciplines in which women and racial and ethnic minority students (other than Asian Americans) continue to be underrepresented (Campbell, Denes, & Morrison 2000; CPST 2006; Fuligni 2007; Kaenzig 2011; NACME 2008; NCES 2000; Nelson 2005; NSF 2002). Relatedly, a close look at undergraduate enrollment numbers for fall of 2011 for the University of South Florida Department of Civil and Environment Engineering showed that men represented 76.8% of overall enrollments, while women accounted for 23.1% (University of South Florida Info Center 2011). Likewise, headcounts of pre-engineering students by race and ethnicity for the University of South Florida Department of Civil and Environment Engineering for fall of 2011 showed an interesting trend. Percentages of enrollments by race and ethnicity indicated that Latino represented 15.2% of overall enrollments; Black 4.8%; Asian 5.6%; and White 71.1% (University of South Florida Info Center 2011). On the other hand, analysis of undergraduate enrollments by gender in the University of Florida Department of Civil and Coastal Engineering revealed that men made up 78.4% of overall enrollments for fall of 2010, while women represented only

21.5% (Florida BOG 2011). Analysis of these percentages by race and ethnicity showed that Asian represented 6.1% of overall enrollments; Latino 19.2%; Black 6.1%; and White 68.3%. Data presented above are a factual illustration of the representation of women and racial and ethnic minority pre-civil engineering students at USF and UF. Those data show that women and racial and ethnic minority students are underrepresented in the two civil engineering departments under scrutiny in this dissertation, namely the University of South Florida Civil and Environmental Engineering Department and the University of Florida Civil and Coastal Engineering Department.

The following statistics provide snapshots of STEM participation differences in the U.S. between men and women and between underrepresented minorities and Asians and non-Latino Whites:

African Americans, American Indians, and Latinos constitute 30 percent of the nation's undergraduate students, yet only 12 percent of baccalaureate engineering graduates in the United States are underrepresented minorities [...] There continues to be a wide gap in educational attainment between URM and whites and Asians [...] Women account for nearly half—46 percent— of the U.S. labor force, but account for just 10.8 percent of U.S. engineers (NACME 2008).

In 2003, 17.2 percent of African Americans and 10.0 percent of Hispanics aged 25 to 29 had completed at least a bachelor's degree in any field, compared to 61.6 percent of Asians and 34.2 percent of non-Hispanic whites (CPST 2006).

In 2007, men earned a majority of bachelor's degrees awarded in engineering, computer sciences, and physics (81%, 81%, and 79%, respectively). Women earned half or more of bachelor's degrees in psychology (77%), biological sciences (60%), social sciences (54%), agricultural sciences (50%), and chemistry (50%) [...] Women's share of bachelor's degrees in computer sciences, mathematics, and engineering has declined in recent years (NSB 2010).

Despite slight gains, STEM participation differences between men and women and between white and non-white students have been consistently widening. The statistics shown above are a reason for concern not only because the U.S. is currently facing dramatic shortages in science and engineering workforce (Borman et al. 2010; CPST 2006; May & Chubin 2003; NSF 2002), but because science and engineering achievement, national security and national economic growth are intertwined (CPST 2006; May & Chubin 2003; NACME 2008; Rosser & Taylor 2008; Porter & van Opstal 2001; U.S.CNS 2001). However, I must point out that while women are disproportionately underrepresented in engineering programs, they are not in institutions of higher learning. According to the University of Florida main Website, in fall 2008 women made up 54% of USF undergraduate enrollments (University of Florida Facts 2011). USF System 2010-2011 facts demonstrate that women represent the majority (approximately 63%) of University of South Florida's student population both at the undergraduate and graduate levels (University of South Florida Pocket Facts 2011). These facts provide an opportunity to examine issues of women representation in higher education from a different perspective. Additionally, the above data help distinguish between problems of access to engineering and broader issues affecting women and racial and ethnic minorities in institutions of higher learning.

Many educational researchers and experts have investigated science and engineering to understand why these disciplines have remained an exclusively white male field (Borman et al. 2010; May & Chubin 2003; JBHE Foundation 2003; Rosser & Taylor 2008; Seymour & Hewitt 1997; Steinke 2004). Yet other scholars have addressed problems of access to engineering using a different approach. Those researchers have

problematized problems of access to engineering departments from critical race and gender perspectives. They would contend that one of the reasons why women and students of color remain a rarity in most engineering programs is because engineering as a discipline (among other so-called hard science disciplines) is based on systems of knowledge that tend to devalue the culture of historically underserved populations and give preeminence to a dominant Euro-American male paradigm (Bix 2004; Braxton 2000; Herskovits 1958; Lee 1990). Problems of access to engineering outline problems of assimilation and cultural reproduction. But questions remain. Is culture change necessarily negative? If assimilation occurs, who will it be in favor or at the expense of? The truth of the matter is that the prejudices that plagued America before the enactment of historic pieces of legislation such as the Civil Rights Act of 1964 and the Voting Rights Act of 1965 have made their way into 21<sup>st</sup> century engineering.

The presence of women in U.S. engineering schools has raised questions about the ability of women to be real engineers (Bix 2004; Dillon 2005; Steinke 2004). Women engineers often experience sexism and discrimination (Cross & Vick 2001); and the feminization of engineering is seen as the end of that discipline (Bix 2004; Steinke 2004). Interestingly, even decades after the Civil Rights Act of 1964 and the Voting Rights Act of 1965, the marks of prejudice and discrimination continue to be a part of the social fabric of America (Campbell et al. 2000; Moore 2005). The implication of this is that today's U.S. engineering schools tend to reproduce, knowingly or unknowingly, norms and practices that exclude individuals from other groups than the Caucasian male type.

A study by Crowley et al. (2004) demonstrated that individuals from historically underrepresented populations tend to view scientific environments as unwelcoming to

people from racial and ethnic minority groups. Negative stereotypes against individuals from historically underserved groups in engineering departments may further complicate STEM participation among young Americans, especially among women and students of color (Kaenzig 2011; May & Chubin; Seymour & Hewitt 1997). Historically, and from a racial and ethnic standpoint, in the United States acculturation was imposed on non-white populations in a one-dimensional fashion (Gershenvorn 2004; Herskovits 1958; McCarty 2002). For students from disenfranchised population such as racial and ethnic minorities enrolling or thriving in engineering involves a dilemma: to assimilate to the Western dominant culture or to lose their own. A number of norms and practices appear to make it difficult for racial and ethnic minority students to persist in engineering. Tremendous efforts are needed to reverse this trend and make engineering a more diverse discipline. Studies found that historically underserved populations, including women and students of color, are likely to be a pool to tap into to help make diversity a reality in engineering schools (Borman et al. 2010; May and Chubin 2003; NACME 2008; NSF 2002). Increasing applications and enrollments of traditionally underserved populations in science and engineering could help address dramatic shortages of engineers and scientists in the U.S. workforce.

The theory that increasing the number of students from traditionally underserved populations in engineering programs will help address shortages in U.S. workforce offers an interesting perspective. This line of thought provide the opportunity to reflect on the representation of women and students of color in STEM fields by raising the following questions: At what rate do women and students of color enter engineering today? What can be done to retain women and minority students already in the system? If providing

more visibility to women and racial and ethnic minorities on engineering programs' Web pages can contribute to increasing applications and enrollments for African American and Latino students in engineering programs, what would that imply? Would the presence of a large number of underrepresented minorities in engineering schools at predominantly white institutions mean that systemic institutional issues relating to race and gender have been addressed? All of these questions are as important as the answers they call for.

At any rate, colleges and universities have utilized the Internet as an important part of their outreach strategies. Today, every university has its own Website; and students, professors, and officials at institutions of higher learning admit that Websites have become the face of colleges and universities. Each college or program presents specific types of information or facts on their Websites. Information posted online often represents various interests and, therefore, is destined to attract different audiences (Tschopp 2000). To investigate the extent to which the Internet and marketing techniques altogether can contribute to diversifying engineering as a discipline is of vital importance, especially because "many colleges and universities find that developing and maintaining their Websites is a daunting task" (Tschopp 2000:144). It is critical, at this point, to define the concept of Internet Marketing.

The concept of Internet Marketing is often used interchangeably with the notion of Electronic Marketing or *E-Marketing*. However, the two constructs have two different meanings. Zinkhan (2001) observed that the multiple usages and applications (in different economic contexts) of marketing techniques complicate the possibility to generate a working theoretical framework for marketing. Marketing is an elusive concept. The phrase *Internet Marketing* derives from the combination of two words; the words

“Internet” and the word “marketing”. According to El-Gohary (2010), Internet marketing must not be confounded with “E-marketing”: “Internet Marketing (IM) refers only to the Internet, World Wide Web, e-mails, while E-Marketing includes all of that plus all other E-Marketing tools like Intranets, Extranets and mobile phones” (El-Gohary 2010:216). This formulation outlines important nuances between the two concepts of Internet Marketing (IM) and Electronic Marketing (E-Marketing). But with that being said and given that the United States is a diverse nation, it is critical to reflect on the agenda(s) pursued by Internet Marketing experts. It is important to reflect on the intersection between Internet Marketing and larger social, cultural, political, and historical issues. In the upcoming sections, I discuss the social implications of the Internet. I examine Web pages on the Internet from an anthropological perspective.

Despite our awareness of the fascination students have with the Internet (Brotcorne 2005; McMillan & Morrison 2006; Ogan et al. 2008; Selwyn 2008), little is known about how and why colleges and universities createuse Websites as communication and marketing tools in recruiting and retaining prospective engineering undergraduate or pre-civil engineering students and how the new media technology can contribute to increasing applications and enrollments in civil engineering departments, especially for women and racial and ethnic minority students. Earlier in this chapter, I outline the impact of negative stereotypes toward women and students of color in science and engineering environments. It is important to keep in perspective that engineering departments’ Websites consciously or unconsciously draw on negative stereotypes against women and minority students in engineering (Steinke 2004). As Markham (1998)

once observed, social realities can be reproduced in a variety of ways on Websites. There is considerable give and take between on-line (virtual) and off-line (real) experiences.

This case study joins the body of research investigating ways to enhance American youth's interest and participation in STEM fields and to erase current shortages in the U.S. science and engineering workforce. Additionally, this work represents an attempt to address important shortcomings in higher education research. Much of the educational research on college students' use of Websites focuses on how universities provide students with Internet-based information via e-journals, virtual learning environments (VLEs) and other forms of e-learning materials (Breen et al. 2001; Brotcorne 2005; Cheung & Huang 2005; Jones 2002; McMillan & Morrison 2006; Selwyn 2008). Little research examines how students browse the Web to gain information and subsequently apply to engineering programs. Information posted on universities' Websites is particularly vital for the following reason. To maintain a competitive edge in an environment of global challenges, particularly from Scandinavian (e.g., Finland, Sweden, and Iceland) and Asian nations (e.g., Japan, China, and South Korea) (CPST 2006), the U.S. must coordinate more of its resources by using Information and Communication Technologies (ICT), and more specifically by employing Websites as information delivery platforms and recruitment and retention tools to increase American youths' interest and participation in engineering. The following section defines important concepts used throughout this dissertation.

## 1.2 CONCEPTS OPERATIONALIZATION

In this section, I clarify certain misleading concepts and stress the idea that the larger the United States population gets, the more its various groups become heterogeneous, rather than homogenous. Phrases and concepts repeatedly employed in this study such as “historically underserved groups” (HUGs) or “underrepresented minority” (URMs), “white”, “women”, “minority”, or “science and engineering” can be misleading. It is, therefore, of utmost importance to clarify the meaning of each of them. It must, however, be noted that in this dissertation I give special attention to the concept of *race* not only because this concept represents a central element in the U.S. system of categorization but also because race, perhaps, symbolizes one of the most pervasive and divisive social constructs the United States has ever come to grip with.

“Engineering programs” refer to a set of engineering disciplinary areas and disciplines formally recognized by ABET (the Accreditation Board of Engineering and Technology) as the depository of quality education in the sciences and engineering (CHEA 2009). According to the Council for Higher Education Accreditation, ABET distinguishes among applied sciences programs; computing programs; engineering programs; and technology programs. But it is important to note that researchers and statistical agencies have often employed different definitions of the notion of science and engineering. NSF’s definition of science and engineering often encompasses disciplines such as the social sciences and psychology (CPST 2006; NCES 2000). But the point is that such a definition masks differences in STEM fields’ gender and race and ethnicity makeups. STEM participation gaps by gender and race and ethnicity tend to be smaller

when the definition of science and engineering includes the social sciences<sup>7</sup> and psychology than they are when the definition refers only to natural sciences and engineering (CPST 2006; NCES 2000). For the purpose of the present study, I use the National Science Foundation's all-encompassing definition of science and engineering. NSF's definition is interesting for it shows that gaps in STEM participation for women and racial and ethnic minority students tend to vary depending on the way the concept of "science and engineering" is defined.

I unpack the concepts of *women* and *minority* using David Valentine's (2007) perspective about group categories. Valentine's (2007) book, *Imagining Transgender: An Ethnography of a Category*, provides a framework for discussing issues of identity formation in the contemporary United States. In this book, he concedes that because the meanings categories convey are never neutral, existing systems of group categorization are never to be left unquestioned (Valentine 2007). Identity creation cuts across different layers of contemporary human life. Systems of group categorization affect humans in various ways and at different levels, including the historical, social, political, economic, and cultural levels. Each level of human life informs the other; historical events inform present day cultural representations. Antoinette Jackson's (2011) discussion on the intersection between the present and the past is relevant here.

In a recently published article, Jackson (2011) articulates the "dynamic relationship between the past and the present" (Jackson 2011:450) and demonstrates that current systems of group categorization in the U.S. (i.e., gender, race, ethnicity) draw on some aspects of American history that misrepresent or underestimate the legacy of

---

<sup>7</sup> The social sciences include anthropology, area and ethnic studies, economics, history of science, linguistics, political science and public administration, sociology, and "other" social sciences.

African Americans in this country. Michel-Rolph Trouillot (1995) used a similar argument in his book, *Silencing the Past: Power and the Production of History*, to question the systematic silencing of the role of Africans in the Haitian Revolution. Although this book depicts a different context (i.e., Haiti and the Caribbeans), the comparison sits well with the U.S. context for both African Americans and Haitians are subjects to a model of assimilation that uses the same sociocultural constructs for people of African descent. Trouillot placed the historical events that unfolded before, during, and after the Haitian Revolution within the context of denial; the denial of a truthful and accurate representation of the heroic role of Africans in the Haitian Revolution. In recounting the life of enslaved Africans in postbellum plantations, Jackson (2011) shows that memories can be used to help “instruct reconfiguration of systems of categorization today” (Jackson 2011) and that power can silence certain voices from history. The implication of this is that history provides an opportunity to reflect on the past to shape the future. Misrepresented historical accounts give way to a distorted understanding of the present and false projection of the future. Trouillot’s (1995) discussion of the Haitian Revolution illustrates this point convincingly. One of the main arguments developed in his book shatters the assumption that Africans are incapable of organizing and leading a “successful” revolution. Two distinctive traits of colonialism consist of living in constant denial as to the “realities” of Africans or people of African descent (Morehouse 2005) and using physical attributes such as skin color and socio-historical constructs such as race as a “traditional stigmatizing signifier” (Winant 2004:xv). In the United States, social and cultural groups have been ascribed certain stereotypes based on socio-historical

constructs. For example, African Americans or peoples of African descent are often described as poor and uneducated.

Scholars have criticized the use of stereotypes and the tendency to ascribe specific categorical attributes to entire groups of individuals based on socio-historical facts associated with these groups (Diamond 2009; Fuligni 2007; Jackson 2011; Lavenda & Schultz 2010; Trouillot 1995; Valentine 2007). The growing diversity in the United States has caught the attention of various political institutions in charge of *regulating* group identification and categorization. Howard Winant (2004), in agreement with this line of thought, opened his book, *The New Politics of Race*, with a resounding statement: “Race is fundamental in modern politics” (Winant 2004:ix). Throughout modern history, U.S. populations have been “color-coded” in a variety of ways by a wide range of political institutions.

In 1977, the White House’s Office of Management and Budget (OMB) issued Statistical Policy Directive Number 15, “Race and Ethnic Standards for Federal Statistics and Administrative Reporting” (The White House 2011). This measure was meant to set forth new standards of racial categorization:

In these standards, four racial categories were established (i.e., *American Indian or Alaskan Native; Asian or Pacific Islander; Black; and White*). Additionally, the Office of Management and Budget established two ethnicity categories, including *Hispanic Origin* and *Not of Hispanic Origin* (The White House 2011).

Twenty years later, the Office of Management and Budget issued “Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity.” The new standards are summarized as follows:

By this Notice, OMB is announcing its decision concerning the revision of Statistical Policy Directive No. 15, Race and Ethnic Standards for Federal Statistics and Administrative Reporting. OMB is accepting the recommendations of the Interagency Committee for the Review of the Racial and Ethnic Standards with the following two modifications: (1) the Asian or Pacific Islander category will be separated into two categories – “Asian” and “Native Hawaiian or Other Pacific Islander,” and (2) the term “Hispanic” will be changed to “Hispanic or Latino” (The White House 2011).

It is apparent in the above quote that the new standards included two important modifications: 1) the Asian or Pacific Islander category was separated into two categories – “Asian” and “Native Hawaiian or Other Pacific Islander,” and 2) the term “Hispanic” was changed to “Hispanic or Latino” (the phrase “Spanish Origin” may also be used in addition to Hispanic or Latino).

In 2007 the U.S. Department of Education issued new standards, New Race and Ethnicity Guidelines for the Collection of Federal Education Data, to be enforced for every research requiring collection and reporting of aggregated student data on race and ethnicity:

The 2007 final guidance allows individuals to self-identify their ethnicity and race, and permits individuals to select more than one race and/or ethnicity. This change authorizes individuals to more accurately reflect their racial and ethnic background by not limiting responses to only one racial or ethnic category, and expands reporting options to seven categories (American Indian or Alaska Native, Asian, Black or African American, Hispanic, Native Hawaiian or Other Pacific Islander, White, and Two or More Races) (U.S.DOE 2011).

The aforementioned statement shows that U.S. institutional color coding has been transitioning from sets of rigid categorizations to more flexible systems of classification.

It is important to ponder over the reasons for those changes. In some ways, I am

sympathetic to the U.S. Department of Education's view. U.S. race and ethnicity identification standards, whatever they may be, should reflect the composition of the United States population. At the same time it is important to answer the following questions. How objective are the racial classifications defined by U.S. systems of institutional color-coding? Do current systems of gender and racial and ethnic categorizations really reflect the diversity of the United States' population? Claiming the absence of an underlying biological basis, some anthropologists have argued that racial categories are culturally constructed on the basis of superficial appearances (Diamond 2009; Gould 1996; Lavenda & Schultz 2010). From a critical anthropological perspective, widespread assumptions about racial differences are invalid.

The notion that women and minority students form distinct, homogenous groups is widespread. But probably today more than ever before the concepts of *women* and *minority* are likely to be employed interchangeably and mistakenly by many, including leading experts in the research and teaching professions. In the context of U.S. higher education research, the notions of "women" and "minority" are often regrouped under the sociocultural construct of "historically underserved groups" (HUGs) or "underrepresented minorities" (URMs). The concepts of "historically underserved groups" or "underrepresented minorities" are often used interchangeably to reflect the numerical underrepresentation of women and racial and ethnic minority groups in certain disciplines or professions, including engineering (NACME 2008; NCES 2000; Nelson & Brammer 2010; Nelson & Rogers 2004). Despite important differences inherent in each group, women and racial and ethnic minority students are commonly considered integral parts of one same sociocultural category. I believe this characterization to be problematic,

although I understand that the usage of the concept of “historically underserved groups” is meant to symbolize the fact that women and individuals from ethnic and racial groups such as African Americans or Latinos are a rarity in science and engineering (Bix 1999; Cross & Vick 2001; JBHE Foundation 2003; May & Chubin 2003). The juxtaposition of the terms “women” and “racial and ethnic minority” as elements of the same category is problematic because it implies that racial classifications and gender classifications have the same social significance. In the U.S. context, racial stigmas have had historical, social, cultural, and political consequences that no other social categorizations have. This is probably what Lavenda and Schultz alluded to when they noted that:

The enslavement of Africans by Europeans in the United States and the continued oppression of their descendants even after emancipation in the nineteenth century have created a social reality for residents of the United States in which the divide between black and white appears so obvious as to be beyond question (Lavenda & Schultz 2010:100-101).

The systematic underrepresentation of women and students of color in engineering programs does not equalize the experiences or nullify the differences between Black and White Americans or between women and Blacks. Rather it makes them more acute.

In a sense, within the broader notions of *women* or *minorities* are embedded multiple sub-factors of classification. The term “woman” has become a generic word. The concept often downplays issues of class, race, ethnicity, or sexual affiliation that may exist within this social construct. On the face of it, the notion that White women are a minority in science and engineering is somewhat ambiguous. From a strictly racial standpoint, white women are not a minority, but on the gender level they are. It must be pointed out that unlike White women, African American and Latina women do

experience a double minority burden in educational institutions (Essed 1991; Essed 1994; Medina & Luna 2000; St. Jean & Feagin 1998). African American and Latina women are stigmatized daily based on their sex and skin color. The double minority status of African American and Latina women suggests that discriminatory practices toward female minority are more impactful than prejudices against their male counterparts.

A closer examination of the situation of non-white populations in the United States reveals some interesting patterns of classification. The Asian group represents an interesting recent case of ethnic integration in the U.S. Asians have always been a part of U.S. minority populations (NCES 2000; PCST 2006). But the increasing number of Asian students and faculty in science and engineering fields in U.S. colleges and universities has earned Asians to be classified as a non-minority group along with Whites (NCES 2000; PCST 2006). By the same token, racial and ethnic classifications adopted by the National Science Foundation reveal important changes in the way a number of sociocultural constructs are being framed. For example, the definition of the construct “white” appears to be more inclusive<sup>8</sup>. According to a 2000 report released by NSF’s social science researcher, Susan Hill, the racial category known as “white” has come to include persons having origins in Northern Africa and the Middle East (Hill 2000). But while U.S. systems of categorization have remained clear about the inclusion of

---

<sup>8</sup> *Black, non-Hispanic*—A person having origins in any of the black racial groups of Africa (except those of Hispanic origin). *American Indian or Alaskan Native*—A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition. *Asian or Pacific Islander*—A person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands. *Hispanic*—A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race. *White, non-Hispanic*—A person having origins in any of the original peoples of Europe, North Africa, or the Middle East (except those of Hispanic origin). *Nonresident alien*—A person who is not a citizen or national of the United States and who is in the United States on a temporary basis.

immigrants to the United States from northern Africa into the white group, they have not addressed the classification of black Middle Eastern or white immigrants to the U.S. from southern African nations (e.g., Zimbabwe, South Africa, Namibia, and Mozambique). Another point of interest in the evolving racial and ethnic composition of the U.S. has to do with the concept of “resident aliens”. Hill’s (2000) research on science and engineering degrees by race and ethnicity is relevant to understanding institutional color-coding. As Hill (2000) demonstrated, starting from the early 2000s individuals who are permanent residents of the United States are now to be reported in the appropriate racial or ethnic categories along with U.S. citizens (Hill 2000). In fact, resident aliens are not citizens *de facto* of the United States, but may be classified as such on the ground that they have been lawfully admitted for permanent residence.

Why bother “deconstructing” the aforementioned concepts? One reason is because systems of categorizations are socially constructed. From a biological standpoint, the concept of race – which U.S. institutional systems of group identification consider sacrosanct – is “scientifically useless” (Diamond 2009:75). Institutional color-coding in the U.S. has strived to make racial variation among groups a centerpiece of its policies. However, studies have demonstrated that genetics alone fails to elucidate the mystery of group differences and that more variation exists within racial groups than among them (Diamond 2009; Gould 1996; Lavenda & Schultz 2010; Zack 1997). Quite understandably, “there are a lot of different ways to categorize human biological diversity” (Diamond 2009:75). But race has never been a biological reality; and it never will. As Diamond (2009) once observed, “Race is indeed an important historical and political concept – as a cultural construction that functions as a folk-biological

rationalization for enforcing social inequalities” (Diamond 2009:75). No matter what their stated goals and objectives are categorization policies directly or indirectly sustain a global system of domination in which racism and inequalities are reproduced and perpetuated.

In a different but related context, educational researchers McCarty, Romero-Little, and Zepeda (2008) took the minority-majority debate over to another level. In studying the root causes of language shift in Native American communities in the United States, the authors developed the concept of “minoritized” groups of people and illustrated the ways in which “tacit and official language policies play out in everyday social practice” (McCarty et al 2008:160). From this standpoint, it makes perfect sense to think about all of the racially, ethnically, and socially defined groups of the United States in terms of “minoritized”, not minority groups. The following section resonates with a discussion of problems of group classification in the United States. In this section, I offer a brief analysis of the history of segregation in higher education in Florida. The two main research sites of this case study, the University of South Florida in Tampa and the University of Florida in Gainesville, are the focus of this section.

### 1.3 CONTEXT (RESEARCH SITES)

As I outline earlier, this case study drew on an ethnographic research that took place over 12 months in two Florida civil engineering departments, one housed at the University of South Florida and the other at University of Florida. I analyzed focus groups with pre-civil engineering or undergraduate students, structured interviews with civil engineering professors and university administrators, demographic information

sheets (from each of the aforementioned groups of individuals), and dozens of university and department Web pages. I supplemented the above mentioned data sources with relevant school artifacts, including college magazines, photographs, or posters and field notes compiled through non-participant observations.

This research was conducted as a case study, which suggests that I devoted a particular attention to the context and setting in which the research was carried out. Jones, Torres, and Arminio (2006) have contended that setting the context for some studies is critical because the context is an integral part of the “case”. Two sites of interest include the University of South Florida (USF) in Tampa and the University of Florida (UF) in Gainesville, two institutions among the 10 largest universities in the country and situated within distinctive locales (Cotner, Workman Whaler, & Tyson 2010). It is important to explore USF and UF not only as public universities using higher standards in the pursuit of academic excellence, but as institutions located in the state of Florida which is a part of the “Deep South” (Borman & Dorn 2007). The part of the United States known as the “Deep South” has a long history of bigotry and racism, especially toward African Americans (Cobb-Roberts & Shircliffe 2007; Morris & Monroe 2009). Therefore, a case study of how Web-based, online information affects the participation of women and other minority students in STEM fields – at the University of South Florida and the University of Florida can and must be grounded within the larger context of the expansion of public higher education in this part of the United States, especially when one considers that African American children, for example, began attending schools with White children in many Florida counties only after the threat of losing federal monies and under injunctions by the federal courts of the United States (Cobb-Roberts & Shircliffe 2007). Using a

similar argument, authors have discussed the U.S. South's influence in shaping African American identity and increasing educational opportunities for people of color (Cobb-Roberts & Shircliffe 2007; Morris & Morris 2002; Morris & Monroe 2009). The civil rights movement and desegregation politics played a significant role in public education in state of Florida. It is crucial today, perhaps more than it was during the civil rights movement and the desegregation era, to ponder over if and how “remedies for school segregation” have really helped push for better educational opportunities for women and minority students, especially for African American students.

At any rate, it is important for the purpose of this study to put the U.S. South in context, especially because, as Morris and Monroe (2009) have observed, this region of the United States has been a “favored setting for historical accounts of segregated Black schooling and the push for segregation” (Morris & Monroe 2009:26). The U.S. South, and particularly the state of Florida, makes an interesting “case” study for this research since it addresses the underrepresentation of ethnic and racial minorities such as African Americans in public universities. Jones et al. (2006) have noted that because cases are situated within a bounded system, understanding the relationships between the case and the bounded system is crucial. The first “case” of interest for this study was the University of South Florida (USF) located in Tampa, while the other “case” was the University of Florida (UF) located in Gainesville. USF and UF are two of the six universities in the Florida State University System (SUS) that house engineering programs. Additionally, it must be noted that UF is one of three research flagship universities in the State University System and one of only three Florida institutions of higher education founded before 1956 (Borman et al. 2010; MatchCollege.com 2011).

The University of Florida traces its beginnings to a small seminary in 1853. Enrolling approximately 55,000 students annually, UF is Florida's largest university – and the nation's third-largest institution of higher education (MatchCollege.com 2011). In addition, UF boasts the largest engineering program in the Florida State University System (Borman et al. 2010). However, while these facts markedly distinguish the University of Florida from other universities in the Florida State University System (SUS), they cannot mask the reality that back in the 1940s, UF was among the southern institutions that denied admission to students based on race:

It's been 60 years since Virgil Darnell Hawkins applied to attend UF's Law School. He was one of five blacks who tried to attend UF's professional program that year (1949), and all five were denied admission based on race (Florida 2009:30).

The quote presented above clearly speaks to the racial divisions that characterized the education system of the “Deep South”. Race was used as a factor to grant or deny admission to students at UF. Refusal to admit five Black students (who probably qualified for the desired program) in UF's Law School in 1949 demonstrated the prevalence of White privilege in Florida's segregated institutions of higher learning. Hawkins did not attempt to convince the admissions officers at UF to overturn his decision. Rather for the next few years, Hawkins decided to fight to, “Desegregate UF. Even the U.S. Supreme Court ruled in his favor, yet UF failed to comply with its ruling” (Florida 2009:30). History shows that there used to be a great deal of resistance to the admission of non-White students at the University of Florida (Borman and Dorn 2007; Florida 2009). The Buckman Act of 1905 restructured the organization of Florida State schools, including the University of Florida. The act concluded that all Florida schools would be segregated by sex and race. Furthermore, the name of UF was changed from the

University of the State of Florida (USF) to the University of Florida (UF). The Buckman Act of 1905 was meant to make the University of Florida an all-White male school.

However, from 1948 to 1974, UF witnessed a remarkable expansion. The rapid population growth of the state of Florida spilled across its colleges. The University of Florida expanded from an all-white male college of 5,000 individuals to a diverse student body of more than 28,000 men and women (Cobb-Roberts & Shircliffe 2007; University of Florida Facts 2011). Women were allowed to enroll full-time at UF starting in the late 1940s. The first women students to ever enter the University of Florida joined in 1947:

Our long fight for our Gator Girlies finally ended this year. The first semester we greeted only a few of the braver fems, but the situation seems to be improving all the time. We hope that many more smiling faces will grace our campus in the near future (University of Florida 1947 Year Book).

The quote discusses the arrival of “coed” on the UF campus in 1947. Women were welcomed as full-time student during the academic year 1946-1947. Apparent in this extract is that the integration of women at UF happened gradually. The females that were enrolled were presumably white women.

But racial and ethnic minority students, especially African Americans, were not represented at UF until the year 1958 when George H. Starke, Jr. officially enrolled in the College of Law as the university’s first African-American student (Florida 2009; University of Florida Facts 2011). Twelve year later, that is by fall of 1970, there were “still only 343 African-American students” on the Gainesville campus (University of Florida Facts 2011). Obviously, African American students were underrepresented at the University of Florida by fall of 1970. Furthermore, these students were repeatedly discriminated against. African American students experienced a “sense of alienation in a

historically white campus” that still was not ready to accept them as students (University of Florida Facts 2011). The first African American students to matriculate at UF confronted two major problems: to navigate the (written and unwritten) rules of a school that had a long tradition of exclusion and denial toward Black students and to negotiate best practices to thrive in their programs of study. It is quite understandable that the first African American students to attend UF experienced feelings of alienation. Those feelings derived from the fact that the University of Florida was founded as a segregated, all white male institution. Moreover, UF is one of the only universities that overtly decided not to comply with new federal regulations about desegregation (Florida 2009). The University of Florida became *integrated*<sup>9</sup> until legalized segregation was abolished as the law in the U.S. in the late 1950s and early 1960s.

On the other hand, the University of South Florida, a public institution located in the thriving Tampa Bay area, is Florida’s third Research I Carnegie classification university. USF was established in 1956 with the ambition of its founders to create a top tier research institution in the state of Florida (Florida BOG 2011). The University of South Florida is Florida’s second largest and the nation’s ninth largest university. According to USF System Facts, today, more than 47,000 students are studying on USF campuses in Tampa, St. Petersburg, Sarasota-Manatee, and Lakeland (University of South Florida 2011). USF was the first of eight state universities founded in the latter half of the 20<sup>th</sup> century and designated as a Hispanic serving institution with a population of 12.9% undergraduate Hispanic students in 2007 (Borman et al. 2010). USF is perhaps

---

<sup>9</sup> It is critical to note that the term *integration* can be a difficult and misleading concept to handle. Integration does not necessarily mean that all non-white and women students were completely accepted as a part of the UF fabric. To some extent there still was a great deal of resistance against “integrated” students, especially African Americans.

one of Florida's fastest-growing public universities. Additionally, USF has the reputation of hosting one of the largest Latino student populations in the state of Florida.

During its early years, the University of South Florida did not derogate to the movement of desegregation and inclusion that characterized many public schools in the U.S. South in the 1950s and 1960s (Cobb-Roberts & Shircliffe 2007; Morris & Morris 2002; Morris & Monroe 2009). In the 1960s, for example, USF was transitioning from “the university being a place of privilege to it being a place of every man” (University of South Florida 2006:35). Desegregation policies were meant to transform USF from an all-White campus to a university where African Americans, Latinos, and Native Americans could apply and, possibly, attend. Before the desegregation era, very few colleges were “serving African Americans in the state of Florida”, including “Florida A&M, Bethune Cookman, Florida Normal Industrial Institute, and Edward Waters” (Cobb-Roberts & Shircliffe 2007:24). Additionally, the movement of inclusion that characterized colleges and universities in the U.S. South changed the University of South Florida into “A place of freedom of thought, of action, and of speech” (University of South Florida 2006:35). Like many universities in the U.S. South, USF was a place of privilege given that only White students were enrolled by the early 1960s. But changes in the country and in the state of Florida provided extended rights to students giving them an opportunity to protest overtly against exclusion and to show their support for desegregation (University of South Florida 2006). African American and Latino students were being actively recruited and the first cohort of non-white students finally made it into USF by the early 1960s.

The University of South Florida has not been in existence the same amount of time the University of Florida has. UF is an institution that is a century old, while USF is relatively “young” institution, all things considered (University of Florida Facts 2011; University of South Florida 2006). A few historical accounts reveal that racial and ethnic minority students had not been accepted at the University of South Florida from day one. While this public university opened its doors in 1956, the first African American student to attend USF enrolled in 1961 (University of South Florida 2006). Furthermore, just like at UF the first African American students to enter USF confronted an unwelcoming campus environment. One African American USF alumnus interviewed for the “First 50<sup>th</sup> Years” of USF recalled a few example of “ugliness” on the USF campus back in those days (University of South Florida 2006). By “ugliness” the student probably means that African American students confronted isolation on campus. Newly enrolled African American students at USF might have had a sense of alienation. Moreover, while today USF boasts a status of “Hispanic serving institution”, to paraphrase Borman et al. (2010), in the late 1960s there were only a small number of Latino students in this institution. One Latino USF alumnus recounted that USF was a “very lonely, alienated kind of world” (University of South Florida 2006:68). One can see that just like the first African American students, the first Latino students to attend USF experienced a sense of alienation and rejection. Starting in the early 1960s, racial and ethnic minority students have been isolated at the University of South Florida. The situation certainly did not change with more students being recruited years later (University of South Florida 2006). But efforts for racial equality on Florida campuses, including USF had consequences for this university. Some legislators in Tallahassee marshaled their forces to “thwart political

reform” (University of South Florida 2006:69). Enrollments for Black and Latino students at the University of South Florida had been on the rise but those students were still underrepresented and victims of both interpersonal and institutional racism.

USF and UF have particularly interesting stories, histories, and anecdotes of racial tensions. Putting those events in context is capital for they make it possible to have a sense of what is at stake. The stories recounted through the civil rights movement and the politics of desegregation in the U.S. South are helpful to reflect on the past, get an understanding of the present, and shape the future. The histories of the University of Florida and the University of South Florida are testimonies of the crosscurrents between race and place and different layers of social life, as Morris and Monroe (2009) suggest: “The nexus of race and regional place contribute to social, economic, political, and educational conditions and outcomes for African Americans, as well as for other racial and ethnic groups” (Morris & Monroe 2009:22). Different school systems yield different outcomes. It appears that predominantly white institutions (PWIs) have had the reputation of being cutting edge schools, whereas historically black colleges and universities (HBCUs) are thought of as institutions providing the bare minimum or less. But it must be noted that the fight against segregation did not imply that all segregated schools were underserved or not valued by their communities, as the following quote suggests: “While the African American community was adamantly opposed to segregation, members of the community supported segregated higher education at FAMU” (Cobb-Roberts & Shircliffe 2007:43). Predominantly black schools played an important role in the African American community. This fact raises an important question. Had this study focused on historically black colleges and universities, would a problem of the representation of

African American students in civil engineering have posed itself in the same terms at historically Black colleges and universities, like FAMU or Bethune Cookman, as it has at PWIs such as UF or USF? Whatever answer to that question may be, the truth of the matter is segregated education in Florida appears to be more of a divisive issue than a consensus-building one.

U.S. history is made up of plenty of fascinating testimonies. Some of those testimonies provide a necessary parallel between the practices of institutionalized racism and discrimination that prevail in the U.S. today and the slavery system that characterized seventeenth century America. A key fact is that today Florida universities continue to struggle with important systemic problems which most likely leave many women and minority students behind. In his address to USF students during the fall of 2005, Dr. Cornell West contended that before America can develop into a truly democratic nation, there must be a critical examination of the “mortalities” and “realities” of its past (Morehouse 2005:2). Therefore, reflecting on such “realities” of U.S. history as the enslavement of millions of Africans in America and the subsequent institutionalization of discrimination towards African Americans may be a good place to begin with a discussion of the underrepresentation of women and students of color in engineering programs in the state of Florida. In the following part, I analyze the Internet from an anthropological perspective.

#### 1.4 THE INTERNET FROM AN ANTHROPOLOGICAL PERSPECTIVE

The ways in which modern humans communicate, trade, and organize their lives are influenced by the new media; arguably the most significant is the Internet (Davis 2000). The Internet and its critical role in transforming communication for a broad

expanse of the community have been studied extensively. Wilson and Peterson (2002) discussed the impact of the Internet revolution from an anthropological perspective and worked on identifying new directions for Internet study. In their 2002 study, Wilson and Peterson concluded that though Internet communications may happen faster, over larger distances, and bring about the reimagining of existing power structures, the rapid and fundamental transformations of society that some foresaw have not come to pass. McMillan and Morrison (2006), for their part, examined autobiographical essays written by college students to understand how the Internet influences various domains of their lives. This study demonstrated that day-to-day use of the Internet has impacted every aspect of students' lives.

Kang and Norton (2006) addressed the extent to which colleges and universities use the Web to accomplish public relations goals. The authors reported that visitors to college and university Websites are primarily interested in the ease of information access. In a 2008 article, Neil Selwyn discussed students' engagement with the Internet as a source of academic information for their studies and its results somewhat parallel the earlier findings of Kang and Norton (2006), whose study addresses the capacity of university Websites to function as information providers for an interested public. Nearly every U.S. college or university uses their Websites to connect with students and the general public (Kang & Norton 2006), adopting computing and Internet practices which establish the Web as the primary means of communication among colleges and universities, students, faculty, staff, administrators, and alumni (Selwyn 2008; Steinke 2004; Venegas 2006). Through specific communication forms or practices, universities' Website information content is not only likely to influence undergraduate students'

applications and enrollments in civil engineering, but also to affect persistence, and degree attainment in this area of study.

Although it draws on a case study, this dissertation advances anthropological theory and practice. What makes anthropology so unique is that the discipline relies on ethnography. Ethnography involves genuine research methods that emphasize in-depth examination of contexts (Berg 2007; Jones et al. 2006). Ethnography is a non-traditional form of basic research involving the use of a wide range of methods and activities for the purpose of collecting primary data (Berg 2007; LeCompte & Schensul 1999; LeCompte, Schensul, Weeks, & Singer 1999; O'Reilly 2005; Podolefsky, Brown, & Lacy 2009). Ethnography plays a critical role in the production of applied anthropological knowledge, which is a body of knowledge accumulated and used to solve problems affecting contemporary communities (Lavenda & Schultz 2010; LeCompte et al. 1999; Podolefsky et al. 2009). Borman et al. (2004) have observed that “since its beginning in the 19<sup>th</sup> century, contemporary, applied anthropology has engaged in the study and active investigation of a wide variety of human problems” (Borman et al. 2004:250). One area of interest to cultural applied anthropologists includes education or the study of school settings. But a critical reader may be tempted to ponder over the relationships between anthropology and education. What is the anthropology of education all about? What is or are the major concern(s) of educational anthropologists? Or to phrase the question more explicitly as did Foley, Levinson, and Hurtig in their 2001 article, *Anthropology Goes Inside: the New Educational Ethnography of Ethnicity and Gender*, “What has the discipline of anthropology contributed to the field of educational research?” Before I attempt to articulate the intersection between the discipline of anthropology and the field

of educational research, it is critical to provide a foundational definition of the field of anthropology of education.

Many scholars have attempted to define the scope of the field of anthropology of education (Fisher 1998; Foley et al. 2001; González 2004; Spindler 2000; Spindler & Spindler 1987; Yon 2003). In an effort to lay out the foundations of the field known as the anthropology of education, Yon (2003) observed that:

Long-established anthropological concerns about the socialization and enculturation of children in different cultural settings formed the historical context for the evolution, in the latter part of the twentieth century, of a distinct field of research focused on ethnographic accounts of schools and educational settings, broadly defined as the anthropology of education (Yon 2003:411).

The major concern of educational anthropology is to document processes of cultural variations and transmission in school settings. The anthropology of education addresses problems of cultural reproduction in schools because as Lucila Ek (2009) has observed, “Schooling is a key site of socialization” (Ek 2009:406). Anthropology as a discipline has applied its constructs to the field of education in a variety of ways. Using a similar argument, Norma González (2004) once observed that:

Since anthropological constructs have been extensively embedded within educational discourse, we might assume a deep investment of the parent discipline of anthropology in issues relating to education (González 2004:22).

González (2004) seems to point out that the theoretical underpinnings of the parent discipline of anthropology which is concerned with documenting and recording multiple meanings of culture validate and justify the use of anthropological methods in educational settings. The discipline of anthropology has contributed to the subfield of educational research in myriads of ways without losing its ethnographic focus. While adopting educational settings as the object of its investigation, the discipline of

anthropology has remained attached to its core methods of data collection and data analysis (Foley et al. 2001; Yon 2003). Speaking at the first Educational Anthropology Conference in Stanford in 1954, George Spindler, one of the organizers of the conference (Fisher 1998), delineated the relevance of educational ethnography, ascribing to that subdiscipline of anthropology a sense of purpose that would last for years to come:

Anthropology can help shed light on human behavior in educational situations...Directly relevant are the concepts of and data of specialized and relatively new fields in anthropology, such as personality and culture ("psychological anthropology") and cultural dynamics (culture change and acculturation) (Spindler 1955:58).

Yon's (2003), González's (2004), and Spindler's (1955) statements represent an important plea in support for the institutionalization of the subfield of ethnographic education. Their claims altogether demonstrate that ethnographic education can make a lasting contribution to the discipline of anthropology and education. Foley et al. (2001) add to the discussion in these terms:

Yet, by looking at education historically-how different teaching and learning modalities have unfolded over time-and comparatively-how different societies have attempted to educate their members-anthropology forces us to regularly distinguish between education and schooling. It thereby gives us great insight into our own educational challenges today (Foley et al. 2001:38).

Anthropology offers possibilities for cross-cultural analyses of our schools (Foley et al. 2001; Heat 1983; Spindler & Spindler 1987). As Spindler and Spindler (1987) once discussed, "There are many possible dimensions of cross-cultural understanding and the learning and teaching of culture" (Spindler & Spindler 1987:4). Educational anthropologists are devoted to studying culture from different angles; they distinguish between education and schooling. The former being the equivalent of what authors Cammarota and Romero (2011) describe as "Funds of knowledge and community

cultural wealth philosophies” (Cammarota & Romero 2011:492). And the latter incarnating a traditional form of education; one that views schools as a set of learning and teaching practices serving the purpose of social reproduction and cultural domination (Cammarota & Romero 2011; Ek 2009; González, Moll, & Amanti 2005; Spindler & Spindler 1987). In this dissertation, I am not interested in traditional learning and teaching practices in civil engineering programs. I am examining education from a broader perspective as I dissect cultural online elements in the educational settings that the USF Department of Civil and Environmental Engineering and the UF Department of Civil and Coastal Engineering represent. I am attempting to transcend the one-dimensional perspectives of traditional Western schooling (Cammarota & Romero 2011; González et al. 2005; Spindler & Spindler 1987) to start a conversation in a broader educational context. The work of Spindler and Spindler (1987) is relevant to this conversation for it points to the core of the business of educational ethnography, which is to uncover systemic issues of race and ethnicity and gender affecting the U.S. education system. However, these assertions also provide a good reason to ponder over the extent to which educational issues are a focal point in the debate over anthropological theorizing.

Understanding educational issues from the perspectives of those who experience those problems first hand is one major concern for educational anthropology. Through ethnographic accounts of school settings, educational anthropologists have devoted their efforts and energy to giving a “voice” to the educational world as a whole, that is, students, teachers, professors, administrators, staff, and educational practitioners (Borman et al. 2004; Ek 2009; González 2004; Harrison 2001; Medina & Luna 2000; Spindler & Spindler 1987; Swisher 2001). More important, educational anthropologists

have marshaled their forces to the cause of disenfranchised groups. Borman et al. (2004) have noted that “with the institutionalization of anthropology and education in the late mid-1960s, attention of the earliest researchers in the field was drawn to the importance of the education of students of color” (Borman et al. 2004:251). Educational anthropology, therefore, has as its primary concern the study of the experiences of students from historically underserved populations.

Educational ethnography has been used to understand issues affecting women and ethnic and racial minority students and to advance the cause of disenfranchised populations in the United States (Borman et al. 2004; Cammarota & Romero 2011; Ek 2009; González 2004; González et al. 2005; Medina & Luna 2000; Romero 2002; Yon 2003). The clearly stated concern of the anthropology of education for problems affecting marginalized groups in school settings provides a justification for the present work which investigates the role of the Internet in the participation of women and students of color in Science, Technology, Engineering, and Mathematics (STEM) fields, with a focus on two Florida civil engineering programs. How can ethnographic methods contribute a case study of access to civil engineering for women and ethnic and racial minorities? How can an examination of Web pages on the Internet advance this study?

Ethnographic methods enable this case study to move away from traditional empirical case studies on undergraduate engineering education that rely for the most part on analyses of statistical data. Furthermore, ethnography improves upon previous studies on undergraduate STEM participation for it makes it possible to obtain critical in-depth perspectives from individuals involved with civil engineering education. In other words, this study allows undergraduate civil engineering students, civil engineering professors

and university administrators to speak in their own voices about how websites affect participation in civil engineering programs. The scarcity of qualitative research-based evidence on the impact of Web-based materials on civil engineering education demonstrates the need for such scrutiny. On the other hand, this study stands as one of the first to investigate the ways in which Websites affect applications and enrollment patterns in civil engineering programs, especially for women and minorities. On a different level, this research is an opportunity to broaden the study of culture (the focus of educational ethnography) to fields which have long been non inclusive and seemingly culture-free, including engineering. Last, this study initiates an interesting interdisciplinary conversation among fields (anthropology, education, public relations/marketing, and engineering) which often pursue different research agendas.

As I outline earlier, this dissertation sought to understand the reason(s) why despite efforts – from universities such as USF and UF – to use their Web pages on the Internet as marketing instruments in recruiting individuals from disenfranchised populations such as women and racial and ethnic minorities into STEM fields, students from these groups not only remain underrepresented in engineering disciplines, but leave them. I address this issue by examining the University of South Florida and the University of Florida Web pages from a critical anthropological perspective. A discussion of the extent to which USF and UF’s sociocultural climate has been evidenced on the two institutions’ respective Websites was of critical importance. Wilson and Peterson (2002) once noted that, “[A]nthropology is uniquely suited for the study of socio-culturally situated online communication within a rapidly changing context” (Wilson & Peterson 2002:450). An anthropological study of online representations requires a query of the

Internet or Websites as vehicles of cultural reproduction and social assimilation and, therefore, as instruments of domination and power (DiMaggio, Hargittai, Russell Neuman, & Robinson 2001; Nakamura 2002; Wilson & Peterson 2002). Issues of identity formation (i.e., gender, race and ethnicity) are as present offline as they are online (Coleman 2010; González 2000; Kolko, Nakamura, & Rodman 2000; Nakamura 2002). This dissertation examines how cultural identities, imageries, and representations of students, professors, and administrators are being reproduced in cyberspace (i.e., on the University of South Florida and the University of Florida's Websites) (Coleman 2010; González 2000). The purpose of this study is to investigate ways in which Website content brings University of South Florida and University of Florida pre-civil engineering students to life as cultural beings (Coleman 2010; Nakamura 2002) and how online portrayals of women and students of color negate or inscribe certain identities (Ek 2009; Heat 1983; Spindler & Spindler 1987). I analyze written texts and images displayed on the aforementioned institutions' Web pages and reflect on how those Web pages build upon culturally accepted and socially transmitted notions of race and ethnicity and gender, which intersect issues of negation, rejection, domination, and power (Cammarota & Romero 2011; Ek 2009; González et al. 2005; Medina & Luna 2000; Romero 2002). Schooling is the place of socialization *par excellence*. However, schools are also the loci of identity reproduction and transmission because institutions of higher learning (i.e., colleges and universities) have the authority to perpetuate or negate certain identities on their campuses or Websites. In the following section, I review the different chapters that compose this dissertation in their order of appearance.

## 1.5 CHAPTERS ORGANIZATION

To examine Websites as instruments of cultural reproduction and as vehicles of power, the background chapter, which is the second chapter of this study, offers a review of the relevant literature on anthropological theorizing, issues pertaining to institutions of higher learning, including the rise of the Internet as a medium of communication and its contribution to higher education marketing, and issues in STEM fields. This section of the study specifically sheds light on a number of theoretical tenets used in anthropology, including structuralism; deficit theories; resistance theories; the theory of acculturation; and cultural ecology theory. Additionally, this part of the study examines the importance of the Internet in higher education to demonstrate that colleges and universities increasingly use Websites for marketing purposes. I question the significance of Internet Marketing and examine possible retention strategies for USF and UF, destined to “non-traditional” students. This is central because Web pages and Internet users vary from school to school; and *internauts*<sup>10</sup> relate to the Web in different ways and have different perceptions about it.

While the second chapter of the study provides a review of the literature on the issues highlighted above, problems of access to engineering for historically underserved populations remain a focal point of the study even though Web pages represent a major component in this study. Website content analysis was embedded in the larger discussion of the representation of women and students of color in engineering. This explains why, in Chapter 2, I give special attention to the research on the lives and experiences of women and racial and ethnic minorities in STEM fields. Detailed examination of both undergraduate or pre-civil engineering students and their professors is included as well.

---

<sup>10</sup> An internaut is someone who spends time exploring the World Wide Web.

The third chapter of the study offers a presentation of the context of the study while articulating the methodological approach employed to address the research questions of the study. This section is a glimpse into the research sites, two major Florida public universities; it is an opportunity to revisit the historical context of the American South—since Florida is a southern state— and to see the ramifications of history in educational issues. Additionally, Chapter 3 offers a discussion of the approach for analyzing the data as well as a breakdown of the different study samples. In this part of the study, I discuss the use of ethnographic research techniques of data collection (structured, in-depth individual interviews, focus groups, background information, observations and field notes and online data of the USF and UF civil engineering programs' Websites) and analytical software (ATLAS.TI 7.0).

Chapter 4 carries the findings of the study and articulates the theoretical framework that guided analysis of the research findings. This theoretical framework draws on the research questions articulated in the introductory part of this work and involves two different streams of theories critical in addressing issues of race and gender in educational settings. These include reproduction theories and dialogic public relations theories. Furthermore, this chapter identifies major themes in the study. Three main themes emerged from Websites and focus group and interview transcripts. I used these themes as centerpiece of study analysis. Each of the data collection techniques I used in this study revealed interesting patterns of meaning providing a critical, in-depth understanding of the role of Web-based, online information in engineering participation for women and students of color. The themes that emerged from data sources included marketing, usefulness of information, and climate.

In Chapter 5, I discuss the three key themes of marketing, usefulness of information, and climate presented above. Speaking of *marketing*, for example, I highlight, in Chapter 5, that university officers and civil engineering professors believe that information and images posted on the two Civil Engineering programs' Websites have a meaning and purpose. They admitted that the USF and UF College of Engineering and departments' Websites are primarily used for marketing purposes. Also, usefulness of information is critical. Here I use qualitative evidence to show that when browsing an engineering school's or department's Website, students look for specific facts that can help them make an informed decision about the college or engineering program to which they need to apply. The last theme discussed in Chapter 5 served to demonstrate that despite outreach efforts initiated by engineering colleges and departments, women and minorities do not always seem to "fit" in the engineering culture. I, therefore, argue that the University of South Florida's and the University of Florida's developing Internet Marketing strategies and posting useful information on the Web does not guaranty that women and ethnic and racial minority students entering these universities' civil engineering programs will thrive in engineering. Last, Chapter 6 represents the conclusive part of the study. This section summarizes facts from the research findings and discussion, and articulates limitations of the study and implications for policy, and, ultimately, offers a discussion of future research.

## CHAPTER TWO: BACKGROUND

### 2.1 CORE ANTHROPOLOGICAL CONCEPTS

It is important to begin this chapter with a discussion of problems of acculturation or culture change because one of the main claims in this dissertation has to do with how “powerful institutions” (in this case, colleges and universities) can use their authority to “inscribe and reinscribe certain essentialized identities” (Ek 2009:406) on their (online or offline) spaces. My perception is that if universities and colleges can “inscribe” or “reinscribe” identities, then, they can either negate cultural practices or reproduce and perpetuate them. And the more colleges and universities utilize the Internet for administrative, academic, and public relation goals (Kang & Norton 2006; McMillan & Morrison 2006; Selwyn 2008; Steinke 2004; Venegas 2006), the more the Web appears to provide a terrain for cultural reproduction and power relations (Coleman 2010; Wilson & Peterson 2002). The new media technology incorporates a wide variety of roles and impacts various dimensions of society in a way that no other media have. Building on this insight, I believe Melville Herskovits’ work on acculturation is relevant to this discussion in many respects.

By defining *acculturation* as “those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original cultural patterns of either or both groups” (Herskovits 1958:10), Herskovits wanted to stress that in the process of cultural change or cultural exchange the cultural values of the dominant group tend to become preeminent at the

expense of the cultural practices of minority groups. It is remarkable that Herskovits' assimilationist<sup>11</sup> perspective first led him to maintain that when Africans were brought to America, they had to accustom themselves to the dominant Anglo American culture (Gershenhorn 2004). Applying the assimilationist construct to the educational realm I ask, would Herskovits' view assume that in order for African American and Latino students to thrive in engineering programs, these students must deny their own culture and assimilate to the dominant Euro-American culture governing engineering programs in the U.S. Herskovits' theory is lacking in perspective in the sense that it does not give attention or value to the cultural survival of oppressed groups in the "acculturation" process. This thesis draws on what many scholars have referred to as deficit perspectives, those theories of school failure that see racial and ethnic communities as deviant places and, literally, blame the cultural backgrounds of students of color for their school failure (Camarota & Romero 2011; Ek 2009; Erickson 1987; González et al. 2005; McDermott 1987; Ogbu 2003; Olmedo 2003). Deficit theories derive from racist and stereotypical views about students of color; these perspectives are reflective of deep issues of power and control within the U.S. education system.

In a 2005 book entitled, *Funds of Knowledge: Theorizing Practices in Households, Communities, and Classrooms*, educational anthropologists, González et al. (2005) attempted to conceptualize the notion of culture within the framework known as "Funds of Knowledge" while connecting it to educational concerns. González et al. (2005) criticize the trends that associate the cultural practices of disenfranchised populations and educational failure. These authors contend that issues of power cannot be

---

<sup>11</sup> The assimilationist view assumed that cultural traits that were similar between blacks and whites meant that blacks adopted white traits and not the reverse or some more dynamic, two-way cultural exchange.

separated from educational practices. In discussing what she called the “culture of education policy” Stein (2004) observes that the traits and characteristics of policy culture include:

A shared conception of policy beneficiaries as deviant from (and usually deficient to) a perceived and often unstated norm; a presumption that government institutions can fulfill a corrective role in the lives of the country’s deviant inhabitants (Stein 2004:xii).

Apparent from the above quote is that that educational policymakers in Washington and elsewhere are trying to push a corrective agenda destined to “fix” the educational attainment of low-income and racial and ethnic minority students. By taking on a corrective approach, government institutions “segregate” students of color even more and deprive them from their agency. Race and class seem to be among the favorite themes in the framing of the concept of the culture of poverty. González et al. (2005) have questioned the culture of policy paradigm. Because it is critical to understand, for instance, who gets to decide what should be taught to African American and Latino students (González et al.2005; Heat 1983; Olmedo 2003). Constructs such as race, ethnicity, gender, and class are critical to understand the ramifications of the culture of policy: “The transmission of the culture of education policy from Congress to the classroom encouraged the language and rituals of naming and segregating eligible students” (Stein 2004:44). This is the problem we are confronting right now. Segregation and racism are seen as a “non-issue” for most policymakers. In light of this assumption, one might argue that because the policy culture feeds into powerful, undemocratic mechanisms designed to silence issues of identity in educational policy, this construct fails to capture the full complexity of policy contexts (Levinson, Sutton, & Winstead 2009; Opfer 2001; Stein 2004; Weaver-Hightower 2008) as the following excerpt

suggests: “Concern over class-based segregation, however, was not treated on the floors of Congress with similar levels of concern. In fact, the framing of poor children as culturally inferior was not deemed problematic” (Stein 2004:44). Education policy is defined in Congress; and it appears that only Congress can do or undo all of the issues entangled in our classrooms.

On a different level, poststructuralism, a late manifestation of structuralism, made history in intellectual milieus as a theoretical perspective used in the production of anthropological knowledge. This construct is critical to the current analysis since its proponents claim its relevance to issues of power. Authors such as Pierre Bourdieu (1984) and Michel Foucault (1979) are considered two of the most influential poststructuralists of their times. But for the purpose of the present study, I only briefly discuss Bourdieu’s perspectives of *habitus* and cultural capital because they speak directly to cultural reproduction and educational issues.

In *Distinction: A Social Critique of the Judgment of Taste* (1984), Bourdieu discussed how those in power define aesthetic concepts such as “taste”. Bourdieu observed that even when the subordinate classes may seem to have their own particular idea of “good taste,” “[It] must never be forgotten that the working-class ‘aesthetic’ is a dominated ‘aesthetic’ which is constantly obliged to define itself in terms of the dominant aesthetics” (Bourdieu 1984:41). Bourdieu’s critique of a definition of aesthetics supported and promoted by the French bourgeoisie certainly reveals power relationships. According to this formulation, taste differences between the subordinate classes and the elite, that is those in power, purport a top-down approach. In other words, the social and cultural values of the elite are imposed to the working classes. As Ortner (2005) once

observed, “For Bourdieu, the subject internalizes the structures of the external world, both culturally defined and objectively real. These internalized structures form a habitus, a system of dispositions that incline actors to act, think, and feel in ways consistent with the limits of the structure” (Ortner 2005:33). It is important to think of power in relational terms because it affects individuals at the interpersonal and institutional levels.

Along those lines, Bourdieu articulated the concept of “cultural capital” (Bourdieu 1974; 1977; 1984; Giroux 2009; McLaren 2009; Sullivan 200) to signify the proficiency in and familiarity with dominant cultural codes and practices. According to this theory, students enter the education system with different endowments of “cultural capital and cultural know-how”; which vary depending on students’ social backgrounds. Familiarity with and ability to decode the dominant language of education gives students from the dominant class an advantage over students from lower socioeconomic status (SES). (Bourdieu 1977) Interestingly, the constructs of *habitus* and cultural capital depict the class structure of France in the 1970s and 1980s. These constructs, according to Bourdieu, are the media whereby cultural knowledge is utilized as an instrument of power. The bottom line of the Bourdieusian arguments of *habitus* and cultural capital is that it demonstrates how the possibilities of the human subject are limited by class structures.

However, I highlighted the concepts of *habitus* and cultural capital to show that Bourdieu’s arguments on the judgment of taste and on differentiated cultural endowment are weakened by a one-sided, Eurocentrist perspective. It is fair to argue that Eurocentrist perspectives – including Marxist and poststructuralist views – have proven unsympathetic and irrelevant to causes of peoples of African descent in general and African Americans

in particular (Adair 2003; Adair & Dahlberg 2003; Camara 2008). The fact that these ideologies have systematically silenced how raced and gendered bodies are particularly affected in the process of class structures and cultural values internalization makes these theories hardly understandable and applicable to the realities of African Americans, for example. Bourdieu's notions of *habitus*, and cultural capital are consistent with the set of theories in European societies that refuse to engage directly and critically with issues of race and ethnicity, giving preeminence to issues of class (Adair 2003; Camara 2008). Examining the U.S. context, the very locus of this study, and focusing on the situation of African Americans put a Eurocentrist doctrine of class at crossed-purpose with Black causes. Class or race, which should go first? In a discussion of the politics of intercultural communication, Robert Young (1996) stated that:

[C]ultural membership is deeper than class membership. An economically upwardly mobile cultural group retains its cultural characteristics whereas an upwardly mobile working class member typically does not (Young 1996:148).

Young's (1996) description makes perfect sense. Racial stigmas have impacted U.S. society in a way that no other stigmas have. Hundreds of years after the Emancipation Proclamation and decades after passage of historic civil right legislations (Campbell, Denes, & Morrison 2000; DeVillar, Faltis, & Cummins 1994), African Americans in this country continue to confront plain racial discrimination and prejudice at all levels of social life, including in educational institutions. This is why it is urgent for educational theory and practice to point to aspects of school life that link schools to the wider society and to devote much attention to the ramifications of culture, ideology, and power. This discussion resonates quite well with the three major findings of this study (see discussion in Chapters 4 & 5).

Educational theory and practice is relevant to a discussion of women and racial and ethnic minorities' STEM participation in the sense that this perspective has the potential to critically engage with aspects of school life that link issues in engineering schools to the wider society. The construct of *hidden curriculum* (Giroux 2001; Giroux 2009), for example, may be used to inform problems of access to and persistence in civil engineering. As a by-product of schools or of non-school settings, the *hidden curriculum* suggests a hidden logic of schooling (Quigley 1990) drawing on and feeding into social status and unequal distribution of cultural capital (Bourdieu 1974; Bourdieu 1977; Giroux 2009; McLaren 2009). Studies have linked educational attainment to socioeconomic status (SES) (Foley 2005; Kingston 2001; Ogbu 1987; Ogbu 2003; Sullivan 2001). The concept of cultural capital needs clarifying. Cultural capital refers to the set of cultural knowledges, dispositions, and skills that are passed on from one generation to the next (Bourdieu 1984; Bourdieu 1977; Giroux 2009; McLaren 2009). Women and students of color's lack of "cultural capital" may prevent these students from entering or persisting in engineering. Students need to acquire Euro-American cultural knowledge and practices in order to navigate engineering programs of study and to thrive in engineering. In fact, social theory does not provide a framework to identify and understand infusions of power in our schools. As Giroux (2001) once pointed out, because "the specificities of culture, ideology, and power have never figured prominently in the dominant language of educational theory and practice", the debates on the hidden curriculum and the claims of critical theory are not enough to offer "a real basis for understanding the relationship among issues such as ideology, knowledge, and power" (Giroux 2001:73). According to the above formulation, a critical understanding of the relationship among issues such as

ideology, knowledge, and power should be the purpose of contemporary educational theory. Failure to explore such issues would imply that the debates on the hidden curriculum and the claims of critical theories have “reached their theoretical limits” (Giroux 2001:42). In a sense, critical pedagogy has lacked a strong theoretical foundation that would allow this orientation to offer a deeper understanding of the forces at work in and outside of our schools.

At the most general level, resistance theories, an extension of reproduction theories (Flores-Gonzales 2002; McLaren 2009), provide a framework for understanding problems of access to civil engineering departments. At the most specific level, issues in engineering schools must be investigated from different critical lenses for “schooling practices are always intricately related to broader issues of social class, ideology, and power” (González et al. 2005:276). The underrepresentation of women and racial and ethnic minority students in the USF Civil and Environmental Engineering Department and in the UF Civil and Coastal Engineering Department needs to be examined in relation to broader, systemic issues of power and domination. Critical theory can be configured in consistent critical ideological formulations such as the ones proposed “Frankfurt School” once suggested (Giroux 2001; Giroux 2009). Critical social theory, feminist perspectives, and critical race theory have the potential to fuse into one set of critical approaches (Essed 1994; Freire 2009; Giroux 2001; Giroux 2009; Henwood 1994; hooks 2009; McLaren 2009; Shor 2009) capable of providing in-depth, not-so-unproblematic accounts of schools. By “unproblematic” I mean that critical studies of schooling may give not even passing attention to problems of race.

Karen Henwood (1994) delivered an unequivocal, but sharp analysis of the tensions within social identity theories. She convincingly pointed out that “[E]ven critical perspectives in the social psychology of prejudice and discrimination tend to neglect black people’s experiences of racism and represent an impoverished approach to the social construction of ‘race’” (Henwood 1994:41). Social psychology theories are silent in their explanations of the processes through which people of African descent are discriminated against in the matrix of domination systems. Henwood (1994) reminds us that as resistance theories, critical identity theories have failed to capture the subtleties and processes of racisms and sexism affecting Blacks in educational settings. In discussing acts of resistance in schools, I frequently refer to African Americans because the black experience in America provides several penetrating instances that allow us to engage in a critical understanding of the (inter)connectedness of minority schooling and power in the United States. The debate that opposed Booker T. Washington and W.E.B. DuBois is just as salient and rich of critical nuances.

Washington and DuBois were at crossed-purpose when as to the educational priorities of African Americans. DuBois wanted “a group of well-educated African American leaders – about ten percent”<sup>12</sup> of the race – to work in black communities for the advancement of the other ninety percent” (Harris 1993:47). Clearly, the use of “college educated leaders to advance African Americans stood at the heart of DuBois’s philosophy” (Harris 1993:48). Unlike Washington who credited the thesis of accomodationists, DuBois resisted the idea that higher education should not be a priority for Blacks. DuBois sought to empower the African American community through higher

---

<sup>12</sup> The idea of the “Talented Tenth“ was that once trained and equipped with the necessary knowledge, ten percent of Black America would return to the African American communities and help advance the entire race.

learning because it was, for him, the best way to achieve self-determination. Washington, on the contrary, thought that “African Americans, in gaining their equal rights, should be patient and prove themselves” (Harris 1993:49). The underlying idea in this formulation is that Blacks would ascend the social ladder more easily if they accommodate the white majority. Derrick Bell, a civil rights attorney and activist, has a different opinion about “civil rights gains”. Describing what he refers to as the “interest conversion dilemma” (Shircliffe 2006:3), Bell suggests that the civil rights movement is unfinished business:

The interest of Blacks in achieving racial equality will be accommodated only when it converges with the interests of Whites; however, the 14<sup>th</sup> amendment, standing alone, will not authorize a judicial remedy providing effective racial equality for Blacks where the remedy sought threatens the superior societal status of middle- and upper-class Whites (Bell 1980:95).

What this statement tells is the story of many African Americans who feel that the civil rights movements has yet to fulfill its promises and that the fight for equality and social justice is far from over. Clearly, Washington’s view stands in sharp contrast with the thesis of new educational theorists who have promoted critical education theories not to legitimize traditional education but to challenge its foundations.

## 2.2 ANTHROPOLOGY, HIGHER EDUCATION, AND ISSUES IN STEM FIELDS

Anthropologists have always been concerned about the educational issues affecting the education system and shared among our communities (Cammarota & Romero 2011; Ek 2009; Fisher 1998; Foley et al. 2001; Fordham 2008; González 2004; McCarty et al. 2008; Ogbu 1987; Ogbu 2003). The anthropology of education has resolved to use ethnographic studies of schools as a basis to understanding issues related to the socialization and enculturation of children in different cultural settings (Yon 2003). By developing ethnographic accounts of school settings, the anthropological study of

education provides a “voice” to students, teachers, professors, administrators, staff, and educational practitioners. Educational anthropologists have marshaled their forces to institutionalize educational anthropology and to use this field of research as a means to support the cause of disenfranchised groups (Fordham 1999; González 2004; González et al. 2005; Yon 2003). Differences in race, ethnicity, social class, language, gender, sexual orientation, religion, and exceptionality, among other things, have all defined inequality in public education (Nieto 2005). College success is correlated to a variety of factors, including cultural background, pre-college preparation, recruitment programs, admissions policies, financial assistance, academic intervention programs, and graduate school preparation and admission (May & Chubin 2003; Nagda et al. 1998; Ogbu 2003). For example, many African American students must receive financial assistance and demonstrate proficiency in and familiarity with a Euro-American value system to persist in engineering. Relatedly, Hobson-Horton and Owens (2004) once argued that African American students are dropping out of college not because they do not value education but because they do not associate with the culture. This argument seems to signal the presence of deeper systemic issues in STEM fields in particular and in higher education in general. Public schools are allegedly ignoring the cultures and languages of minorities and are attempting to replace them with those of mainstream White Americans (Harrison 2001; McCarty & Bia 2002; McCarty et al. 2008; Medina & Luna 2000). Some minorities perceive this as an unacceptable imposition of Eurocentric curricula and Eurocentric pedagogic tradition (Ogbu 2003). Engineering schools’ climate has often been described as “chilly”; a result of enduring, static, predominantly white, middle class, heterosexual, and male values (Medina & Luna 2000). Evidence indicates that higher

education settings devalue or ignore indigenous students' worldviews (McCarty & Bia 2002; McCarty et al. 2008; Romero 2002) and scientific environments make individuals from racial and ethnic minority groups think that individuals from the majority group create and maintain a campus environment that makes students of color feel isolated (Crowley et al. 2004; Fordham 2008; Hurtado et al. 1998; Jones et al. 2002). As a result, most minority students end up limiting their interactions across campus and participating exclusively to ethnic-specific (multicultural) events and organizations (Jones et al. 2002). Likewise, the presence of women in colleges and engineering schools has led university communities across the nation to confront questions about what it means to be a man or a woman in an increasingly technical society, and to question what it means to be an engineer (Bix 2004; Durkin 1975; Ogilvie 1986; Oldenziel 2000). Women engineers have always gotten a certain amount of attention as a result of women being a "rarity" in most science and engineering departments in the United States (Bix 2004; Ogilvie 1986; Oldenziel 2000). At the most general level, the work of engineers has a strong masculine connotation. This state of affairs may reinforce negative stereotypes and prejudices against women in higher education, STEM majors, and engineering.

Romero (2002) once pointed out that educational scholars have addressed a long-overdue search for a balance between "indigenous" cultures of America and mainstream academics that enhances students' connections to their communities, cultural traditions, and the larger society. Several critics of Eurocentric education have indicated that the diversification of college faculty, for instance, is an important component for ensuring student academic success (Cole & Barber 2003; Hurtado 2001; Umbach 2006). One of the most compelling arguments for a diverse faculty body in institutions of higher

education relates to the important contribution made by faculty of color in undergraduate education. Some argue that diversifying the faculty body increases the variation of perspectives and approaches creating a richer learning environment for students (Umbach 2006). According to Kanter (1993), underrepresented groups need to be at least 15% of an organization in order to begin to impact that organization's culture, policy, and agenda. However, while people of color now make up approximately 31% of the United States population, African Americans, Asian Americans, Latina/os, and Native Americans represent only 13% of the professoriate at degree-seeking institutions of higher education (Harrison 2001; Medina & Luna 2000; National Center for Education Statistics 2000; Umbach 2006). Clearly, from an organizational psychology standpoint the representation of minority groups in public universities is below the average level for multicultural integration to become a reality. Bourdieu (1977) once argued that culture is an instrument of communication and knowledge but also an ideological force or political power for imposing social order. But, using a different line of thought, Foley (2005) has dismissed the claim that white Euro-American values dictate academia. Citing ethnic theories, he concedes that ethnic or racial identity constructions and everyday ethnic or racial practices are never fixed and inherited (Foley 2005). For Foley, the cultural concepts of gender and ethnicity are mere social constructs which cannot be associated with heredity or genetics. But as much as I do justice to Foley's argument, I must concede that constructs such as race and ethnicity or gender have been reproduced by popular, institutional media, including the Internet and Websites, for so long as in the collective conscience, those constructs even appear to be "fixed and inherited".

## 2.3 ANTHROPOLOGY AND ONLINE COMMUNITIES

One way to understand computing and the Internet is to compare these mechanisms with traditional media technologies, viewing them as new forms of technologically mediated language and human interactions. As I discuss earlier, an anthropological approach drawing on the work of visual anthropology and the anthropology of mass media, as well as approaches in media and cultural studies, provides critical perspectives to view phenomena of online interactions (Wilson & Peterson 2002). DiMaggio et al. (2001) define the Internet as the electronic network of networks connecting people and information through computers and other digital devices enabling person-to-person or person-to-institution or person-to-machine communication and information retrieval. The fascination individuals – around the globe and in the United States – have for the Internet renders plausible the assumption that the new technology is likely to transform human relationships and interactions more deeply than any other communication means have (DiMaggio et al. 2001; Warschauer 1998). People increasingly engage in fast, long distance communications. The Internet has impacted every aspect of human life, including the social, cultural, political, and economic dimensions of contemporary society (Coleman 2010; DiMaggio et al. 2001; Warschauer 1998; Wilson & Peterson 2002). Additionally, the new technology known as the Internet has even more significance in today's world since internauts in diverse real-world locations use the Web to negotiate cross-cultural interactions (Coleman 2010; González 2000; Kolko et al. 2000; Nakamura 2002; Slater & Miller 2002). Not only does the Internet function as a platform for identity creation, but the Web has become the venue for cross-cultural communications.

By enabling the emergence of new types of communities and communicative practices (Coleman 2010; Wilson & Peterson 2002), the Internet is an essential communication tool in the twenty-first century (DiMaggio et al. 2001; Ogan et al. 2008). However, scholars have warned that the Internet may hold false promises. The propensity of the new technology to radically transform existing power structures is undermined by the power of communication regulations authorities to monitor and oversee information access (Hakken 1999; Warschauer 1998; Wilson and Peterson 2002). Through most of the 1980s and 1990s, the conviction was widespread that the growing and evolving communications medium comprising inter-networked computers would enable the rapid and fundamental transformation of existing sociopolitical structures (Coleman 2010; Warschauer 1998; Wilson & Peterson 2002). Similarly, David Hakken (1999) pointed to uncritical appropriations of the popular rhetoric on technology in much of the scholarly Internet research – rhetoric that has created multiple, diffused, disconnected discourses which mirror the hype of popular *cyberculture*<sup>13</sup>. Not only are nation states (at least hypothetically) committed to regulate internet-based access to information, but they have come to hold a substantial control over Website information content.

#### 2.4 HIGHER EDUCATION, THE INTERNET REVOLUTION, AND INTERNET MARKETING.

Wilson and Peterson (2002) have brought to our attention that in the process of studying online communities from an anthropological perspective, it is crucial to ponder about the ways in which scholars have approached online communities and online communication in general. This involves determining if constructs such as race or

---

<sup>13</sup> Cyberculture refers to the set of behaviors and values that have emerged as a result of the use of computer networking.

ethnicity or gender – through which communities tend to be defined – are misleading (see discussion in Chapter 1) or not and how issues of information access and power structures are evidenced online (Warschauer 1998; Wilson & Peterson 2002). Hakken (1999) raised similar questions when he examined, 1) the significance of social practices emerging from an increasing reliance on online communication; 2) the impact of cyberculture in human activity in the future; and 3) the possibilities and dangers to which our use and misuse of cyberculture exposes us? Clearly, the Web has come to play a key role in all facets of contemporary human activities. Along this line of argument, it must be pointed out that Internet access affects individuals in a wide variety of ways in different social strata. During a discussion on an educational blog called *Gradebook* (Gradebook Blog 2011), Pinellas County<sup>14</sup> officials urged principals in their school district to “ensure that teachers are not unfairly disadvantaging some students by assigning homework that require Internet access”. What is this blog conversation telling us? Families and students with no access to the Internet in their homes tend to be disadvantaged in the educational process. (Gladieux & Swail 1999; Venegas 2006) Likewise, a U.S. Census 2009 study reported that 68.7% of American households had computer and Internet access, whereas the remaining 31.3% totally lacked familiarity with these technologies. On the other hand, 45% of the 31.3% who reported having no Internet access were black households, while 47% of them were Hispanic households. Most importantly, the U.S. Census 2009 study found that in 67.8% of the households investigated, the highest level of educational attainment was less than a high school diploma. The majority of households with access to the Internet were White (U.S. Census Bureau 2009). Low-income students and students of color are unlikely to have a leg up in

---

<sup>14</sup> Pinellas County is one Florida's 67 counties.

the computer and Internet use. As a result, the pool of students that a Web-based approach to marketing could reach is white students.

The Internet and Websites outline deep problems of social justice and equity; Internet disparities affect students in the school setting as well. Availability of Web accessible computers in schools does not necessarily translate in student access, especially in charter schools where most low-income students are populated. Students may not be allowed to use the computers in their schools (Venegas 2006). The interconnectedness of Internet access and problems of equity is essential to this study, especially when research shows that the Internet, and more particularly Websites, is ranked as the most reliable source of information used by potentials college students who browse the Web for either college search or application purposes (Guliana 2000; McAllister-Spooner 2008; McMillan & Morrison 2006; Stoner & Lincoln 2000). Moreover, as Stoner and Lincoln (2000) suggest, traditional sources of recruitment and retention have outmoded by a Web-based approach to marketing. Today, one fast way to get the most up to date information about engineering schools is to browse the Web. With this in mind, one easily understands that computer access or, more specifically, Web accessible computers play out in the educational attainment of students from traditionally underrepresented groups.

The interplay between the Internet and Websites and marketing is undeniable (Kuegler 2000; Stafford 2005). An effort to develop a marketing approach to the Internet that involves various groups requires considering the kinds of questions raised by Wilson and Peterson in their 2002 study. Considering the case of African Americans, the issue of homogeneity in the African American community is one that renders the creation of an

African American “cultural brand” for Web-based recruiting quasi impossible. And as the Internet offers opportunities to collect and send information that were not available in the past, it is worth wondering if a single theory of Internet marketing can be arrived at to sustain the promotion of a racial community online given the ambiguities surrounding the definition of concepts such as race or gender or ethnicity (Lavenda & Schultz 2010; Winant 2010). As I underline earlier (see discussion in Chapter 1), the concept of race is elusive and without strong (biological) foundations (Gould 1996). However, it is difficult if not impossible to deny the significance of race in contemporary human activities (Gould 1996; Lavenda & Schultz 2010; Podolefsky et al. 2009). The fact that race seems to be everywhere and nowhere at the same time renders the concept of community a difficult focus for study, generally because it seems to symbolize an arbitrary and groundless construct (Wilson & Peterson 2002). This is even more so when issues of race and ethnicity and gender are taken into the cyberculture conversation.

Wilson and Peterson (2002) have conceded that in the case of Internet-mediated communication within a group, constituted around some shared interest or condition, the problem of a community is compounded. This is especially true when one looks at the body of existing literature on Internet communication. Within the scholarly literature on Internet communication, a debate has continued about whether online, virtual, or otherwise computer-mediated communities are real or imagined (Gibb 2006; Jones 1995; Kolko et al. 2000; Nakamura 2002; Wilson & Peterson 2002). Relatedly, Kolko et al. (2000) once observed that the most prominent of the arguments about the significance of race in cyberspace is the assumption that “online environments facilitate fragmentation of identity” (Kolko et al. 2000:5). This is absolutely not true. Online communities more than

anything are community by choice or by association (Jones 1995). Members of virtual communities freely choose to assert their identity or not or to be a part of a given group or not. Considerable attention has been given to the idea that virtual spaces allow for fundamentally new constructions of identity; these constructions would be detached from any generally accepted frames of reference (Gibb 2006; González 2000; Markham 1998; Steinke 2004). Of course, identities are presented and negotiated in a variety of ways in online interactions; and these often cannot be understood without considering the offline context (Jones 1995; McMillan & Morrison 2006; Markham 1998; Richardson 2001; Wilson & Peterson 2002). There is a considerable overlap between virtual and real locales or spaces.

At any rate, Internet marketing practices must align with social offline realities. Stressing retailing theory, a theory based on on-ground patronage and interactivity, Zinkhan (2005) one explained that this approach represents just one possibility out of many. In traditional retailing theory, patronage behavior includes such behaviors as buying from particular outlets and showing fidelity to such outlets (Zinkhan 2005). This perspective draws on traditional rules of mass communication and minimizes the versatility of the Internet as a new medium of communication capable of combining both old and new forms of advertising models. Kirby and Marsden (2006) pointed out that mass marketing today is a mass mistake. In other words, today the Internet offers advertising companies the opportunity to utilize more modern forms of marketing techniques such as “interactive technologies” (i.e., Web phones or video conferencing) (Nicovich & Cornwell 2001:147). It is tempting to use new technologies in terms of what existing technologies can achieve. As Nicovich and Cornwell (2001) noted:

While many attempt to mold the Internet into a new form of mass communication, a few are realizing that the Internet is a vastly different form of communications device that combines many of the elements of previous forms (Nicovich & Cornwell 2001).

The Internet has the ability to combine different forms of marketing techniques. Traditionally, there was a one-way street type of communication between the company and the customer. With the Internet, a two-way system has been adopted to allow the company to interact with the customer and to gain specific insight that was hardly available before. Stafford (2005) noted that a prerequisite to truly understand the use and effectiveness of the World Wide Web as a marketing device is to develop a single theory of marketing that could be easily applicable to the Web.

Besides this, educational scholars and public relation experts have commented on the interconnectedness between the Internet and education (Kang & Norton 2006; McAllister-Spooner & Taylor 2007; McAllister-Spooner 2008; McMillan & Morrison 2006; Selwyn 2008; Venegas 2006). The Internet has gripped the realm of education. Institutions of higher learning have devoted substantial resources to make the communication between the university and its multiple interlocutors a fact (Gladieux & Swail 1999; Kang & Norton 2006; Selwyn 2008). It is, therefore, likely that prospective undergraduate students browse college and university Websites in search for information content that would help them make an informed decision throughout the application process.

It must be noted that there is a scarcity of literature on the importance of Website use in college applications and enrollment patterns. One theoretical framework critical to this study draws on public relations theories to understand the nature of communication practices among colleges and universities, students, and other interested publics. This

dissertation reflects on the assumptions of a number of authors, including McMillan and Morrison (2006), Kang and Norton (2006), McAllister-Spooner (2008), and Kent and Taylor (2002). More than a decade ago, Kent and Taylor (1998) articulated a theory-based strategic framework to facilitate relationship building with a variety of audiences on the World Wide Web. Streams of perspectives have since grown out of the public relations “dialogic loop” theory (Kang & Norton 2006; Kent & Taylor 2002; McAllister-Spooner 2008; McAllister-Spooner & Taylor 2007). Kang and Norton (2006) and McAllister-Spooner and Taylor (2007) – whose works builds extensively on the Kent and Taylor (1998) public relations “dialogic loop” model – are particularly relevant to this study. The approaches developed by these authors may be used as a frame of reference for this dissertation.

Kang and Norton (2006) examined colleges and universities’ use of Websites to shed light on how these Websites are being used to achieve public relations goals. University Web pages contain wealth of information, including admissions information (e.g., admissions requirements), financial or scholarship sources, links to library and departments (Kang & Norton 2006; Venegas 2006). On the other hand, in their examination of community college Websites, McAllister-Spooner and Taylor (2007) have suggested that community college have created user-friendly, information Web pages designed to communicate with a variety of publics. With mounting evidence that Websites represent the “face” of colleges and universities around the world (McAllister-Spooner & Taylor 2007), institutions of higher learning are determined to engage in a public relations venture which requires them to harness as much information as they find appropriate for Web display. The ultimate goal is to build lasting public relations with

multiple audiences, including students. This may prove to be an excellent communication strategy for colleges and universities because the Web has become a means of communication of choice for the average college student. McMillan and Morrison (2006) once stated that college students are more likely than any other segment of the general population to be online and to perform a wide range of activities. This formulation is essential because it indicates that meaningful interactions take place between students and universities. It is important, however, to ponder about the place of traditionally underrepresented groups such as women and racial and ethnic minority students in this dialogue, given universities are dedicated to providing information to all interested publics. I touch on this issue as I articulate the key findings of this study (see discussion in Chapter 4). The following chapter discusses methods of data collection employed in this study. I present each method used while reflecting on my experience in the field. Additionally, I incorporated tables and figures (i.e., bar graphs and photographs) to illustrate my point further.

## **CHAPTER THREE: METHODS**

### **3.1 RESEARCH DESIGN**

This study utilized a qualitative design and consisted of two major phases. The first phase involved focus groups with undergraduate students from the USF and UF Civil Engineering programs and in-depth interviews with both civil engineering professors and university administrators. The first and the second phase of the study literally took place simultaneously since I carried out online data collection of the USF and UF general Websites, including the two institutions' Civil Engineering programs' Web pages at different stages throughout the research. I was to visit the USF and UF Civil Engineering programs' Websites at least once a month from November of 2009 through January of 2011. Once a month, I pulled relevant Web pages from the USF Department of Civil and Environmental Engineering and the UF Department of Civil and Coastal Engineering's websites. Web pages monitored included the following: college and department (home pages), undergraduate students, prospective undergraduate students, faculty and staff, admissions, undergraduate admission, school events, and newsletters (Table 3.1).

**Table 3.1** Number of Visits per University Websites Monitored

Site Name	URL	Visits
USF Eng	<a href="http://www2.eng.usf.edu/">http://www2.eng.usf.edu/</a>	16
UF Eng	<a href="http://www.eng.ufl.edu/index.php">http://www.eng.ufl.edu/index.php</a>	14
USF CEE	<a href="http://cee.eng.usf.edu/">http://cee.eng.usf.edu/</a>	14
UF CCE	<a href="http://www.ce.ufl.edu/">http://www.ce.ufl.edu/</a>	15
UF Elect	<a href="http://www.ce.ufl.edu/electives.html">http://www.ce.ufl.edu/electives.html</a>	16
UF Admiss	<a href="http://www.eng.ufl.edu/admissions/undergraduateadmissions/index.php">http://www.eng.ufl.edu/admissions/undergraduateadmissions/index.php</a>	15
USF Eng Up	<a href="http://www2.eng.usf.edu/cee/#&amp;slider1=1">http://www2.eng.usf.edu/cee/#&amp;slider1=1</a>	2
<b>Total</b>	<b>7</b>	<b>92</b>

*Source:* Website data compiled by PI throughout Website data collection. Dissertation Fieldwork 2009-2010.

An important fact is that all Web pages monitored were not necessarily included in the analysis since I desired to visit as many Web pages as possible, allowing me to emphasize those that would help shed light on the associations between students' cultural background, gender, Website experiences, and civil engineering program selection. (Table 3.1) Additionally, it must be pointed out that students depicted in the two institutions' Websites are real students attending the USF and the UF Colleges of Engineering. The focus was on Web pages containing information and images of women and minorities in engineering. Additionally, I set out to keep track of changes in Website content at beginning, half way through, and around the end of online data collection, that is in February of 2011.

This research drew on a year-long case study conducted in the Civil Engineering Departments of the University of South Florida and the University of Florida. Albeit it is primarily a case study, this dissertation employed traditional ethnographic methods of data collection. Ethnography is a peculiarly human endeavor and a slow process in which the researcher is the main tool for collecting primary data (Agar 1996; Lavenda & Schultz 2010; Sterk 2009). LeCompte et al. (1999) defined the ethnographic approach as a mechanism providing a valid and important way to gather qualitative information about the larger community. Data used in the present study are derived from field notes, school artifacts (this includes Web pages, departmental newsletters, college magazines, and pictures taken in each school), in-depth interviews with civil engineering professors and administrators, and focus groups with civil engineering undergraduate students.

For the purpose of analysis, I included conversations, observations, and interpretations from the field in analysis. Additionally, I recorded said conversations, observations, and interpretations into my field notes. Although observation is “subordinate to what one learns in interviews” (Agar 1996:9), I recount what I observed during the course of fieldwork at USF and UF. Observations carried out for the purpose of this study enabled me to test out and think critically about what I was learning (Agar 1996; Berg 2007; Lavenda & Schultz 2010) from the interviews with civil engineering professors and university administrators, focus groups with pre-engineering students, and university and departmental Websites. I incorporated conversations, anecdotes, direct observations, and interpretations from field notes throughout this Chapter in order to make sense of the time spent in the field. The goal is to give a presence to how I negotiated the field, what I saw, who I interacted with, or to discuss issues relating to the

recruiting process. In a sense, all these data collection methods enabled me to triangulate<sup>15</sup> data and perspectives (Agar 1996; Berg 2007), that is to examine a symbolic reality from different angles.

Furthermore, in this dissertation, I utilized analytic software ATLAS TI. 07 to code interview transcripts and Web pages. ATLAS TI. is a computer software program used mostly, but not exclusively, in qualitative research or qualitative data analysis. Thanks to this software program, I was able to identify and code in groupings relevant patterns of meaning and themes contained in interview transcripts and Websites. Coding allowed me to streamline my data sources (i.e, interviews, focus groups, Websites, field notes) and to analyze data thematically and critically. For example, I would group all the quotes addressing the theme of “Internet Marketing” together, regardless of their source. Then, I would examine the relationships among the quotes. In other words, I would investigate if, how, and why the quotes contradict one another and if, how, and why the “Internet Marketing” group of quotes would complicate a different group of quotes, for example the “Climate and Websites” group of quotes. Coding activities provided an opportunity to cross-analyze data and to answer the research questions more directly. A qualitative research design was particularly useful to answer the research questions because data collection techniques and methods of analysis employed by qualitative researchers have the potential to elicit patterns of meaning contained in interviews, focus groups, Web pages, or observations and to capture cultural nuances that mere statistical evidence cannot.

---

<sup>15</sup> In anthropology, triangulation refers to the use of at least three different research methods in studying a symbolic reality. The term is also commonly used in surveying activities to designate the use of multiple lines of sight.

### 3.1.1 Samples

Early on in this research, before I got started with data collection, I determined what the inclusion criteria for the study would be. I decided that only individuals in good mental and physical health condition could be allowed to volunteer their time in the study. Undergraduate pre-engineering students from USF and UF Departments of Civil Engineering were the primary targets of the study. To volunteer their time in the research, civil engineering students had to be either male or female and at least 18 years of age. By interviewing students 18 and older I avoided the IRB issues associated with interviewing minors and gained more direct perspective on the problem. Additionally, research participants had to be either male or female from the following racial and ethnic groups: “White”, “Black”, “Asian”, and “Hispanic”. Two specific ethnic groups were not purposefully included in this study, notably “American Indian/Alaskan Natives” and “Native Hawaiians/Pacific Islanders”. I decided not include “American Indian/Alaskan Natives” and “Native Hawaiians/Pacific Islanders” in my sample for I anticipated that it would be difficult to identify and recruit individuals from those groups. Also, civil engineering professors and university officials employed by either one of the two universities investigated (i.e., USF and UF) at the time the research was being carried out were eligible to participate in the study. Civil engineering professors who did not teach any civil engineering courses during the course of the research were not allowed to enroll in the study.

On the face of it, sampling appears to be a straightforward process: identifying and recruiting individuals to participate in research activities. In actuality, sampling is of utmost importance to qualitative research designs (Agar 1996; Jones, Torres, & Arminio

2006) as establishing samples can be an intricate task. Poor sampling decisions directly impact data quality, credibility, generalizability, and trustworthiness of findings (LeCompte & Schensul 1999). I undertook to make it possible for different members of the UF and USF civil engineering communities to volunteer their time in the study. For the purpose of this study, two different samples were used: one initial sample and one incremental sample. Analysis essentially drew on the initial sample, although data from the incremental sample also added to the analysis. The initial sample refers to the sample that was generated through study research design. This sample includes interview and focus group participants. The initial sample consisted of n=40 participants, including 23 pre-civil engineering or undergraduate students, 8 civil engineering professors, and 9 university administrators. On the other hand, the incremental sample is the sample where data were not generated for the purpose of this study but were added to support the analysis. The incremental sample involved n=17 participants. Unlike the initial sample which involved pre-civil engineering students, the incremental sample comprised students who had enrolled in different programs of study in the University of South Florida's College of Engineering between May 2002 and August 2006 but ended up switching from USF Engineering into another major.

The 17 participants in the incremental sample were “switchers”, that is students who left engineering for a different major within USF. In 2008, researchers at the Alliance for Applied Research in Education and Anthropology (AAREA) conducted retrospective interviews with “switchers” to determine the causes of attrition from engineering programs. The *Switchers Study* was developed as part of a large mixed methods study involving several engineering schools in the state of Florida. It is critical

at this point to discuss pre-civil engineering student demographic data for the two civil engineering departments investigated in this study, namely the University of South Florida's Department of Civil and Environmental Engineering (CEE) and the University of Florida's Department of Civil and Coastal Engineering (CCE).

Demographic data used in this study derived from interactive university online data available on the University of South Florida's USF Info Center's website (University of South Florida Info Center 2011) and on the Florida Board of Governors Website (Florida BOG 2011). It must be noted that these interactive demographic data are not official data. However, data were useful because they provided an opportunity to compare general demographic data (see discussion in Chapters 1 and 2) on the representation of women and minority students in engineering programs in the U.S. and demographic data generated in the case study. Additionally, one reason for presenting data from different academic years is because the USF Info Center's (database from which the University of South Florida's CEE enrollment information was extracted) interactive data are updated in the beginning of the year and made readily available to the public. The Florida Board of Governors (the database from which the University of Florida's CCE data were drawn) interactive data do not become accessible until the end of the school year.

Tables 3.2 and 3.3 display the absolute, aggregated number of individual students enrolled by academic level and by race and ethnicity in the Department of Civil and Environmental Engineering at the University of South Florida. I used the "Drop/Add" benchmark within the fall semester of 2011. These are unduplicated headcount numbers, sorted by the self-declared home campus of pre-civil engineering or undergraduate

students. Interestingly, these numbers did not include freshmen. Furthermore, civil engineering sophomores are relatively underrepresented in this pool of students.

**Table 3.2** USF Pre-Civil Engineering/Undergraduates by Academic Level and by Race and Ethnicity

	NRA	Lat	Bla	Am Ind.	As	Wh	2Rac	Not Rep	Total
<b>2<sup>nd</sup> Yr</b>	0	1	1	0	0	1	1	0	4
<b>3<sup>rd</sup> Yr</b>	0	3	0	0	1	24	1	0	29
<b>4<sup>th</sup> Yr</b>	4	31	10	0	12	138	0	1	196
<b>Total</b>	4	35	11	0	13	163	2	1	229

Headcount of enrollments, fall 2011. *Source:* USF Info Center 2011.

Undergraduate pre-engineering enrollment numbers for the fall of 2011 for the University of South Florida's Department of Civil and Environment Engineering showed that men represented 76.8% of overall enrollments, while women accounted for 23.1% of enrollments (Table 3.3). The headcount of undergraduate students by race and ethnicity for the fall of 2011 for the University of South Florida's Department of Civil and Environment Engineering presents an interesting trend. The breakdown of enrollments by race and ethnicity was another story. Latino represented 15.2% of overall enrollments; Black 4.8%; Asian 5.6%; and White 71.1% (Table 3.2).

**Table 3.3** USF Pre-Civil Engineering Undergraduates by Academic Level and by Gender

	Male	Female	Not Rep	Total
<b>2<sup>nd</sup> Yr</b>	4	0	0	4
<b>3<sup>rd</sup> Yr</b>	21	8	0	29
<b>4<sup>th</sup> Yr</b>	151	45	0	196
<b>Total</b>	176	53	0	229

Headcount of enrollments, fall 2011. *Source:* USF Info Center 2011.

Table 3.4 displays the absolute, aggregated headcount of individual pre-engineering students enrolled by gender and by race and ethnicity in the Department of Civil and Coastal Engineering at the University of Florida. Interestingly, the above percentages summarize enrollment patterns by race and ethnicity and by gender in the Department of Civil and Environmental Engineering at USF during the fall of 2011. Data presented above indicate that the White category in total represent more than all the other categories combined. Furthermore, the male group accounts for more than three times the representation of the female group.

**Table 3.4** UF Civil Engineering Undergraduates by Gender and by Race and Ethnicity

	Black	White	Latino	Asian	Total
<b>Male</b>	24	336	98	23	481
<b>Female</b>	14	83	20	15	132
<b>Total</b>	38	419	118	38	613

Headcount of enrollments, fall 2010. *Source:* Florida Board of Governors 2010.

On the other hand, an examination of undergraduate enrollments by gender in the University of Florida's Department of Civil and Coastal Engineering revealed that men made up 78.4% of the overall enrollments for the fall of 2010, while women represented 21.5% (Table 3.4). Analysis of these numbers by race and ethnicity indicated that Asian represented 6.1% of overall enrollments; Latino 19.2%; Black 6.1%; and White 68.3% (Table 3.4). The above percentages reflect enrollment patterns by race and ethnicity and by gender in the UF Civil and Coastal Engineering Department during the fall of 2010. Like at USF, the White category in total is more than all the other categories combined and the male group represents about four times the representation of the female group. Data presented above display the larger set from which I drew the pool of students I recruited for my focus groups at USF and UF. Data are a factual illustration of the underrepresentation of women and racial and ethnic minority students in the two civil engineering programs under scrutiny.

The main student sample is not representative of the fall 2011 pre-engineering student enrollments at USF and the fall 2010 undergraduate student enrollments at UF with respect to student gender and racial and ethnic composition in two schools' Colleges of Engineering. Likewise, the switcher sample is not representative of the fall 2011 pre-engineering student enrollments with respect to gender and racial and ethnic composition in USF Engineering. Likewise, the civil engineering professor sample and the administrator sample are not representative of the faculty and administrator populations at USF and UF (see Tables 3.4 & 3.6) with respect to the demographic elements previously underlined. Altogether, I wished to have samples that included an overrepresentation of women and minority students, the focus of the inquiry.

### 3.1.1.1 Reflexions from the Field

Today, as I look back at the research process, I understand the position I was in as a researcher doing fieldwork in two different sites. I can comprehend that my numerous trips between Tampa and Gainesville and my interactions inside two different departments of civil engineering required me to negotiate relationships with pre-engineering students, civil engineering professors, and university administrators of various backgrounds very cautiously. There has always been some anxiety issues related to doing fieldwork (Agar 1996; LeCompte et al. 1999) because to paraphrase Agar (1996), ethnographers have always been “The professional strangers”. I was a stranger to much. I was a stranger to my respondents, their offices, their classrooms, their amphitheaters, their study rooms, and their departments. In a sense, I was stranger to their environment.

Before I entered the field, I continually meditated on the nature of my future relationships with research participants at the University of South Florida and the University of Florida. “How will I be perceived?”; “Will I ever be accepted?”; “How quick will I be in terms of recruiting pre-engineering students?” These were some of the questions I was asking myself. I was also anxious about how my training as an anthropologist will be perceived in those “engineering lands”. Equally important, I was wondering if my being a doctoral candidate or a Black male or a foreign national (studying at the University of South Florida) would complicate or facilitate the research experience for me in Gainesville or Tampa. Like Agar (1996) said I was confronted with the question of, “Who are you to do this?” (Agar 1996:91). I was sensing the “arrogance” or audacity described by some anthropologists (Agar 1996; Berg 2007). The ‘arrogance’

and the ‘audacity’ of pretending you can study and to understand an environment that is not your own after spending some time in it. Furthermore, I was concerned about how my not being a native speaker of American English would reflect on the results of my research; if the participants would be able to understand my “accent”; or if I was going to be able to understand theirs. This also provided an opportunity to gage and reflect on my awareness of the biases I was going to bring to fieldwork situations from my own cultural background and personality (Agar 1996). In the same way, I was thinking (maybe less anxiously) about entry at USF. I felt less pressured at the thought of recruiting subjects at USF. The fact that USF was my “home campus” seemed an advantage. Being able to walk over to the College of Engineering (from my research base in the Eastern side of the USF Tampa campus) and introduce myself as a “USF student” and then start recruiting subjects or observing the physical ecology added a convenience that my UF Gainesville fieldwork experience lacked. At any rate, I had only one goal in mind: recruit, recruit, and recruit.

While in the field (both at USF and UF), some of the students with which I interacted were interested in knowing if I was doing this research for some “big institution” or if I was “getting paid” by USF or UF to conduct this study or where the focus groups were taking place. Whenever the occasion arose, I explained with the same passion and patience that this study was being conducted as part of the completion of my Ph.D. degree and that I was not getting paid to conduct the research. One of the most important questions I confronted was the monetary question: “Where does the money come from?” Although I never got asked this question directly, there seemed to be the implicit belief that I was somehow funded by some organization out there. I had to clarify

that the \$5 dollars stipend disbursed to every participant came in part from my Major Professor “overhead account” and from personal savings. In addition, the fact that most of the focus groups were scheduled to take place in a conference room provided by each department, may have led students to associate me with the “institution” instead of seeing my study as an independently carried out research. All of these assumptions about me and my study probably had a direct effect on the nature and quality of my study. It is, therefore, of utmost importance to remain reflexive about my research. I also, learned from this experience that doing multi-sited research like my own is a daunting task that surely calls for set of complexities.

#### 3.1.1.2 The Initial Sample

The initial sample – the sample generated through the research design for this study and including interview and focus group participants – can be broken down into several subsamples. The student sample  $n=23$  comprised 6 women and 17 men. The female sample included 3 White females and 2 Latina females, and 1 female who self-identified as “Other-East European”. Among the men were 2 Black males, 9 White males, 4 Latino males, 1 male who self-identified as “Black/African American” and “Latino/Hispanic American” at the same time, and 1 male who identified as “multiracial”. It must be noted that for analytic and methodological purposes, the participants who identified as “Eastern European”, “multiracial”, and “Black/African American” and “Latino/Hispanic American” were reported in one single category, which is “Other” (Table 3.5). The faculty sample  $n=8$  included 5 men and 3 women. Those constituting the male sample comprised 1 Black male, 2 White males, 1 Latino male, and 1 Asian male. Among the women were 2 White females and 1 Asian female. The

administrator sample n=9 involved 5 men and 4 women. Among the men was 1 Black male and 4 White males. Among the women were 4 White females (Tables 3.5 & 3.6).

**Table 3.5** Study Respondents by University and by Race and Ethnicity

	Black	White	Latino	Asian	Other	Total
<b>USF</b>	0	10	4	1	3	18
<b>UF</b>	4	14	3	1	0	22
<b>Total</b>	4	24	7	2	3	40

Headcount of USF and UF interview and focus group participants. *Source:* Dissertation Fieldwork 2009-2010.

**Table 3.6** Study Respondents by University and by Gender

	Men	Women	Total
<b>USF</b>	9	9	18
<b>UF</b>	18	4	22
<b>Total</b>	27	13	40

Headcount of USF and UF interview and focus group participants. *Source:* Dissertation Fieldwork 2009-2010.

Purposive sampling allowed me to create and integrate different samples in the study. I recruited key informants using an *a priori* analytic approach (Agar 1996; LeComte & Schensul 1999). An *a priori* analytic approach involves universally accepted concepts or truths. I recruited subjects using a number of characteristics including, educational level, seniority, position, race, ethnicity or gender. For example, student participants were Black, White, Latino or Asian male or female undergraduates (in their first or second year), aged 18 years or more, matriculating at USF or UF, and regularly enrolled in one of the two civil engineering departments investigated. The purpose was to reach out to participants from various backgrounds and genders. In the following

sections, I discuss participation numbers for the USF and UF Civil Engineering Departments. Research samples are broken down by institutions, professional categories (e.g.: students, professors, and administrators), gender, race and ethnicity to bring sample diversity to the foreground.

### 3.1.1.3 The Incremental Sample

As I outline in the introductory chapter of this study, the incremental or *Switcher* sample drew on the National Science Foundation's (NSF) STEP project. The STEP project included a study of 288 students who declared engineering as their major or pre-major at the University of South Florida between May 2002 and August 2006. A total of 17 students who had switched from USF Engineering into another major were recruited from this pool of 288 students to participate in retrospective interviews. The sample involved 7 women and 10 men all interviewed on the USF Tampa campus. The women group included 4 Black females, 1 Hispanic female, 1 White female; and 1 Native American female. Among the men were 4 Black males, 1 Hispanic male, 1 Asian male, and 4 White males.

### 3.1.1.4 Creating the USF Sample

The Tampa campus of the University of South Florida was my main research site. I spent more time at USF than I did at UF not only because I attended there but also because my "research headquarters" were located there. I had one key informant in the CEE Department at USF. My key informant is a very active individual. He shared some concern that I expressed early in the data collection process about recruiting a diverse group of student participants in the Department of Civil and Environmental Engineering

at USF. At any rate, my CEE key informant helped me connect with potential research participants (both faculty and students), ensured that conference rooms were always set up and readily available for focus groups, and replied to my emails. During the course of fieldwork at USF, I spent most of my time recruiting students in the “Hall of Flags”<sup>16</sup> affectionately called “Fish Bowl” by students. The “Fish Bowl” is the main gathering and study area for all engineering students (Figure 3.1).



**Figure 3.1** Engineering Building II, University of South Florida. Hall of Flags, a.k.a “Fish Bowl”. *Source:* “A Proposal for Naming Opportunities for the Renovation of Engineering Building II 2011”.

---

<sup>16</sup> The Hall of Flags includes numerous flags hanging from the ceiling of that gigantic premise. The flags are reportedly representing the different nationalities of the students that attended the college.

My favorite time for recruiting subjects was morning time. Every time I walked in the “Fish Bowl”, it was packed with students. Students were always busy studying in the “Fish Bowl”. Being a student myself, and being aware that study time is precious, I somewhat felt uncomfortable interrupting a student that was studying just because I needed to recruit subjects. In most cases, students who did not want to volunteer their time in the study would politely say, “No, thanks”. Every time I went and recruit students in the “Fish Bowl”, they would direct me to a different site: the “Success Center”. The “Success Center” was another study place with smaller capacity and limited seating – in comparison to the “Hall of Flags”. But it was the place where I recruited most of my USF pre-engineering student participants. Many civil engineering students, including graduate and undergraduate students, meet in the “Success Center” before or after class to complete individual or group assignments. But one major difference between the “Success Center” and the “Fish Bowl” is that the former was essentially packed with civil engineering students, while the latter was a “mix” of engineering students from different departments or programs. Recruiting seemed a lot easier in the “Success Center” than it was in the “Fish Bowl”.

Another strategy for recruiting pre-civil engineering student participants at USF Engineering was to recruit civil engineering professors first. I recruited professors to participate in structured in-depth interviews. Whether they agreed to volunteer their time in the study or not, I asked each of the faculty contacted permission to have a few minutes to recruit subjects in their class. Generally, professors were supportive. At USF, I was invited to recruit participants in two classes that met in big amphitheaters, including Environmental Water Resources and Capstone Design. Once in the classroom, I

introduced myself and briefly explained why I was there. Then, I circulated a sig-up sheet for students to pick days and times they would like to volunteer in the study. Besides, the classrooms, I solicited participants from social clubs or other campus locations.

Recruiting in the classroom was not as convenient as recruiting throughout campus.

Classrooms are study environments. And I was not necessarily welcomed to walk around the classroom or talk with the students. This significantly limited my ability to increase the study sample size.

Recruiting pre-civil engineering students to volunteer in this study was particularly difficult at USF. One reason for this was probably that I did not initially include any incentives for student participants. I recruited the first pool of students for the USF focus groups without any incentives. The results were not particularly impressive since I ended up with only very few students after almost a month trying. I then submitted a “Modification Request” to USF Institutional Review Board (IRB) so that I can be granted permission to disburse a certain amount of money for student volunteers. I proposed to disburse a one-time \$5 payment to every pre-engineering student participant for the time they volunteer while being in the study. The compensation proved to be useful since the number of participants began to increase gradually.

Throughout fieldwork in the USF CEE Department, I had the sense that the Department of Civil and Environment Engineering had a substantial pool of Latino students. Students from this category were quite “visible” just as visible as white students. On the other hand, I was struck by the observation that there were literally no Black pre-civil engineering students around at USF Engineering. It was interesting that during focus groups at USF, two students pointed out that Black students were

underrepresented in the USF Civil and Environmental Engineering Department. I attempted to reach out to Black students through social organization within USF Engineering. Several student organizations were active on the Tampa campus during the course of fieldwork. Some of the student organizations available on the Tampa campus of the University of South Florida include the American Society of Civil Engineers (ASCE), the Society of Women Engineers (SWE), the Society of Hispanic Professional Engineers (SHPE), and the National Society of Black Engineers (NSBE). Most of the time, when I was recruiting in the Department of Civil and Environmental Engineering the doors of the aforementioned student organizations were closed and no office hours or schedules were provided so that potential visitors (like myself) may be able to come back at regularly scheduled office hours. However, I was able to touch base with some of the members of SWE and SHPE, two of the most proactive organizations in the USF College of Engineering (Figure 3.2). I interviewed almost the entire Executive Board of the USF student chapter of the Society of Women Engineers (SWE). It caught my attention that one Latina pre-civil engineering student was a part of the Board. Latino students, especially female students appeared driven and motivated. Besides this, I did not notice a strong presence of women civil engineering students and professors. I did not get a sense of the presence of Black male nor female pre-engineering students in the CEE Department. I was desperately looking for Black and Latino students and professors. They were almost inexistent. A close look into the “Faculty and Staff” rubric on the Web confirms this trend.



**Figure 3.2** Students of the Society of Hispanic Professional Engineers showcase in the “Fish Bowl”. *Source:* SHPE’s Website 2010.

Overall I recruited 10 pre-civil engineering student participants in the USF Department of Civil Engineering. I conducted three focus groups in the USF Civil and Environmental Engineering (CEE) Department. The first focus group included 4 men. Among these were 1 White male; 1 Latino male; and 1 male who self-identified as, “Other” (Table 3.6). The latter participant added the handwritten mention, “Asian/White American” to assert his dual “identity”. This participant desired to be understood as part of two distinct racial categories; and he simply could not just identify to the White or Asian group. The second focus group involved 3 men and all of them were Latinos. The last focus group in the student sample included 4 women. Among the women were 2 White females; 1 Latino female; and 1 woman who self-identified as “Other” and wrote the mention, “Eastern European”, in the empty box (Table 3.6).

**Table 3.7** USF Pre-Civil Engineering Students by Race and Ethnicity and by Gender

	Black	White	Latino	Asian	Other	Total
USF	0	1	3	0	2	6
UF	0	2	1	0	1	4
Total	0	3	4	0	3	10

Headcount of USF student focus group participants. *Source:* Dissertation Fieldwork 2009-2010.

In the most general case, civil engineering professors were certainly the easiest research participants to approach and to enroll in the study. If I did not contact them by e-mail or by phone, I could just walk in. Oftentimes, office doors were open. And office hours were an excellent time to get to recruit professors. The USF civil engineering professors group involved 4 participants. Of these were 1 White male; 2 White females; and 1 Asian female (Table 3.7). Three of the USF civil engineering professors interviewed were women. It must be noted that this occurrence was merely serendipitous. Interviews were scheduled based not only on faculty members' willingness to volunteer their time in the study, but their availability. As outlined earlier, I was struck by the observation that I could not sense the presence of Black students and professors in the USF Department of Civil and Environmental Engineering. There was at least one Black female professor in this department. However, this Black female professor could not be allowed to participate in the study for ethical reasons<sup>17</sup>. I wanted to get participants from the black group involved in the study; but my efforts were just in vain. I consulted with my key informant in the CEE Department to see what could be done. It was clear that this situation did not have to do with my recruiting techniques or cultural sensitivity. Black

<sup>17</sup> The professor in question has been serving as an active member on my dissertation committee.

professors (and administrators as well) are basically a rarity in the CEE Department. An examination of the USF Civil and Environmental Engineering Department’s “Faculty & Staff” Web page confirms this evidence (University of South Florida Faculty & Staff 2010). There is a disproportionate ratio of male to female faculty in the CEE Department. As of my last online visit of the CEE Department’s Website (i.e., during the spring of 2011), the professoriate in the department included 5 female professors (one of which is Black) versus 23 male professors. More important, information provided on the CEE’s Website would not allow me to determine the ethnicity of the only Black professor in the USF Civil and Environmental Engineering Department.

**Table 3.8** USF Civil Engineering Professors by Race and Ethnicity and by Gender

	Black	White	Latino	Asian	Other	Total
USF	0	1	0	0	0	1
UF	0	2	0	1	0	3
<b>Total</b>	0	3	0	1	0	4

Headcount of USF faculty interview participants. *Source:* Dissertation Fieldwork 2009-2010.

Some USF administrators were extremely enthused by the study and wanted individuals they personally know to get to volunteer in the study. I did not get to “run after the subjects” or anything like that. I was able to schedule interviews with all of the subjects I personally pre-selected for the interview. Sometimes, my USF key informant would encourage me to interrupt administrators even during meetings. Four USF administrators volunteered their time in the study. Among these, were 2 White males and 2 White females (Table 3.8). Their positions were, respectively, Academic Advisor/Undergraduate Students, Undergraduate Advisor CEE, Communication and

Marketing Officer, and Academic Services Administrator. It struck me that some administrators who believe they were not the right person to interview would recommend someone they think would be a good fit. Just like the USF faculty and student samples, the administrator sample included no black females not males. It was not so much that I did not look around or recruit enough. During the course of the research, there was no black administrator that I knew of in the Department of Civil and Environmental Engineering at USF.

**Table 3.9** USF Administrators by Race and Ethnicity and by Gender

	Black	White	Latino	Asian	Other	Total
<b>USF</b>	0	2	0	0	0	2
<b>UF</b>	0	2	0	0	0	2
<b>Total</b>	0	4	0	0	0	4

Headcount of USF administrator interview participants. Dissertation Fieldwork 2009-2010.

Overall the University of South Florida sample was a relatively diverse sample. It involved students, professors as well as administrator participants. Students had the highest number of participants with 10 individuals accepting to volunteer their time in the study. Administrators and professors lagged behind with only 4 participants in each of the two categories. Additionally, the USF sample included an even number of male subjects and female subjects (9 females versus 9 males). On the ethnicity level, there were fewer minority participants (5) than there were non-minority participants (8). The low representation of minorities (see Tables 3.6, 3.7, & 3.8) in this sample is problematic for women and minorities constitute the focus of this study. The section that follows

discusses the University of Florida sample. In this section, I review the number of study participants in this school by race and ethnicity and by gender.

#### 3.1.1.5 Creating the UF Sample

I spent a lot of time commuting between Tampa and Gainesville in order to recruit participants at UF. My key informant at UF was someone I did interacted with on several occasion. My UF key informant set me up with a room (CCE Department's conference room) to conduct focus groups. Unlike my USF key informant who was outgoing and active, my UF key informant was pretty reserved. He enjoyed the comfort of his office and scarcely got out of his office unless it was a very important mater. My UF key informant provided me with technical advice I needed to get started with data collection. He helped me find out about the UF student Chapter of the American Society of Civil Engineering (ASCE). Consequently, I touched base with the president of the UF student Chapter of ASCE.

The president of the student Chapter of ASCE became my second key informant at the University of Florida. The second key informant managed to assist with sending emails (to subjects he personally knew). My second key informant was a graduate student but he appeared to be well-connected and respected in the CCE community. He helped recruit undergraduate students at the University of Florida. I spent most of my “hanging out” inside Weil Hall<sup>18</sup> (Figure 3.3). I would run from one level of the building to another because I was under the pressure of recruiting subjects. For scheduling and timeline purposes, I had to complete at least one focus group and two or three interviews per day while in Gainesville. Like at USF, I used the classroom strategy. I was invited to recruit

---

<sup>18</sup> Weil Hall Building is home to the UF Department of Civil and Coastal Engineering. Other engineering departments are also housed in this building.

participants in amphitheaters. Two of the classes I visited at UF included “Primary Capstone Design” and “Civil Engineering Materials”. This recruitment technique did not prove to be effective because I had limited access to potential subjects, including undergraduate civil engineering students.



**Figure 3.3** Principal Investigator “hanging out” in Weil Hall during the course of fieldwork. *Source:* Dissertation Fieldwork 2009-2010.

While I was on the run trying to recruit research participants, I could not help but stop in front of some nicely framed posters on display in the Department of Civil and Coast Engineering at the University of Florida. The posters seemed to be telling a story. They seem to tell anybody travelling the hallway that, “these are the values of today’s CCE!” The posters depict civil and engineering students are seen hanging out at a

departmental “barbeque party” (see poster in Figure 3.3) or engaged in hands-on activities (see poster in Figure 3.4).



**Figure 3.4** Engineering students engaged in hands-on activities. Poster on display in Weil Hall. *Source:* Dissertation Fieldwork 2009-2010.

I facilitated four distinct focus groups for UF civil engineering undergraduate students to discuss their use of Web-based materials as well as the relationships between Web pages on the Internet and civil engineering enrollments. For this purpose, I recruited 15 student participants in the UF Department of Civil and Coastal Engineering (CCE). Of these 15, there were 2 Black men; 9 White Man; 1 White woman; 1 Latino man; 1 Latina woman; and 1 man who reported his race or ethnicity as, “Other” (Table 3.9).

**Table 3.10** UF Civil Engineering Undergraduate Students by Race and Ethnicity and by Gender

	Black	White	Latino	Asian	Other	Total
Men	2	7	1	0	1	11
Women	0	1	1	0	0	2
Total	2	8	2	0	1	13

Headcount of UF focus group participants. *Source:* Dissertation Fieldwork 2009-2010.

I interviewed four civil engineering professors at the University of Florida.

Interestingly, almost all racial backgrounds were represented in this group of faculty. It is important to note that no women faculty members were included in this sample. Among UF professors were 1 Black male, 1 White male, 1 Hispanic male, and 1 Asian male. It must be mentioned that all of the professors interviewed at UF were male (Table 3.10); this did not happen by choice. I did not get a sense of the visibility of female professors as I was recruiting study participants in the CCE Department at UF. This observation counts for fall of 2009, spring of 2010, and fall of 2010. A closer look at the online faculty list in the Department of Civil and Coastal Engineering at UF indicates a scarcity of female professors in this department (University of Florida Faculty 2011). Just like at USF, there is a disproportionate ratio of male to female faculty in the UF Civil and Coastal Engineering Department. Perhaps the underrepresentation of female professors in the CCE Department more than anything significantly affected the participation of female civil engineer faculty members. Time conflict with interview scheduling was another factor that limited enrollment of female subjects in the professor sample. I tried to schedule an interview with the only two female professors teaching in the CCE Department in the fall of 2009 when my research actually began. I made several attempts

but ended up not getting any positive outcomes. In a sense, prior to beginning data collection, I feared that the underrepresentation of women in the CCE Department would come up as a major obstacle in my recruiting efforts, so I ensured that every single recruiting option was tried out before I could move onto the next step.

For recruiting purposes, I knocked on office doors, waited out during office hours, sent emails, made phone calls all this with the only goal of scheduling an interview. None of those means proved to be enough to secure an interview with a female professor in the CCE Department. It must be noted that teaching a course or courses during the semester when the research was carried out was one of the criteria for being enrolled in the study. Additionally, the busy schedules of the only two female professors in the CCE Department at the University of Florida did not make it possible for them to volunteer their time in the study. The fact that the Civil and Coastal Engineering Department at UF included only two teaching female faculty members at the Ph.D. level (see Website above) during the fall of 2009 is a cause for concern. This even has greater implications for the present study whose focus includes women engineers at the professoriate and student levels. In a sense, the reality of the CCE Department reinforces the claim that males and females have differentiated experiences and roles in engineering. This is crucial especially because faculty-student relationships may be an important factor in retention in engineering.

**Table 3.11** UF Civil Engineering Professors by Race and Ethnicity and by Gender

	Black	White	Latino	Asian	Other	Total
<b>Men</b>	1	1	1	1	0	4
<b>Women</b>	0	0	0	0	0	0
<b>Total</b>	1	1	1	1	0	4

Headcount of UF faculty interview participants. *Source:* Dissertation Fieldwork 2009-2010.

Overall I interviewed 5 administrators at the University of Florida. Among these, were 1 Black male; 2 White males; and 2 White females. (Table 3.11) The positions of the five administrators were, respectively, Diversity Coordinator/STEM Fields, Associate Chair/Undergraduate Coordinator, Director of Admissions, Director of Communications/Marketing Director, and Academic Support Coordinator.

**Table 3.12** UF Administrators by Race and Ethnicity and by Gender

	Black	White	Latino	Asian	Other	Total
<b>Men</b>	1	2	0	0	0	3
<b>Women</b>	0	2	0	0	0	2
<b>Total</b>	1	4	0	0	0	5

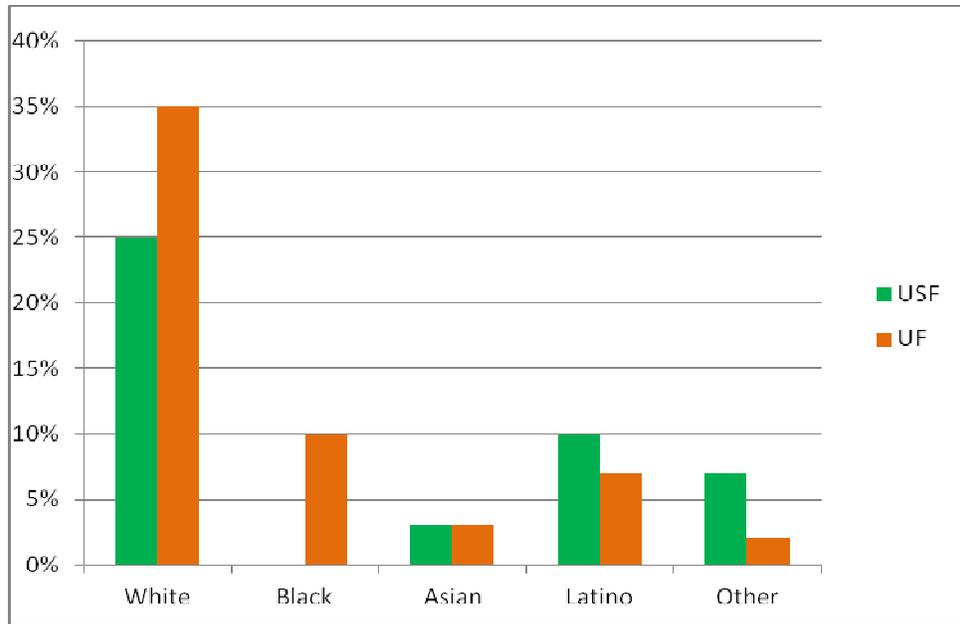
Headcount of UF administrator interview participants. *Source:* Dissertation Fieldwork 2009-2010.

An examination of the University of Florida and the University of South Florida samples revealed some interesting characteristics. Research participants at the two institutions totaled 40 and involved students, professors, and administrators. Whites had the highest percentages of participants both at USF (25%) and UF (3%), followed by Latinos (10% at USF and 7% at UF) and Blacks (10% at UF and no participants at all at USF), the individuals who identified as “Other” (7% at USF and 2% at UF), and Asians

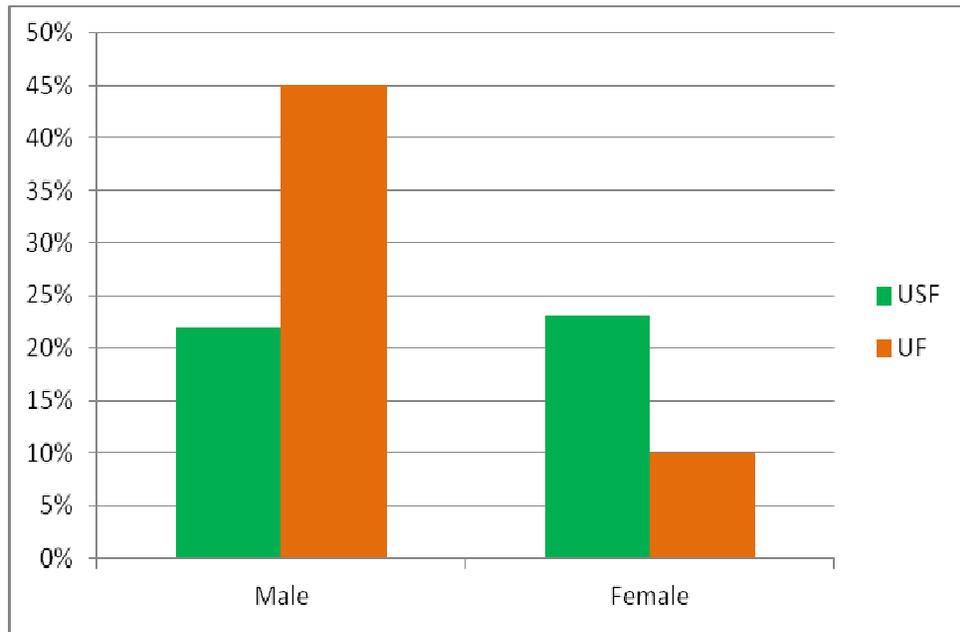
(3% at each school). A look into the overall sample size shows that at both USF and UF, the number of non-minority (Caucasian and Asian<sup>19</sup>) respondents was higher than the number of women and racial and ethnic minority (Black and Latino) respondents (Figure 3.5). On the gender level, one could notice that while there were more female respondents than male respondents at USF (23% versus 22%), the percentage of male participants at UF was almost five times that of female participants (45% versus 10%). One key fact that emerged from the overall study sample was that male participation was way higher (67%) than female participation (33%) (Figure 3.6). The above percentages summarize interview and focus group participation by race and ethnicity and by gender in the University of South Florida and the University of Florida. An examination of the percentages indicate that the White category in total represent more than all the other categories of respondents combined. Likewise, the male group accounts for more than three times the representation of the female group. It is important to say that this was not by design; it was all coincidental. One possible explanation for percentage differences is that White male students (who obviously represent the majority in the two departments investigated) were more responsive to the research. In the process, I approached the sample from different angles. As I discuss in Chapter 3, I was recruiting participants from classrooms or amphitheatres and throughout campus. I tried to balance my sample size and cultural background by targeting women and racial and ethnic minority students. I wanted to make it as clear as practical to all potential participants I approached that they were free to accept to volunteer their time in the study or not.

---

<sup>19</sup>As I comment in the introductory part of this work, Asians are considered a minority in the U.S. general population but not in science and engineering. Today, Asian students and professors, reportedly, represent a vast majority of the STEM population in the U.S.



**Figure 3.5** Distribution of Respondents by Race and Ethnicity and by University. *Source:* Dissertation Fieldwork 2009-2010.



**Figure 3.6** Distribution of Respondents by Gender and by University. *Source:* Dissertation Fieldwork 2009-2010.

It must be noted that sample representativeness represents one critical issue in qualitative research (Agar 1996; Berg 2007; LeCompte & Schensul 1999). In qualitative studies, biases can arise from a sample that fails to represent the population of the community investigated. For the purpose of this study, I tried recruiting civil engineering professors and undergraduate or pre-civil engineering students and university officials (at different levels in the administration) from all races and ethnicities, and genders currently in the University of South Florida's College of Engineering as well as the University of Florida College of Engineering. Additionally, I attempted to create sample data which could be accurately and specifically representative of the USF and UF populations in general and of the two departments of civil engineering in particular. (see Figures 3.5 & 3.6) Given the relatively low number of participants in this research, I would argue that the overall study sample for the present dissertation is not representative of the populations of the USF and UF Colleges of Engineering or Civil Engineering Departments. One goal was to create a sample with an overrepresentation of women and racial and ethnic minority students. The tables and bar graphs presented above reflect sample diversity. (see Figures 3.5 & 3.6) Sample diversity (i.e., participants' backgrounds, age groups, positions) was an important criterion building the study sample but it was not the only factor. Another objective of mine was to create a sample big enough to include twice as many participants as I was actually able to recruit.

### 3.2 DATA COLLECTION TECHNIQUES

Interviews are the primary means by which perceptions and beliefs are generally documented (Agar 1996; Berg 2007; Jones et al. 2006; Schensul et al. 1999).

Interviewing techniques represent the centerpiece of this study. First, retrospective focus group interviews with pre-engineering students were useful to gather data about students, including their use of Web-based information before and after they applied; familiarity with departmental Web pages; women and minority representation in civil engineering departments; and women and minority representation on civil engineering programs' Websites. Second, structured interviews with civil engineering professors and university officers helped to document civil engineering professors' and university admissions officers' perceptions of Websites as a marketing tool. I kept in mind that although they may be accurate or inaccurate, perceptions represent the reality of the participants and guide their behavior and expectations (Agar 1996; Jaeger & Thornton 2006). Because I wanted to understand students' use of Web-based materials before they applied to each respective university, I conducted retrospective focus group interviews with pre-engineering students only.

### 3.2.1 Focus Groups

Focus groups were useful to obtain pre-engineering or undergraduate civil engineering students' perceptions in a defined area of interest (Denzin & Lincoln 1994; Kreuger 1988). I asked student participants about the associations between Website content, engineering program selection, race and gender. This data collection technique enabled me to capture the synergy of group talk and to collect more in-depth information and understanding about Web-based materials that affected students' decisions when they applied. The focus groups were also critical to assess, corroborate or negate facts or insights other data fail to illuminate (Berg 2007).

Importantly, focus groups made it possible to ask students questions related to what particularly was appealing to them during Website visits (if any) before they applied. Here I assessed the extent to which department Web pages engage prospective students to encourage them to apply (Taylor et al. 2001). In fact, focus group informed the first research question of this study in a pretty interesting way (Berg 2007). The advantage of retrospective focus group questions is that they made it possible to challenge participants to recollect and to provide information on past events. However, the flipside of the retrospective technique was that students did not always recall fully what they found interesting or useful on a Website, mainly because Websites are often updated on a regular basis. Additionally, a major issue with focus group interviews is that they do not allow too much probing (with one specific respondent) because the primary concern is to keep all of the focus group members talking.

### 3.2.2 Structured In-depth Interviews

Structured, in-depth interviews were conducted with the sample of 8 faculty and 7 administrators or key informants at USF and UF. I asked those individuals about the facts posted on departmental Websites. Also, I asked administrators about the role of the World Wide Web as a marketing and recruiting instrument for their school. Civil engineering professor interviews as well as university officer interviews provided an opportunity to expand on focus groups conducted with pre-civil engineering students (Agar 1996; Bogdan & Biklen 2003; Kreuger 1988). The task was not the simplest of all. In a sense, I interviewed individuals who are the repository of academic knowledge. I, therefore, ensured that the intentions of my questions were adequately communicated (Agar 1996; Berg 2007; Bogdan & Biklen 2003). Communication is a must in the

interview process. Having all the research questions or interview protocols memorized was no guarantee that I would capture all the information I needed. In addition to asking questions about Web pages' influence on recruiting, I asked civil engineering professors, administrators, and students about the rationale behind promoting diversity on the Web. This question was one of the only questions that were asked to the three different categories. Not only were the answers revealing about student, professor, and administrator perceptions of online diversity, but they represented a major research theme in this study.

### 3.2.3 Demographic Information Sheets

Demographic information sheets allowed capturing vital information about research participants. The Information I collected through this technique included demographic data. I particularly focused on such elements as gender, race or ethnicity, age, level and program of study, etc. All participants were required to complete a background or demographic information sheet after agreeing to volunteer their time in the study and signing an informed consent form. Once research participants completed the demographic sheets, I collected and put them in manila envelopes. I carefully assessed and analyzed the demographic sheets by selecting a number of variables such as race, ethnicity, gender, age, program of study, and position. Demographic data not only helped generate bar graphs and tables for the purpose of this study (see discussion in Chapters 3 & 4), but they informed focus groups, interviews, observations, and Web-based data (Agar 1996; Berg 2007; Bogdan & Biklen 2003). Bar graphs provided visual representations of qualitative evidence, including quotes from focus groups and

interviews. My choice for bar graphs was determined by the fact that bar graphs are among the most common type of figures used in data presentation.

#### 3.2.4 Content Analysis of Web Pages

In addition to conducting focus group interviews and structured, in-depth interviews, I utilized an ethnographic approach to the Internet. This refers to a critical approach to Web page analysis destined to ascertain information and images posted on the University of South Florida and the University of Florida Websites. The two universities' civil engineering programs' Websites were the focus of Web page analysis. Slater and Miller (2000) observed that an ethnographic approach to the Internet is one that is embedded in a specific virtual locale. The following Websites or Web pages are the "virtual locales" that I carefully scrutinized. I visited and monitored the following Websites once a month: <http://www2.eng.usf.edu/>; <http://www.eng.ufl.edu/index.php>; <http://cee.eng.usf.edu/>; <http://www.ce.ufl.edu/>; <http://www.ce.ufl.edu/electives.html>; <http://www.eng.ufl.edu/admissions/undergraduateadmissions/index.php>; and <http://www2.eng.usf.edu/cee/#&slider1=1>. These different websites or Web pages are the property of the University of South Florida and the University of Florida. Therefore, the Websites operate with an "edu" domain, the domain for education-related Websites.

The Web pages were examined in an effort to sort out the themes or patterns of meaning (Berg 2007). Data extracted from the websites were just as critical as interview transcripts. These data proved to be helpful to assess the impact of information and images posted on Web pages on program selection. In order to make content analysis meaningful, I created a codebook listing the codes used to interpret texts and pictures. Additionally, I selected each text and image and elicited comments depending on the text

or image displayed in the photograph. Online texts and images selected included those portraying women or minorities in engineering (students, professors, and administrators) or simply undergraduate students or professors (involved in hands-on or research type activities) or program course offerings or course schedules or schools' mission statements, etc.

Content analysis consisted of a systematic interpretation of relevant texts and images. As far as texts are concerned, each text or paragraph or even an entire webpage (with only text) was associated with a specific code. The three categories used in the analysis may serve as an example here. These include marketing, usefulness of information, and climate. Once a text was matched to a code, interpretation could begin. For example, the code "Climate" was utilized to categorize all written texts presenting either the experiences of women and minorities in the engineering field or those of White males. And the same coding process applied to picture analysis. As Bogdan and Biklen (2003) once observed, content analysis is primarily a coding operation and data interpretation process. Patterns and themes pulled from Web pages suggested ways in which colleges and universities engage students (especially individuals from populations that have been disenfranchised for so many years) with the purpose of getting them to apply. Website content is an important dimension of online media. Slater and Miller (2000) once noted that the Internet has reached a level where people can focus on the content and ignore the technology. This fact was a driving force in this effort since the focus has been on patterns of meaning more than anything.

Content analysis provided me the opportunity to investigate Websites as elements of cultural reproduction. I critically examined the representation of women and minorities

in the USF and UF Civil Engineering Departments as well as on the two institutions' Webpages. Also, I questioned the extent to which online visibility or representation translates into interest in or the intention of applying to civil engineering programs. This interrogation is critical as it shows the capacity of the civil engineering departments mentioned above to engage students for relational purposes (Taylor et al. 2001). Last, Website content analysis made it possible to reflect on how race and ethnicity and gender are being reproduced and transmitted through Civil Engineering program Web pages and how Website content brings civil engineering students to life as cultural beings.

I agree with Berg (2007) that, “[M]ost researchers have at least one methodological technique they feel most comfortable using” (Berg 2007:5). It is tempting and, perhaps, easy to try and single out research methods and pick one’s favorites. But ethnographic work asks of the researcher-ethnographer a certain level of flexibility. Being able to employ a wide range of methods and to work in different environments is an advantage anthropological research has over other social science disciplines. All the methods used in this study might not be my favorites, but they were extremely useful because, “[E]ach method reveals slightly different facets of the same symbolic reality” (Berg 2007:5). Triangulation represents a unique approach to knowledge production. The possibilities of a “methodological convergence” are just as limitless as intriguing. Triangulation seems to suggest that, “[T]here may be new ways of thinking about ethnographic methodology” (Agar 1996:183). In any case, the use of different methods in this dissertation created multiple lines of sight which probably enrich data analysis. The next chapter discusses the research findings of this study and provides an outlook over triangulated data.

## CHAPTER FOUR: FINDINGS

### 4.1 GUIDING APPROACH

The theoretical framework guiding this study drew on the overarching research questions posed in the introductory part of this work. One goal was to ascertain the reason(s) why despite efforts – from public institutions of higher learning such as USF and UF – to use Websites as marketing tools in recruiting and retaining individuals from disenfranchised populations into STEM fields, students from these groups not only remain underrepresented in engineering, but they leave engineering programs. I used triangulated data, as I discuss in Chapter 3, in an effort to have different lines of sight in answering the research questions. It must be pointed out that the present study involved a low representation of women and racial and ethnic minority participants at the two institutions investigated. However, even though interviews and focus groups yielded a substantial portion of research data, this study did not entirely rely on these qualitative techniques of data collection. This research also drew on (content analysis of) Web pages, observations, demographic sheets, and relevant school artifact; all of which help validate the findings of the present study.

This study was guided by a theoretical framework involving a set of complementary theoretical positions critical in addressing issues of race and gender (relations) in educational settings. These include cultural reproduction theories and public relations dialogic theories. Cultural reproduction theories originally question exploitative class hierarchies. This theoretical position examines the ways that inequities are

perpetuated from one generation to the next (Bourdieu 1984; Giroux 2001; Holland & Eisenhart 1990). A by-product of reproduction theories, the construct of cultural capital assumes that familiarity with and use of the codified language of education predisposes children from the dominant class to educational achievement (Bourdieu 1984; Kingston 2001; Sullivan 2001). But I purposefully depart from this classical use of cultural reproduction theories. Analysis builds on works which go beyond traditional views of cultural capital and investigate cultural reproduction from racial and ethnic and gender perspectives (Adair 2003; Adair & Dahlberg 2003; Bell 1980; Cammarota & Romero 2011; González 2004; González et al. 2005; Olmedo 2003). On another level, public relations theories are suitable to understand how the University of South Florida and the University of Florida facilitate relationship building with a variety of audiences on the World Wide Web, including with students from historically underserved populations. I used Kent and Taylor's (1998) analysis of Websites as a platform for creating and maintaining organization-public relationships to support my arguments. The interesting point of connection between public relations theories and cultural reproduction theories is that the Internet is a media capable of shaping and transmitting cultural rules or codes of behavior (Coleman 2010; Wilson & Peterson 2002). In a sense, Web pages serve as reproductive technologies of racial and ethnic and gender differences. In the process of creating and maintaining organization-public relationships, Websites (or better those in charge of creating or maintaining them) may, consciously or unconsciously, reproduce and transmit cultural norms through languages or images posted on them. The works of Kang and Norton (2006) as well as those of McAllister-Spooner and Taylor (2007)

expand on Kent and Taylor's (1998) public relations "dialogic loop" model. These authors are also particularly relevant to this discussion.

#### 4.1.1 Cultural Reproduction Theories

Cultural reproduction theories – including feminist theories and critical race theory (CRT) – were useful to discuss the finding of the present study especially because the constructs of education and reproduction are intertwined:

Anthropology as a discipline calls attention to the evolutionary dimension of human existence, the sweeping historical development of human communication and reproduction. Within this broad purview, the process of education can be defined as humanity's unique methods of acquiring, transmitting, and producing cultural knowledge for interpreting and acting upon the world. (Foley et al. 2001:38)

Reproduction theories helped critically reflect on the ways in which racial and ethnic and gender representations are reproduced and transmitted in school settings from one generation to the next (Holland & Eisenhart 1990; Medina & Luna 2000). As a matter of fact, in this country, for generations the education system has reproduced a system where White male students perform at a higher level while students of color, females, and students of low socioeconomic status (SES) do not fare as well (González 2004). Critical race theory and feminist theories can be ascribed to resistance perspectives and reproduction theories because they overlap (Bell 1980; González 2004; Henwood 1994; Yosso, Parker, Solórzano, and Lynn 2004). To paraphrase Yosso et al. (2004), critical race theories have ramifications into larger societal issues, including sexism and racism:

[C]RT (critical race theory) scholarship offers an explanatory structure that accounts for the role of race and racism in education and works toward identifying and challenging racism as part of a larger goal of identifying and challenging other forms of sub-ordination (Yosso et al. 2004:2)

Understanding the place of historically underrepresented groups in civil engineering programs requires understanding the racial and ethnic and gender dynamics at work in engineering schools. Engineering switchers as well as persisters provide valuable insight on the burden of racism and sexism in engineering. Moreover, to reflect on the representation of women and students of color in engineering schools imposes to have a better understanding of what constitutes *engineering culture*. In Gideon Kunda's (2006) critical analysis of an American company's corporate culture, the author attempted to define the notion of engineering culture. Although, Kunda's ethnography took place in a corporate setting rather than an educational one, the analogy is worth considering and relevant to this research. Kunda's research participants would describe engineering culture as "the context of their work life, a set of rules that guides the relationships" – in the engineering world. But more importantly, Kunda (2006) made the following observation:

Culture means not only the implicit and explicit rules that guide and shape their (engineers) own behavior and experience of work; it is also the vehicle through which they consciously try to influence the behavior and experience of others. The "culture" in this sense, is something to be engineered—researched, designed, developed, and maintained... (Kunda 2006:7).

Engineering culture so defined suggests that this social construct and ambivalent notion is a driving force in engineering; one without which it is hard to thrive as an engineer. In the corporate world, the "culture" determines chances of success for all. A number of criteria exist that must be taken into account to become an engineer. *Cultural*

*capital* is a prerequisite, and perhaps the most important tool, for any student desiring to successfully complete a bachelor's degree in engineering. Relatedly, in his extensive study of the relationships among culture, education, and social class, Bourdieu articulated the concept of "cultural capital" (Bourdieu 1974; 1977; 1984; Giroux 2009; McLaren 2009; Sullivan 2001). Cultural capital is the proficiency in and familiarity with dominant cultural codes and practices. According to Bourdieu (1977), students enter the education system with different endowments of "cultural capital and cultural know-how"; these two are variable depending on students' social backgrounds. How does this relate to reproduction theories in education and how does this apply to the situation of women and students of color in the U.S., one would ask? Aschaffenburg and Maas's (1997) article, *Cultural and Educational Careers: the Dynamics of Social Reproduction*, attempts to provide an answer:

Students with more (and the correct) endowments of cultural capital – students from families with the skills and preferences of the dominant culture – are better able to decode the implicit "rules of the game"...and hence are better able to negotiate their way through the highest educational levels (Aschaffenburg & Maas 1997:573).

One goal for reproduction theorists is to critique existing social orders. While this statement adds to the general frame of critique of social class theories, by showing how cultural capital gives children from the elite an advantage in gaining educational credentials (Bourdieu 1974; Bourdieu 1977; Sullivan 2001), it does not inform the reader about the interplay between cultural capital and race and ethnicity and gender. I have outlined earlier the ineffectiveness of social critical theory in dealing with issues affecting Blacks (discussed in Chapter 2). It is critical to reiterate that this study is an attempt to bring race and ethnicity and gender to the forefront of the *hidden curriculum* debates. For

the purpose of this dissertation, I voluntarily disregard class as an important dimension of cultural reproduction theories. Rather I use reproduction theories from a strictly racial and ethnic and gender standpoint. One goal is to shed light on the unfulfilled promise of cultural capital theory (Kingston 2001) when it comes to issues of race and ethnicity and gender and to call into question the subtle but systematic alienation and exclusion of certain groups of individuals from engineering schools.

#### 4.1.2 Public Relations Theory

To broaden public understanding of the Web as a recruiting and relationship building tool in academic settings, I utilized public relations theories. From McAllister-Spooner (2008) one learns that Kent and Taylor (2002) are among the researchers of public relations who developed five dialogic principles and generated a theory-based, strategic framework to facilitate relationships with different publics or audiences through the Web. Among the five dialogic principles designed by Kent and Taylor (2002) to assist organizations in creating and maintaining relationships with different audiences is “useful information, suggesting that organizations provide useful information of general value to all publics” (McAllister-Spooner 2008:1). Many engineering student respondents in this study reported that one of the reasons they browsed the Web was to find useful information. In fact, *usefulness of information* was a major theme in the study. For analysis purposes, I focused my attention on the usefulness of information posted on the University of South Florida Web pages and the University of Florida Web pages.

Public relations “dialogic loop” perspectives are critical in understanding the ways in which colleges and universities and students build relationships through the Web. These theories draw on public relations theories to question the capacity of university

Websites to function as information providers for interested publics (Kang & Norton 2006; McAllister-Spooner & Taylor 2007). Websites constitute the places where information delivery takes place and meaningful communication occurs between colleges and universities and potential students (Kang & Norton 2006; McAllister-Spooner & Taylor 2007; Steinke 2004). With that said, it is critical to ponder about the degree to which institutions of higher learning are concerned about their role as information providers. Dialogic theories of public relations question the ability of college and university Websites to successfully engage potential students, especially in an era where colleges and universities are increasingly using Websites as a “vehicle for student recruitment and a method of application” (McAllister-Spooner 2008:1). This assumption makes perfect sense. Although a relatively low percentage of student focus group participants (13%) who volunteered in this study could recall having browsed the Web to seek information about engineering programs, 45% of the participants reported that the USF Civil and Environmental Engineering and the UF Civil and Coastal Engineering’s Websites have served as information providers for civil engineering students and other interested publics. Using a similar argument, Mechtovet et al.’s study (2001) found that information content, among other things, was the most important factor influencing overall perceptions of Website effectiveness by college students.

As I discuss later, it is vital to know the extent to which authorities at the University of South Florida and the University of Florida are concerned with creating and maintaining Websites for relationship building and to offer interested publics useful and timely information. Dialogic communication is eminently relational. It involves an understanding of the past and the present and has a grip on the future of all of the parties

involved in the relational process (Kent & Taylor 2002). Effective communication between prospective and current students and USF and UF as organizations can only take place when each party is considerate of the past, present, and future aspirations of the other. One of the findings in this study was that USF and UF's Websites were created with the goal of meeting users' interests and providing useful information to diverse audiences. The rapid spread of the Internet in both U.S. secondary and post-secondary schools in recent years (Schofield & Davidson 2002) provides some indication that the new media technology can serve meaningful marketing and information purposes. But the question is, how successful are USF Engineering and UF Engineering in terms of addressing persisting gaps between minorities and non-minorities in engineering?

Cultural reproduction theories and public relations theories pursue somewhat different agendas, although the two theoretical frameworks find a common ground. Cultural reproduction theories, feminist perspectives, and critical race theories altogether were useful to uncover manifestations of racism and sexism in civil engineering program in contemporary America. This framework was appropriate to discuss race and gender issues in engineering in general and in the USF and UF Civil Engineering programs in particular. Public relations "dialogic loop" theories were also useful to analyze the bulk of qualitative data collected for the purpose of this study. This approach helped me shed light on the usefulness of data posted on the USF and UF Websites. Public relations theories made it possible to analyze users' perceptions of Web-based information. While cultural reproduction theories allowed me to examine racial and gender issues in the USF and UF Civil Engineering Departments, public relations theories enabled me to examine the usefulness of information displayed on the USF and UF civil engineering Websites,

especially to assess the role of Web-based information in facilitating persistence in engineering.

#### 4.2 MAJOR THEMES

Web pages, student focus groups, professor and administrator interviews, and field notes revealed interesting patterns of meaning relative to the USF and UF Civil Engineering programs. Each of these data sources provided valuable insight on the relationships between Web-based, online information and applications and enrollment patterns in the USF Civil and Environmental Engineering Department and the UF Civil and Coastal Engineering Department. Additionally, the data enhanced my understandings of why it is that women and ethnic and racial minority students continue to be underrepresented in engineering. I examined the University of South Florida and the University of Florida engineering colleges' Websites. Every Web page I studied had a domain of "edu". It is important to note that the domain of "edu" is limited to education-based Websites. The Websites that I analyzed included the University of South Florida College of Engineering's Website (<http://www2.eng.usf.edu/>); the University of Florida College of Engineering's old Website (<http://www.eng.ufl.edu/index.php>) as well as the newly updated Website (<http://www2.eng.usf.edu/cee/#&slider1=1>); the University of South Florida CEE Department's homepage (<http://cee.eng.usf.edu/>); the University of Florida CCE Department's homepage (<http://www.ce.ufl.edu/>); the University of Florida CCE's undergraduate elective courses Web page (<http://www.ce.ufl.edu/electives.html>); and the University of Florida College of Engineering undergraduate admissions Web page (<http://www.eng.ufl.edu/admissions/undergraduateadmissions/index.php>). One goal was

to pull indicative images or written texts to answer the research questions posed in the introductory part of this study.

Three major themes emerged from the data. Research participants discussed the themes of *Internet Marketing*. This theme derived mostly from conversations with university administrators and civil engineering professors (interviews). Administrators and civil engineering professors reported that the USF and UF Websites serve marketing and recruiting purposes. On the other hand, students, professors, and administrators underlined the importance of Web-based materials in attracting prospective students. The theme of *Usefulness of Information* was another recurring concept throughout the research. This theme came up during focus groups with students and interviews with professors and administrators. Pre-engineering student participants who used Websites during their senior year in high school reported that information posted on university and departmental Web pages had been appealing and informative in the application process. Other students simply shared their Internet habits as pre-engineering enrollees. For some, Web-based information had been instrumental in getting some interest in civil engineering programs. The last emerging construct was the theme of *Climate and Websites*. This theme was articulated during focus groups with students and interviews with professors and administrators. All of the study participants discussed the place of women and racial and ethnic minority students, professors, and administrators in the two civil engineering programs. Interviewees from all three categories (i.e., students, professors, and administrators) reported that many women and minorities face difficulty fitting in the “engineering culture”. In the following sections, I discuss the three key themes of marketing, usefulness of information, and climate, presented above. I

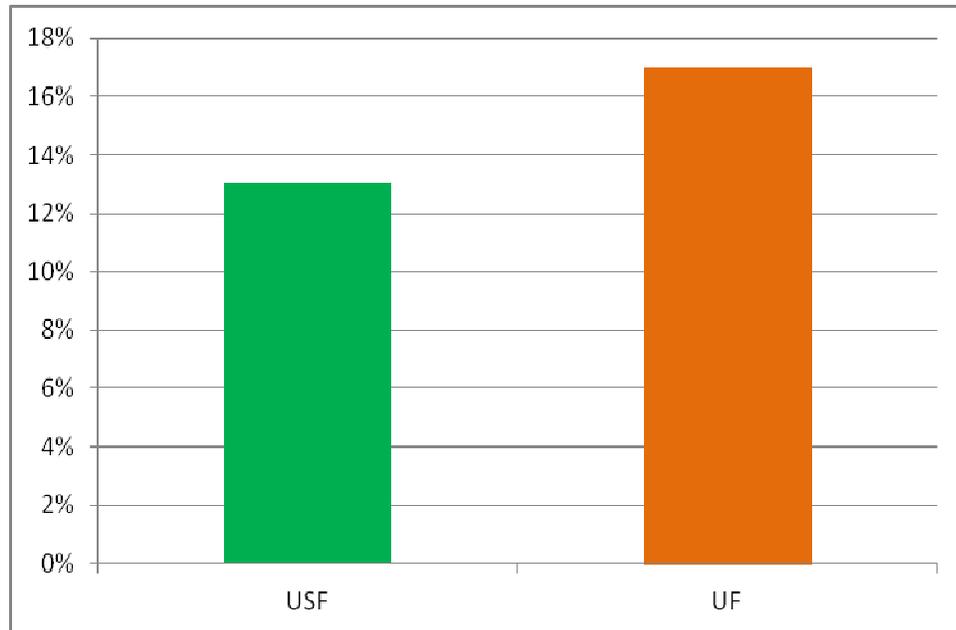
introduced and analyzed each theme in an orderly fashion. Analysis of each of the major themes drew on qualitative evidence gathered from Web pages, pre-engineering student focus groups, and professor and administrator structured in-depth interviews.

#### 4.2.1 Internet Marketing

Before I begin the discussion on the Internet and marketing, it is necessary to unpack the concept of “marketing” and to explain its connection with the new media technology, namely the Internet. Marketing refers to “the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to exchanges satisfying individual and organizational goals” (Bennett 1996:166). This definition shows that marketing entails a set of distinctive but interrelated activities. The bottom line in Bennett’s (1996) definition is that marketing is used for communication purposes. On the other hand, in an economic environment dictated by competition, one pressing issue for today’s marketing professionals is to find effective ways to communicate. Along those lines, the Internet represents a first-of-a-kind means of facilitating exchanges among different actors in the market (Nicovich & Cornwell 2001; Richardson 2001). The association of online communication and marketing strategies has become the norm in contemporary business transactions. The bulk of qualitative evidence presented in this section corroborates this formulation.

Websites have been used for a variety of purposes and in different contexts. Thousands of companies and entities seem to have become cyberspace “insiders”. And colleges and universities have jumped on the band wagon in an interesting way. University officers, civil engineering professors and students discussed the role of Internet marketing in the University of South Florida Civil and Environmental

Engineering Department and the University of Florida Civil and Coastal Engineering Department. Thirty percent of the overall 40 participants (13% at USF and 17% at UF) reported that the USF and UF Departments of Civil Engineering's Websites primarily serve marketing purposes (Figure 4.1).



**Figure 4.1** Responses for Use of Websites as Marketing Tools by University.  
*Source:* Dissertation Fieldwork 2009-2010.

The Internet has permeated the marketing field; and Internet marketing has gripped USF Engineering and UF Engineering. For USF and UF respondents, the ultimate goal of posting information on the USF and UF Websites is to attract the best students.

#### 4.2.1.1 Internal and External Communications

Websites, student focus groups, and civil engineering professor and administrator interviews revealed that electronic communications, and more particularly Websites,

have become a reliable opportunity through which the University of South Florida and the University of Florida communicate with interested publics and advertise their “brand”. These two institutions of higher learning, probably among the largest in the state of Florida, have used the Internet to implement their communication and marketing strategies. Websites have grown to become one of the primary media through which the University of South Florida and the University of Florida reach out to prospective and continuing students. At UF, for instance, both professors, students, and administrators use Web pages for internal (within departments) and external communications (among departments), as the following statement suggests:

For Civil Engineering Departments just like any other department really, in all fields not just engineering, I would say the primary purpose would be to market your institution, your department. Because websites have truly become the way the prospective students, especially, get information about your department before deciding to come to the university. They [websites] help to facilitate internal communication as well as external communication. It helps in your effort to brand and market your department and get your name out there; and talk about research breakthroughs and so forth. But I think one of the primary reasons has long been and, I think, will continue to be to market your unit or department or college or whatever level you’re at, to your prospective students both undergraduates and graduates (UF-White Female Administrator).

It is apparent in this quote that prospective students look for information on the UF departmental Web pages. The statement also shows that the purpose for the University of Florida Civil and Coastal Engineering Department’s Websites is to disseminate information and to promote the UF College of Engineering, its research units and departments. A fundamental element in the statement is that the University of Florida uses its Websites as a public relations tool (Kang & Norton 2006; McAllister-Spooner

2008; McAllister-Spooner & Taylor 2007). Clearly, the University of Florida is trying to create and maintain relationships with potential students through the Web.

As is clear from the above reference, at the University of Florida, information delivery occurs at two different levels: the internal level and the external level. Internal communication involves the communication that takes place among the University of Florida CCE students, faculty, and staff while external communication includes the world outside the CCE department. External communication appears to be a vital portion of the UF online communication process since this segment has the responsibility to promote the institution outside. The above statement demonstrates that the UF Civil and Coastal Engineering Department's Website not only helps disseminate information within and among UF engineering departments and research units, but it achieves student recruitment goals. One administrator held a similar view when she stated this:

A lot of people who are looking for universities and programs make very, very quick decisions. We've discussed with a lot of incoming students and other students during orientations and whenever I have a chance to speak with them about why they came here; what the reasons were. And they tell me how quickly they assessed the website. You have seconds. Literally maybe 10 to 15 seconds of their attention. If they don't see something that's there that intrigues them, that makes'em want to go further, they go. And they don't come back (USF-White Female Administrator).

This formulation shows that USF Engineering's strategy is to use Web pages on the Internet to build lasting relationships with prospective students. The idea behind this assertion is that if USF Websites use marketing communications (e.g., posting detailed, relevant information or displaying attractive images of students and professors) they would help generate multiple return visits. The administrator seems to stress that the more the USF Department of Civil and Environmental Engineering's Websites showcase marketable communications, the greater their chances to get "the attention" of

prospective students. Along those lines, the following statement outlines the importance of a well-designed Website (McAllister-Spooner 2007). This USF administrator explains her role in the online communication process while emphasizing the marketing value of it all:

I do for the most part, although I do it in collaboration with subject matter experts throughout the college. I am not an expert in undergraduate advising or anything so I go to them and they would provide me with the information...I know how to communicate it but I don't know the detail. They give me their information and I turn it into marketable communications (USF-White Female Administrator).

Website design is a collaborative effort led by different departments and research units in the USF College of Engineering. As a marketing expert, this administrator realizes that it is one thing to get the detail straight and it is quite another to be able to organize the information into readily available online marketing content. The next section offers a discussion of the importance of online marketable communications in USF and UF's global outreach.

#### 4.2.1.2 Global Outreach

Marketable online communications involve organizing and (re)presenting information in such a way that the USF Webpages on the Internet would be able to speak to larger audiences than the regular academic communities. The University of South Florida has the potential to reach out to prospective students from around the world through its Websites as the following statement indicates: "The primary reason for creating and maintaining a website is a global outreach [...] Our website is our face to the world [...] it is our presentation to the rest of the world" (USF-White Female Administrator). It is clear in this statement that USF's Websites (i.e., college and

departmental Websites) are primarily designed to reach out to audiences from across the country and around the world. The USF College of Engineering updated homepage is consistent with the above statement. This new Website shows that this engineering school is interested in a global appeal (Figure 4.3). McAllister-Spooner and Taylor (2007) once observed that, “Today, many schools seek to increase enrollment and this demands that colleges get their message out to broader audiences” (McAllister-Spooner & Taylor 2007:1). Universities such as USF and UF will be able to increase their enrollments unless these schools “get their message out” to communities beyond their campuses, towns, or cities. The World Wide Web offers the University of South Florida and the University of Florida limitless recruiting possibilities. The two Web pages presented below illustrate the “global outreach” approach developed by USF Engineering.



**Figure 4.2** USF College of Engineering’s old homepage, accessed November 16, 2009.



**Figure 4.3** USF College of Engineering’s updated homepage, accessed August 16, 2010.

The two figures presented above (Figures 4.2 & 4.3) illustrate two USF College of Engineering’s Websites. The first site shown (Figure 4.2) represents the college’s old homepage. In this site, two minority students are shown. Additionally, the site includes a brief presentation of engineering departments and provides a checklist of the various programs housed in the University of South Florida’s College of Engineering. As shown on the site, one of the first departments listed is the Department of Chemical and Biomedical Engineering, followed by the Department of Civil and Environmental Engineering (Figure 4.2).

The second site shown (Figure 4.3) is the USF College of Engineering’s updated homepage. Not only does this updated homepage display more images of a diverse engineering community (Caucasian, Latino, Black, Asian, men and women engineers are

represented on the site) but it also contains interactive images of engineering students and professors introducing themselves and highlighting their disciplines or areas of interest (see upper part of Figure 4.3). The updated site shows images of a woman engineer carrying out research activities (under the headline, “Research”) (see lower part of Figure 4.3). Finally, the two webpages presented above do project the University of South Florida’s College of Engineering in favorable terms. The two sites emphasize the idea that the University of South Florida and its College of Engineering are committed to using Websites in their global outreach efforts.

Undoubtedly, USF Engineering and UF Engineering have used their Websites for global marketing purposes. Not only have these engineering schools used the Internet as an instrument for marketing missions, but they have employed the Web as a recruitment and retention tool. Communication and marketing go hand in hand with recruitment and retention. When asked if the Web had ever been utilized as a tool for recruiting and retaining students, one UF administrator admits that:

It is a tool. We (the University of Florida) were probably the first university to go to an all electronic application; web-based application required. And there were a number of years when the digital divide was, the concept was out there (UF-White Male Administrator).

The idea in the statement is to recall that the University of Florida has been using the Internet as a recruiting strategy to attract students from across the country and around the world. The University of Florida would have had an edge over other universities when it comes to using the Internet as a recruiting and application device. Oftentimes, the notions of marketing and recruiting are used interchangeably. The truth of the matter is that these concepts are different in meaning. While marketing refers to the sum of activities involved in the transfer of goods from the producer or seller to the consumer or

buyer, including advertising, shipping, storing, and selling, in the educational context the notion of recruiting consists of engaging in finding and attracting students to a given school with the intention of enrolling and retaining them. However, the concepts of marketing and recruiting are intertwined; and marketing and recruiting activities fundamentally need information delivery. One may go as far to contend that successful information delivery is the *sine qua none* for successful marketing or recruiting. One University of Florida professor expressed a similar view when he pointed out that Websites are primarily designed and maintained for information delivery:

There are two reasons. One is internal communication and dissemination of information. The primary reason may have been to attract students to the department and to highlight the work that is done. One sees sort of a transition between one and the next [...] It facilitates people finding out about us and us finding out about ourselves (UF-Black Male Faculty).

The following Web page (Figure 4.4) may serve as an example of marketable communication (both at the internal, external, and global levels). The University of Florida Department of Civil and Coastal Engineering's homepage is made up of detailed information about the subfields of civil engineering and images displayed as a slideshow. The pictures were put together in an effort to promote global outreach; they are meant to be an accurate representation of the subfields of the discipline of civil engineering, each picture including a caption describing a subfield. As I discuss earlier, students represented on the USF and UF Websites are real pre-engineering or undergraduate students enrolled in USF Engineering and UF Engineering. But more important, the images are a testimony that the University of Florida Department of Civil and Coastal Engineering provides students with a top quality multidisciplinary civil engineering education.

Right at the center of the Web page one can see images illustrating different civil and coastal engineering activities. The slide show begins with a slide including the picture of a broken bridge and stating, “Welcome to Civil and Coastal Engineering”. Following are slides describing various civil and coastal engineering subfields or areas of expertise including “Structures, Coastal and Oceanographic, Pavements and Materials, Public Works, Geotechnical, Construction Management, Water Resources, and Transportation”. This presentation of the academic specialties of the CCE Department is likely to be useful to an audience interested in finding out about the kind of training offered in the CCE Department at the University of Florida. The left hand side of the Web page includes several links: “About Us, Admissions Information, Financial Aid, Newly Admitted Students, Current Students (this includes graduate and undergraduate degree requirements as well as course requirements), Academic Specialties and Research Centers, CCE Distance Program via UFEDGE, People (a presentation of the CCE staff and faculty by specialization), Departmental Forms, Departmental News, Employment, CCE 100 Years Strong (a link that celebrates the 100 years of existence of the program), CCE IT Policies, Join the Civil Gator, and Contact Us” (Figure 4.4). The links contained in the CCE’s webpage represent a wealth of information for interested public to use. The lower part of the webpage displays a small picture and delivers a “Message” from the Civil and Coastal Engineering Department’s interim chair and a social network (Facebook) link. The chair’s message reads as follows:

The Department of Civil and Coastal Engineering is proud of our roots at the University of Florida and we continue to grow strong. Our graduates span the globe working in Construction Management, Coastal and Oceanographic Engineering, Geotechnical Engineering, Hydrologic Engineering and Water Resources, Materials and Pavements, Structural Engineering, Public Works and Transportation Engineering. Please click on the link to the left titled CCE 100 Years Strong to learn more about the history of our department, the Who's Who of Civil Engineering and information on one of our first graduates (see Figure 4.4).

The substance of this message is that the University of Florida's Civil and Coastal Engineering Department has a long tradition of success and accomplishment in the field of civil engineering and enjoys recognition both nationally and internationally. Moreover, the fact that the CCE Department celebrated its 100<sup>th</sup> year of existence in 2009 is some indication of the prestige of this department. Not only does the link of "CCE 100 Years Strong" mark the celebration of the CCE Department's centennial events, but it makes the statement that the CCE Department has been successfully recruiting and retaining students for a century. No doubt UF's Civil and Coastal Engineering centennial events represent a supplemental marketing argument for the CCE Department to capitalize on as they strive to recruit and retain students from across the country and around the world.



**Figure 4.4** UF Department of Civil and Coastal Engineering’s homepage, accessed November 16, 2009.

The above Web page reinforces the idea that the UF Websites primarily serve as information providers and seek to achieve global outreach. Information posted on the site is destined to attract potential students. A similar view is illustrated in the following quote:

Primarily, informational purposes; to make sure students are aware of our program; what we can provide to them in the way of an education; how broad and how deep the program is; and how much it reaches beyond Gainesville and the University of Florida (UF-White Male Administrator).

Apparent in the above statements is that the University of Florida Civil and Coastal Engineering (CCE) program’s Web pages are set up and maintained for informational purposes; the knowledge collected, organized, and posted online has one purpose: reach out “beyond Gainesville and the University of Florida”. This assumption is some indication that the University of Florida has a vested interest in global marketing communications. In a sense, the above assertion underlines a close connection between

information delivery, marketing, and global outreach. On the other hand, a picture of the University of Florida Civil and Coastal Engineering Department's Interim Chair displayed in Figure 4.4 helps notice that the CCE Department is chaired by a Caucasian male engineer. This information is in line with research that shows that White males tend to be a majority and to occupy leadership positions in engineering professions and departments (Kanter 1993; May & Chubin 2003). In fact, integration has not been a reality in many Florida universities, including the University of Florida, until legalized segregation was abolished as the law in the U.S. in the late 1950s and early 1960s (Cobb-Roberts & Shircliffe 2007; Florida 2009). Underrepresented groups such as women and racial and ethnic minorities have been progressively included in the UF CCE Department. As I outline later, the University of Florida College of Engineering celebrated the appointment of its first woman Dean of Engineering. The celebration of UF's centennial events coincided with the appointment. Of course, the event had a remarkable coverage on the Web.

A line of thought echoed in the following statement by one University of South Florida's Civil and Environmental Engineering (CEE) professor delineates the mission(s) of the USF Civil and Environmental Engineering Department's Website:

The purpose of having a departmental website is to try to present the information, the department, especially for those who are interested in our undergraduate or graduate programs. Those who want to find out what is this area about (USF-Asian Female Faculty).

It is clearly indicated in this statement that the USF CEE Department's Website is meant to be an information provider for interested publics (i.e., students, professors, staff, administrators, parents). Helping interested parties find out about civil engineering is the number one goal of the CEE Website. Along those lines, the University of South Florida

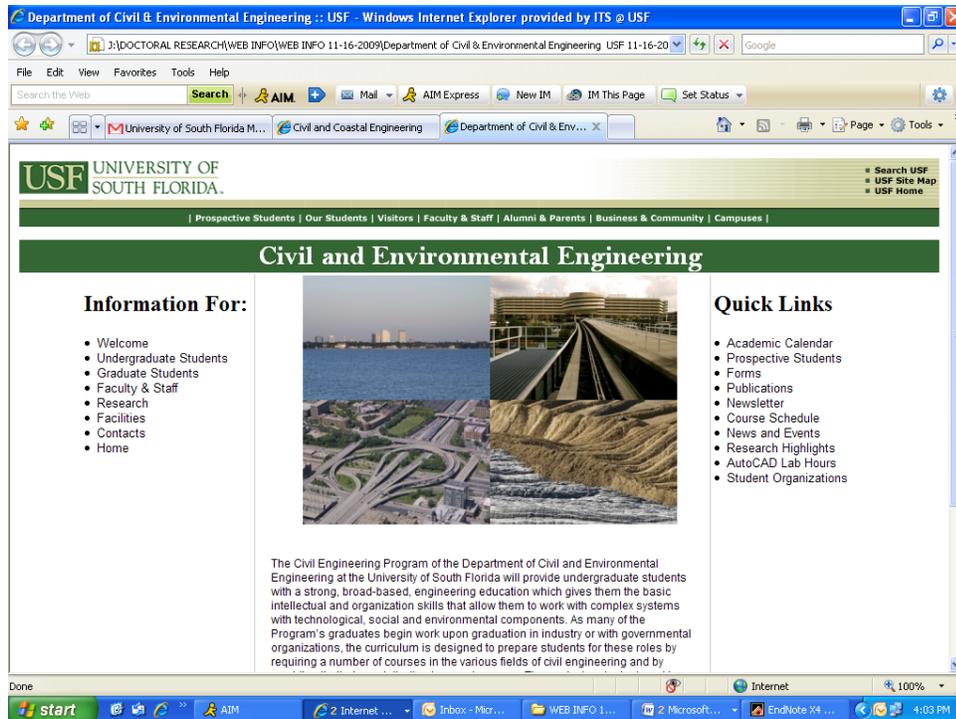
CEE department's Web page (Figure 4.5) offers a straightforward presentation of the field of civil engineering by displaying relevant information and pictures.

The images shown on the University of South Florida's CEE homepage include four pictures representing four specific areas of expertise for civil engineers. Some of the areas are: public construction, water management, pipeline construction and monitoring, and highway transportation systems. On the left hand side of the page, one can read the headline, "Information For". This section lists relevant links with information about "Graduate and Undergraduate Students (i.e., programs and degree requirements), Faculty and Staff (i.e., contacts and interests), Research (i.e., research activities conducted by students and professors), Facilities, and Contact (i.e., the CEE Department's physical address).

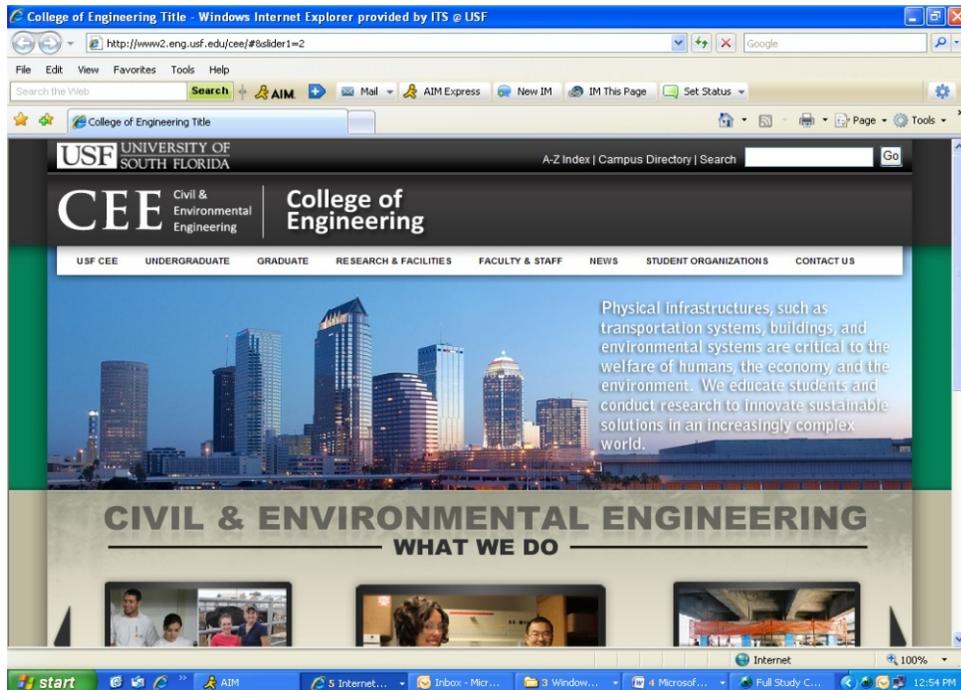
The right hand side of the University of South Florida's CEE Department's webpage presents a different headline: "Quick Links". "Quick Links" refer to important departmental links providing information about "Academic Calendar, Prospective Students, Forms, Publications, Newsletter, Course Schedule, News and Events, Research Highlight, AutoCAD Lab Hours, and Student Organizations". The bulk of Web-based information presented above is a reflection of the University of South Florida's commitment to providing students, faculty, and staff with quality support system. Moreover, the lower central part of the CEE Department's Web page is a brief presentation of the USF Civil Engineering Program's goals. The overview reads as follows:

The Civil Engineering Program of the Department of Civil and Environmental Engineering at the University of South Florida will provide undergraduate students with a strong, broad-based, engineering education which gives them the basic intellectual and organization skills that allow them to work with complex systems with technological, social and environmental components. As many of the Program's graduates begin work upon graduation in industry or with governmental organizations, the curriculum is designed to prepare students for these roles by requiring a number of courses in the various fields of civil engineering and by providing limited specialization in one given area. The curriculum is designed to encourage lifelong learning and to prepare students for undertaking advanced studies in engineering or in other professional areas (see Figure 4.5).

The aforementioned quote –which stands as the mission statement of the Civil Engineering Program of the Department of Civil and Environmental Engineering at the University of South Florida – is a clear testimony that department and university officials understand the necessity to communicate effectively the strengths of the USF Civil Engineering Program. Mention is made in the statement that undergraduate students entering the USF Civil Engineering Program can reach their potential through a “strong, broad-based, engineering education”. Most importantly, the mission statement suggests that the USF Civil Engineering Program offers undergraduate students rich, multilayered educational and professional opportunities. The USF Civil Engineering program's mission statement presents program objectives in a pretty concise way. This information might be appealing to prospective students. And, in fact, it has the potential to convince any prospective students interested in pursuing a bachelor's degree in civil engineering to join the Civil Engineering Program of the Department of Civil and Environmental Engineering at the University of South Florida.



**Figure 4.5** USF Department of Civil and Environmental Engineering's old homepage, accessed November 16, 2009.



**Figure 4.6** USF Department of Civil and Environmental Engineering's updated homepage, accessed January 19, 2011.

Information presented in Figures 4.4, 4.5, and 4.6 reflects the assumption that Web-based, online information plays a key part in the University of South Florida's CEE Department's and the University of Florida's CCE Department's marketing and recruiting processes (McAllister-Spooner 2008). University and engineering department outreach efforts intersect and are increasingly Internet-based as a large portion of the world's youth population browses the Web for educational purposes. Besides, the updated site of the USF College of Engineering and the updated site of the Civil and Environmental Engineering Department indicate that officials at the University of South Florida have been committed to making USF a Research One institution. Interview and Web-based evidence have indicated that Web pages on the Internet serve multiple purposes, including promoting STEM fields globally and giving American as well as world youth an opportunity to develop some interest in these fields. The following statement by one University of Florida administrator highlights the fascination college students have with the Internet suggesting the generational changes brought about by the communication superhighways:

The current generation of students is far more web savvy or web dependent, I should probably say, than the generation I came from. So, in general terms, the first place a student would look for information is online. That's almost exclusively the case (UF-White Male Administrator).

According to this administrator, the University of Florida Web pages represent an important data source where prospective students can seek and find relevant information about engineering schools or programs. Additionally, the statement suggests that the current generation of college students is increasingly keen on online communications and is more likely than the previous generation to use the Internet technologies throughout the

college application process. The following excerpt by another University of Florida administrator corroborates this view: “In today’s age, that’s (websites) what students deal with. It’s a great source of information and it doesn’t cost anything. It’s easy to maneuver; it’s easy to update (UF-Black Male Administrator). As this administrator points out, UF Websites function as cost-effective, user-friendly technologies that can be accessible to all. Prospective students can access the USF Websites to get vital information:

Once I did go to one of the sessions and got more information about USF, I actually was given a card by one of the representative (sic) that had come down and told me to check out the website for the college of engineering, so I did investigate the website, go more into and tried to read up on what different students thought about the program, seeing what they really provided on their website as far as information went (USF-Civil Engineering Black Female Switcher).

This quote recounts the story of a student who switched from the University of South Florida’s Department of Civil and Environmental Engineering. The student explains how the USF Website had been useful to her back when she was searching for a college.

By way of a conclusion, data analyzed in this section have evidenced that today more than ever before, the University of South Florida and the University of Florida Websites play a central role in the two universities’ communication and marketing strategies. In a sense, the University of South Florida and the University of Florida Websites have incalculable transformative power. I make this statement because the two institutions’ Web pages have completely altered the way USF and UF communicate with different audiences, including potential and current pre-engineering students, across the U.S. and around the world. As matter of fact, the USF and UF Web pages provide

potential students with readily accessible critical information. Internet marketing offers many possibilities to colleges and universities, especially for institutions like the University of Florida and the University of South Florida which have expanded from segregated institutions to universities with a broad global appeal (Cobb-Roberts & Shircliffe 2007; The Florida Engineer 2009; University of South Florida 2006; University of Florida Year Book 1947). Internet marketing has redefined the boundaries of the University of South Florida and the University of Florida as higher education institutions.

As media technologies enabling people from around the world to connect with USF and UF without being physically present in the U.S. or in the state of Florida, the USF and UF Websites can play a pivotal role in promoting diversity in each university. With that being said, it is crucial to ponder over the nature of the data displayed on the USF and UF Civil Engineering Departments' Web pages to see if and how those data help USF and UF fulfill their marketing and communication goals and if and how Web-based, online information help USF and UF expand their pool of women and minority applicants and enrollees as well. Qualitative evidence demonstrated that the USF and UF Websites target different audiences, including women and racial and ethnic minority students. Enrollments statistics speak to the reality in engineering schools in the state of Florida and the U.S.

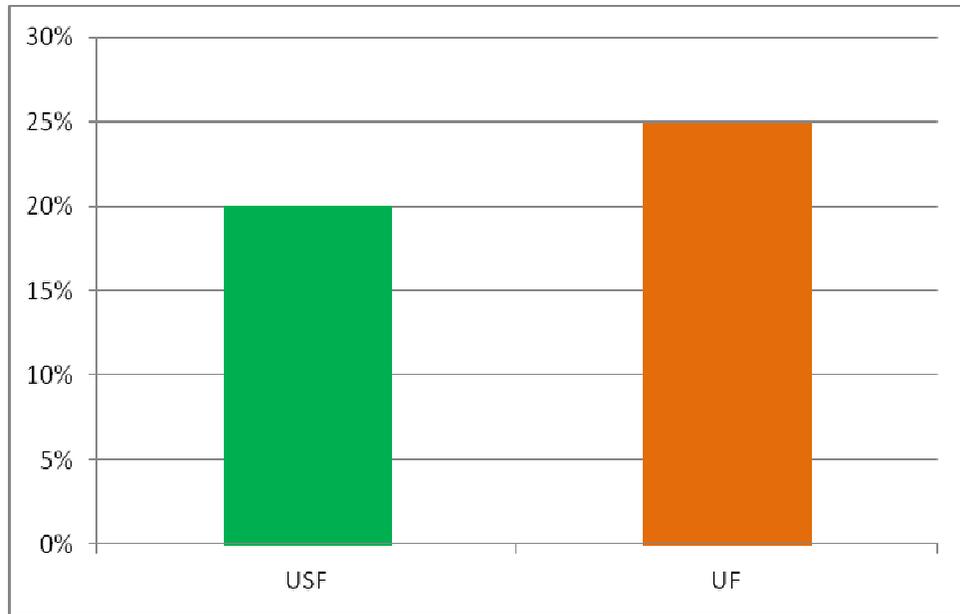
While a study shows that women and racial and ethnic minorities comprise about 4 percent of higher education (Guliana 2000), a 2008 National Action Council for Minority Engineers (NACME) report suggests that, “[A]frican Americans, American Indians, and Latinos constitute 30 percent of the nation’s undergraduate students, yet only 12 percent of baccalaureate engineering graduates in the United States are URM’s”

(NACME 2008). Internet marketing represents a course of action to address these gaps; even though many colleges and universities are now confronted with issues of market and technological change (Guliana 2000; McAllister-Spooner 2007; Nicovich & Cornwell 2001; Richardson 2001; Stoner & Lincoln 2000). Like some have suggested, I believe addressing the needs of underrepresented minorities may help colleges and universities like USF and UF expand their science and engineering enrollments (Guliana 2000; May & Chubin 2003). It is now a fact that the University of South Florida and the University of Florida utilize Web pages to fulfill relational and marketing goals. The question is, what kinds of values are these institutions promoting on their Websites to expand their pool of applicants and enrollees?

In the following section, I discuss the usefulness of the Web-based, online information posted on the USF and the UF Web pages. I examine the extent to which online information was or is appealing to students and how Web-based information affected program selection for pre-engineering or undergraduate students at the two institutions. In doing so, I used USF and UF current pre-engineering or undergraduate civil engineering student as well as former USF engineering student (switchers) perceptions of their college's or department's Websites. Additionally, in order to substantiate the discussion, I employed two different Web pages. These include one University of Florida CCE Department's elective Web page (<http://www.ce.ufl.edu/electives.html>) and one University of Florida College of Engineering Admissions Web page (<http://www.eng.ufl.edu/admissions/>). I selected these Web pages because they represented the most descriptive visual elements among a wide range of other Web pages.

#### 4.2.2 Usefulness of Information

Today every university uses its Website to fulfill marketing and communication goals (Guliana 2000; Nicovich & Cornwell 2001; Richardson 2001). And I just discussed university officials' perceptions of Web pages on the Internet. Both at USF and UF, administrators agreed that Websites have become the face of their universities (McAllister-Spooner 2007). In the same way, each department's or program's Website is characterized by specific information with a specific target. Often times, information posted online is meant to be representative of various interests and, therefore, to attract different audiences. Because students increasingly browse the Web in search of different kinds of information (Kang & Norton 2006; Schoenfeld, Weimer, & Lang 1997; Schofield & Davidson 2002), it is important to examine student online interests. In other words, I am taking a closer look at the kinds of Web-based materials (i.e., texts and images) that are appealing to students when they browse the USF Department of Civil and Environmental Engineering and the UF Department of Civil and Coastal Engineering's respective Websites, especially when focus group and interview responses show that 60% of the participants reported that Websites serve communication purposes and are, indeed, maintained in order to provide timely, vital information to interested publics (Figure 4.7).



**Figure 4.7** Responses for Websites as Information Providers by University.  
*Source:* Dissertation Fieldwork 2009-2010.

The above graph shows that 20% of USF respondents reported that Websites serve information delivery purposes, while 25% of UF participants reported the same thing. UF had the highest percentage of respondents on this specific question. The total of the individuals who indicated that the Internet and Websites serve information delivery was 45%. In any case, participants from both the University of South Florida and the University of Florida indicated that their schools utilize Web pages on the Internet to convey messages and to provide information to interested audiences. It is critical, at this point, to examine the types of information the USF Department of Civil and Environmental Engineering and the UF Department of Civil and Coastal Engineering's Websites. The following two subsections are a discussion of departmental online data. First, I analyze program of study data. Then, I review students' day-to-day information needs.

#### 4.2.2.1 Program of Study Data

The following statement by one University of South Florida civil engineering student is a testimony that students may find information relating to civil engineering curriculum on the USF Civil and Environmental Engineering Department's Website. Additionally, the statement illustrates that when browsing an engineering college or department's Website, students look for specific information:

What I liked honestly, actually, I wasn't sure like when I was at the community college if, you know, those prerequisites I am taking, I wasn't sure if they actually would match, you know, the USF program. So, when I checked out the catalog (on the Civil and Environmental Engineering's website) and I saw all the classes that I'm taking like actually matching up. And this is, you know, pretty accurate with the classes. So, that was kind of cool, you know. It makes you calm down. You know you're on the right track. So, that was helpful (USF-Eastern European Female Student).

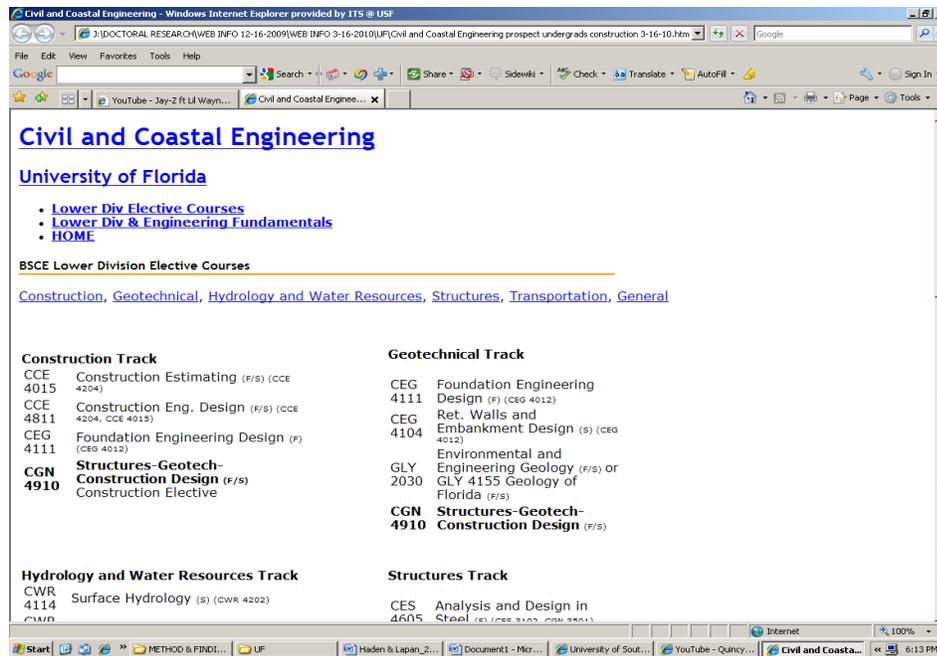
This USF civil engineering student indicates that curriculum information posted online was the motive behind her visiting the CEE Department's Website. According to the statement, the female civil engineering student's being able to find Web-based information (i.e., civil engineering curriculum) relating to her program of interest (the USF CEE Department) gave the student a good impression of the University of South Florida and its Civil and Environmental Engineering Department. This seemingly simple fact may have been a determining factor in the student's decision to attend USF.

The following comment parallels the previous one. The University of Florida CCE Department's Website breaks down into graduate and undergraduate sections and provides curriculum information among other things:

Well, I mean, they, they kind of have a couple, I think they split it up to undergraduate and graduate info and they kind of, and the undergraduate section, I think they kind of they let you know what courses are going on and they kind of, like, some professors, um, like she said, you can use it if you want to find a professor's webpage, to find out if they're doing research or something. Um, let me see, I don't know, I haven't really paid too much attention to it when I go to the page (UF-Black Male Student).

The statement shows the student's familiarity with the UF Civil and Coastal Engineering Website. Albeit the respondent does not seem to be certain about the accuracy of the information on display on the page, his recollection points to undergraduate and graduate level sections, curriculum information, and professors' areas of specialization. The comment of the Eastern European female civil engineer and that of the Black male civil engineer are in line with public relations theories. These statements show the capacity of the USF and UF Websites to function as information providers for interested civil engineering students (Kang & Norton 2006; McAllister-Spooner & Taylor 2007). Websites are the virtual locales where information delivery takes place and meaningful communication occurs between colleges and universities and interested students (Kang & Norton 2006; McAllister-Spooner 2008; McAllister-Spooner & Taylor 2007). The descriptions of the two students indicate that specific facts catch students' attention on the Web. Perhaps it is in light of those kinds of facts that people develop some interest in engineering or decide to apply to certain schools or programs. As Mechitove et al. (2001) once observed, information content is one of the most important factors influencing overall perceptions of Website effectiveness by college students.

The Web page below displays useful undergraduate course fact. The information contained in this Web page is consistent with the Black male engineer's statement:



**Figure 4.8** UF Department of Civil and Coastal Engineering elective courses Web page, accessed November 16, 2009.

Figure 4.8 displays important data about particular elective courses offered in the University of Florida CCE Department. Four specific tracks are being shown on the Web page. Electives are organized by track (e.g., Construction Track, Geotechnical Track, Hydrology and Water Resources Track, and Structures Track).

In the following statement, one Latino student –who apparently was in the military and deployed overseas before he applied to the USF Department of Civil and Environmental Engineering–indicates that facts posted on the department’s Website had been useful in the application process:

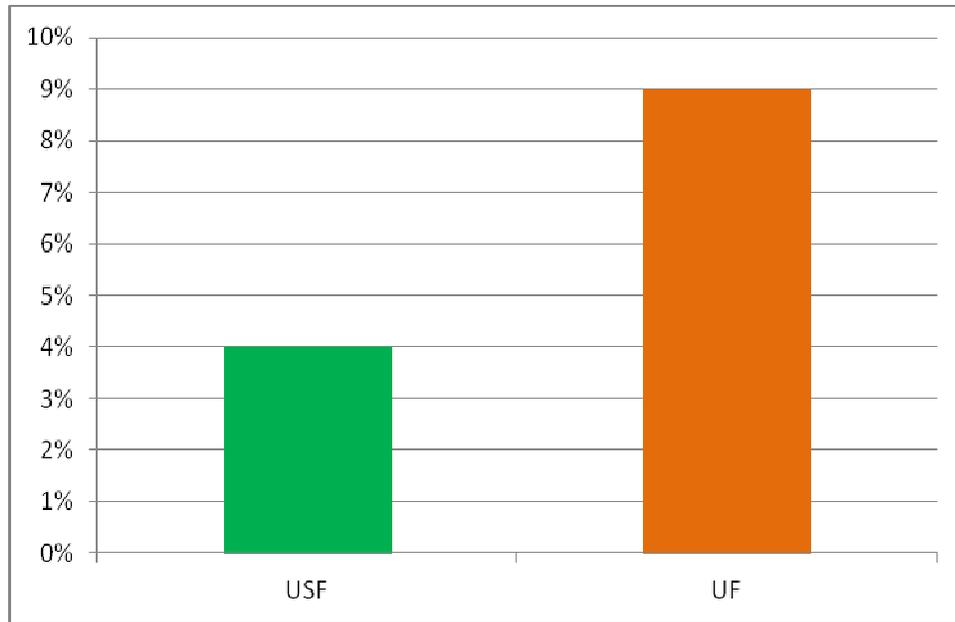
For me it was a special situation because I needed like all the info I can get to get approved for this program. So, it was vital. I wouldn't I have gotten into the program without all that information because with the time difference, between calling here and E-mailing; it wasn't time conducive. It wouldn't have worked as well...I literally went on there like two days in a row and got all the info I needed and all I had to do was contact one person here to get it approved. I mean it's exactly what I needed (USF-Latino Male Student).

The convenience of applying online adds to the satisfaction of getting information relevant to one's interest. Moreover, it is imperative for students to be aware of program prerequisites and course schedules. The following statements parallel the previous one:

I think that's the most helpful thing on the website because - especially that engineering is so mi-prerequisites - you really can't just start taking grant of classes. You have to take some before others. And if you don't that kind of sets you back in the semester. So, that's probably the best information on there for sure (USF-White Male Student).

For me it was time thing. I had to do my degree in three years. I needed the course schedule to work perfectly. So, that was my main concern. It was the course schedule that is an attachment on that website. It lists summer, spring, and fall. It's like a metrics. And that's exactly the one I needed. And that was the most important thing for me because like I said the time constraint. That's the biggest thing, my biggest worry (USF-Latino Male Student).

Departmental Websites have the potential to facilitate not only college application for students but also engineering program selection. However, it is worth pondering about how many students in the sample created for this study reported that they used Website information to decide to apply to either one of the engineering programs investigated.



**Figure 4.9** Responses for Use of Websites for Civil Engineering Program Selection by University. *Source:* Dissertation Fieldwork 2009-2010.

Web pages represent a window of facts and opportunities that both prospective and continuing students can tap into. The above graph shows that a significantly low number of students used the Web for program selection. Of the 23 pre-engineering students who participated in this study, 13% reported that they used Web-based, online information to select their program. As Figure 4.9 summarizes, about 9% of UF student participants indicated that they did browse the Web during their senior year to look for specific engineering program information compared to only 4% at USF. It is, indeed, an interesting finding that not so many students were able to recall their Internet use when they were applying for college.

One female switcher reported that Web-based, online information about course offerings was helpful in the application process:

I did, actually. Another thing I liked about the College of Engineering was the fact that they had a very structured plan of attack, if you will, of like you have to take these classes now and then you'll follow them with these classes and these classes and these classes, and I really liked that. And so I was like okay, well this, you know was very structured. I like structure and that definitely appealed to me, so I did look at the website and I liked it. I thought it was very helpful (USF-White Female Switcher).

Prospective and current civil engineering students seek information about program courses of study. It mattered to this White female switcher that the USF College of Engineering Website was “very structured” at the time she needed it to apply. The student declares that she found the online information on course offerings to be “very useful”.

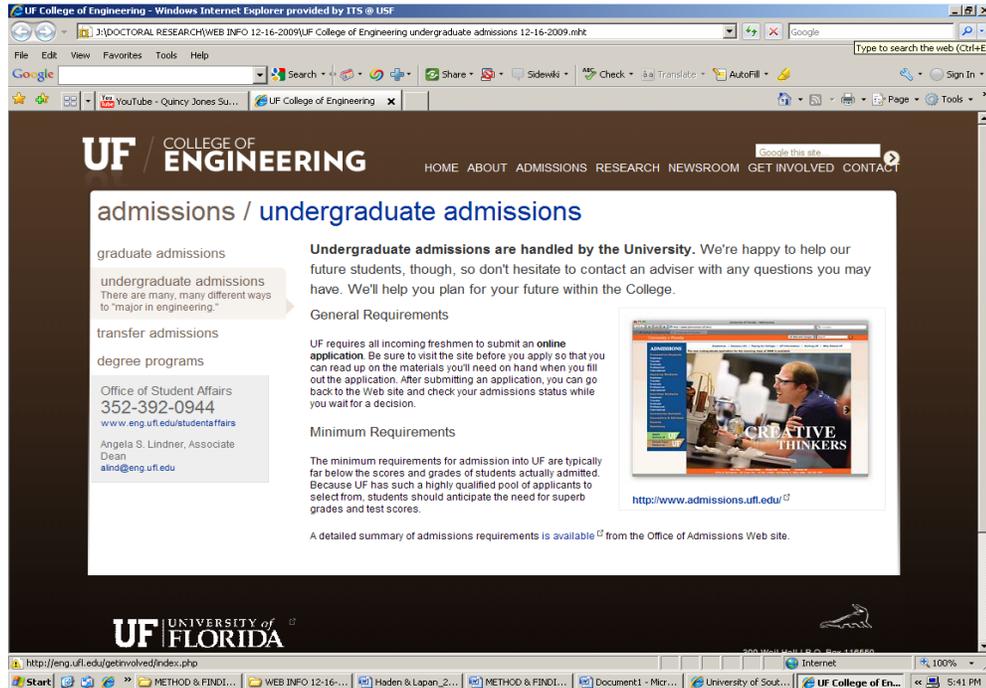
#### 4.2.2.2 Day-to-Day Information Needs

Not only do civil engineering students use departmental Websites to learn about program courses of study but they try and meet day to day information needs (scholarships, professors' Websites, email addresses, office hours, or admissions facts) as the following statements suggest:

Yeah, I'm not extremely familiar with the, the civil department's website, I've been there to look, um, for scholarship information and to search for specific professor's websites and Emails and office hours and stuff like that...um, I've, I know they have some course listings and stuff on there...(UF-Black Male Student).

Um, it (the CCE Department's website) seems to have more maybe for graduate students and people interested in research and specific, um, projects that are going on, or information about professors--the only...the only thing I've really used it for as an undergraduate student is, um, like I said, scholarship information, um, I know that they have also admissions, like, um, information about admissions on there for high school students, and people applying to the program or applying to the graduate program... (UF-White Female Student).

The following Web page (Figure 4.10) provides a clear testimony that in the University of Florida College of Engineering, admissions facts are communicated through the Internet and, more specifically, through Web pages:



**Figure 4.10** UF College of Engineering admissions Web page, accessed November 16, 2009.

Students can get admissions facts (graduate and undergraduate admissions) on the UF CCE Department's Website. These include admissions requirements for both prospective and continuing civil engineering students (Figure 4.10). Prospective students as well as pre-engineering students do not just look for the “best schools” or “cool” sites. They are attracted by engineering programs that are able to meet their day-to-day information needs (DiMaggio et al. 2001; McMillan & Morrison 2006; Venegas 2006) by providing general or specific knowledge about degree programs students are interested in:

Yeah, um, when I was in high school, applying for UF, I did go to the engineering website, not the civil, but just engineering in general to find, to see if I could find the sound engineering program in this school, but there wasn't any so, the closest thing I found to that was a sound designer, I'm sorry, digital arts and science, engineering program, and that's what I put in my application because you supposed to put something, so I just put that I wanted to do that, and that's what I started with. But I did go to the engineering website (UF-Latina Female Student).

Student interests vary from concentration to concentration, from program to program, and from school to school. What is of interest to a Structural Engineer may not be of interest to a geotechnical engineer. And what is appealing to one UF Civil Engineer may not be appealing to one USF Civil Engineer. The following two statements support the argument that students from the same program may have different views on Web-based information use. One student commented on images posted on the CCE Department's Website in these terms:

I feel like they're very, I feel like they're dynamic, the images, 'cause every time I see an image of like somebody doing something like if you go to the coastal specialization one (UF-Latino Male Student).

Whereas another student contended what follows:

Well, I ain't, (sic) I really haven't been there too much and so I really don't remember, as I told you, I just visited the forms part of the website which is pretty boring, it's just forms, um, so yeah, that's it, I don't know really...(UF-Latina Female Student).

The point of contention in the two comments is usefulness of Web-based information. The first statement shows that images posted on the UF CCE Department's Website can be appealing to prospective students, especially those interested in getting involved in some sort of hands-on activities. The second assertion demonstrates that materials found on the UF Web pages such as forms are useful, although the statement is

also a criticism of the reliability of the information posted on the CCE Department's Website.

Relatedly, other University of Florida pre-civil engineering students pointed out that the UF Civil and Coastal Engineering Department's Website should not be trusted as the only source of information students can possibly tap into in an effort to make an informed decision about which school or program to select:

And, I think, through the website, it's like, you can't get a feel for it just from a website. It wasn't until I visited the campus that, that I knew that I wanted to come here like, like for sure. But from the website, I was just looking for something that told me that this was a good university (UF-Latino Male Student).

Like, UF has so many engineering things, like engineering week, or, like I remember there was this one day when I was in high school that I followed around a college student to their classes--like they have a lot of little programs for high school students wanting to be engineers, and um, I felt like I had a ton of information, I didn't really do any online searching at that point, um, I think when I switched my major to civil engineering, I briefly looked at the website, but, um, I just met with an advisor (UF-White Female Student).

It is clear in those statements that online information means different things to different users. Prospective engineering students browse the Web with the goal of finding specific information that could help them make an informed decision about where to apply or not. Additionally, a student may declare a major without being fully informed about the chosen major. This is why each of the two institutions investigated in this case study have developed important guidelines and procedures to help pre-engineering students navigate the process. Lack of sufficient or appropriate information may, in fact, lead a student to declaring a major he or she is not really interested in. As I discuss in the second chapter of this dissertation, cultural capital is a catalyst of educational attainment (Bourdieu 1974; Bourdieu 1977; Kingston 2001; McLaren 1999). Students with the right

amount of knowledge at the right moment would be able to make a difference (Sullivan 2001). But as Cammarota and Romero (2011) pointed out, there are different types of cultural capitals. The experiential knowledge accumulated by students inside and outside of school is an asset they can tap into to thrive in their program. The underlying assumption here is that USF and UF pre-engineering or civil engineering undergraduate students who will take ownership of information posted on their schools' Websites (another form of cultural capital) will be able to navigate their program of study more easily. The study demonstrates that pre-civil engineering students at USF or civil engineering undergraduate students at UF equally used the Web. Internet use for both groups was mainly for academic purposes. Additionally, pre-engineering or civil engineering undergraduate students at both the University of South Florida and the University of Florida reported that they used Websites more once they arrive at the respective universities. However, students at the two institutions did not fully take advantage of the resources made available through the university or college or department.

Being able to navigate departmental, college, or university Web resources may help pre-engineering students thrive in their program of study. However, not all engineering students fit in engineering school's culture (Borman et al. 2010; Cross & Vick 2001; Tinto 1993; Tyson et al. 2010). In fact, students leave engineering for different reasons. In their book, *Talking About Leaving*, Seymour and Hewitt (1997) discussed why student switch out of STEM majors and articulated the concept of "more pushed than pulled" (Seymour & Hewitt 1997:292-293). What these authors meant was that there exist sociocultural practices within science and engineering programs that

cause non-traditional students, especially women and racial and ethnic minorities, to leave these programs (Cross & Vick 2001). As I outline earlier, and document more extensively in the next section, in the process of reaching out to diverse audiences (Kent & Taylor 2002) the University of South Florida and the University of Florida Websites communicate sociocultural practices and ideologies.

Dialogic (online) communications between the University of South Florida and the University of Florida, as organizations, and prospective and current pre-engineering students could be “relational” if these communications involved an understanding of the past, present, and future of all people involved in the relational process (Kent & Taylor 2002). As I document in Chapter 1, there is a clear connection between the history of the U.S. South and the educational conditions of African American in Florida schools, including the University of Florida and the University of South Florida (Florida 2009; Morris & Monroe 2009; The Florida Engineer 2009; University of South Florida 2006). The two public universities have not been “integrated” from day one (Cobb-Roberts & Shircliffe 2007; The Florida Engineer 2009; University of South Florida 2006). Black and Latino students were not allowed to matriculate at either USF or UF until legalized segregation was abolished as the law in the U.S. in the late 1950s and early 1960s. Nevertheless, it is worth noting that although they were subject of rejection, women (from the White group) started to take classes at UF in the late 1940s and early 1950s, which was about a decade before Black and Latino students were officially allowed to enroll and three decades before Rhonda D. Holt became one of the first Black women “Gator engineers” (The Florida Engineer 2009). Given these important historical precedents – and being aware that universities are increasingly concerned about the way

prospective students, including racial and ethnic minority students, perceive their image (Guliana 2000; Synes 1996) – it is important to investigate how the Web pages of the University of South Florida and the University of Florida Colleges of Engineering speak to non-traditional or diverse audiences, including women, African American, and Latino students.

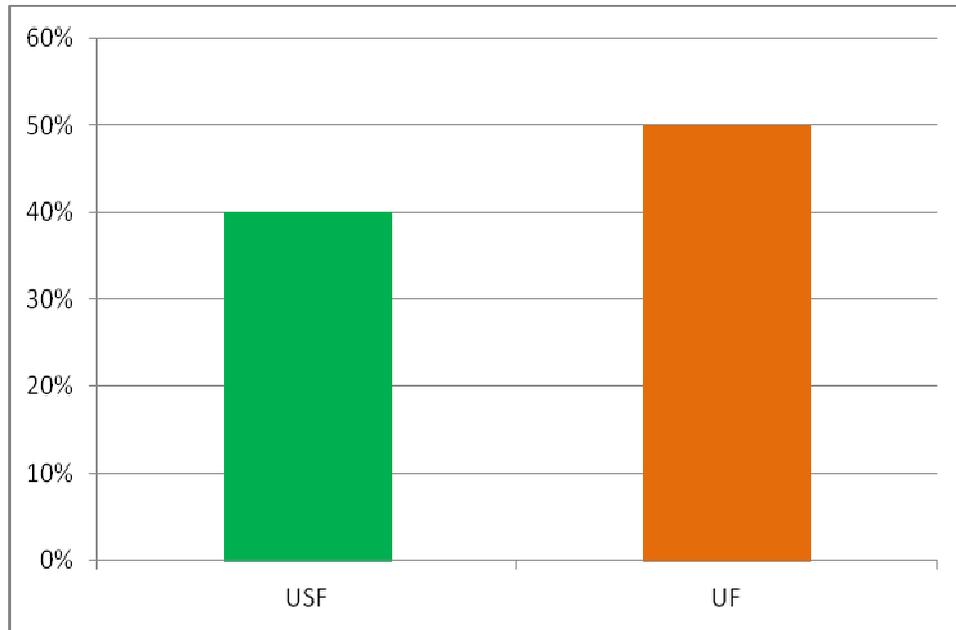
In the following section, I examine departmental *climate* in relation to engineering program *culture* in general and from an online standpoint. Departmental *climate* refers to “student perceptions of ‘what it is like’ to be in the department in terms of practices, policies, procedures, routines, and rewards” (Borman et al. 2010:105). The notion of *climate*, as defined by Borman et al., appears to be pretty generic but straightforward. Another critical argument presented by Borman et al. (2010) in the discussion of organizational culture holds that the culture of an organization includes ideologies, assumptions, and values adopted by members of an organization (Borman et al. 2010; Kanter 1993). An examination of departmental climate and culture is useful to understand why it is that less women and racial and ethnic minority students enroll and persist in engineering.

In an effort to understand the intersection of online departmental climate and culture, applications and enrollments in civil engineering, and recruitment and retention, I discuss the representation of women and racial and ethnic pre-civil engineering students on the University of South Florida and the University of Florida’s Web pages – with a focus on the CEE Department’s and the CCE Department’s Websites. Given the assumption that “constructs related to climate refer to experiential descriptions of what happens in the department” (Borman et al. 2010:105), I report student, professor, and

administrator perceptions of the representation of women and racial and ethnic minorities in the two civil engineering programs and, more specifically, on the two programs' Websites. This is especially important because, as is evidenced in marketing and public relations research, in the process of developing recruiting and retention strategies, colleges and universities are concerned about their image (whether represented on or offline) and about prospective student perceptions of that image (Guliana 2000; Kang & Norton 2006; Kent & Taylor 2002; McAllister-Spooner & Taylor 2007; Nicovich & Cornwell 2001; Synes 1996). Climate is a significant factor in college and university recruiting and retaining efforts.

#### 4.2.3 Climate and Websites

Engineering has long been an all-White male field. Research on why women and racial and ethnic minorities remain a rarity in many engineering programs is replete (Bix 2004; May & Chubin 2003; NACME 2008; National Science Board 2010; National Science Foundation 2002; Oldenziel 2000; Seymour & Hewitt 1997; Steinke 2004; Tyson et al. 2010). Educational scholars and experts agree that tremendous efforts will be needed to make engineering a more diverse discipline and that historically underrepresented populations such as women and racial and ethnic minorities represent a pool to tap into to make diversity a reality in engineering (Guliana 2000; May & Chubin 2003; Steinke 2004). But the problem is despite outreach efforts initiated by states and engineering schools, women and racial and ethnic minority students do not always seem to “fit” into the engineering culture.



**Figure 4.11** Responses for Websites as Diversity Promoters by University.  
 Source: Dissertation Fieldwork 2009-2010.

It is important to assess the representation of women and racial and ethnic minorities in the University of South Florida’s Department of Civil and Environment Engineering and the University of Florida’s Department of Civil and Coastal Engineering. In doing this, I draw upon experiential descriptions of what happens in the two departments. Not only did civil engineering students, professors, and administrators discuss the representation of women and racial and ethnic minorities on the USF CEE Department’s and the UF CCE Department’s Websites but they reflected on the representation of these groups in the two departments in general. I asked civil engineering students and professors and university administrators, what they would say is the purpose of promoting images of women and racial and ethnic minority students, professors or administrators on the Civil Engineering department’s Website. Of the 40 individuals interviewed at the two institutions, almost all of them (90%, with 40% respondents at

USF and 50% at UF) reported that posting written texts or images of women and racial and ethnic minority students on the USF and the UF Colleges of Engineering's Websites would encourage members from these groups to apply to and enroll in these programs (Figure 4.11).

For the purpose of study analysis, I used interviews, focus groups, USF and UF Colleges of Engineering's Web pages (<http://www.eng.ufl.edu/index.php> and <http://www2.eng.usf.edu/>), school artifacts (one UF CCE Department photo), and field notes. It must be noted that although this study focuses on the relationship between Web pages on the Internet and civil engineering applications and enrollments, this subsection discusses women engineers from different engineering department such as Computer Science Engineering or Material Science Engineering. The reason for doing so is because Website content analysis in this study not only includes an interpretation of Web-based, online information contained in the USF Civil and Environmental Engineering Department and the UF Civil and Coastal Engineering Department's Websites, but the general university Websites and the two institutions' Colleges of Engineering's Websites. This discussion breaks down into two subsections: women and racial and ethnic minorities. First, I reflect on the experiences of civil engineering women students in the USF CEE Department and the UF CCE Department while examining the representation of this group on university and program Websites alike. Second, I examine the representation of Black and Latino students in the two Civil Engineering Departments. I conclude the subsection with an examination of the representation of this group on the USF and UF respective Websites.

#### 4.2.3.1 Gender Issues

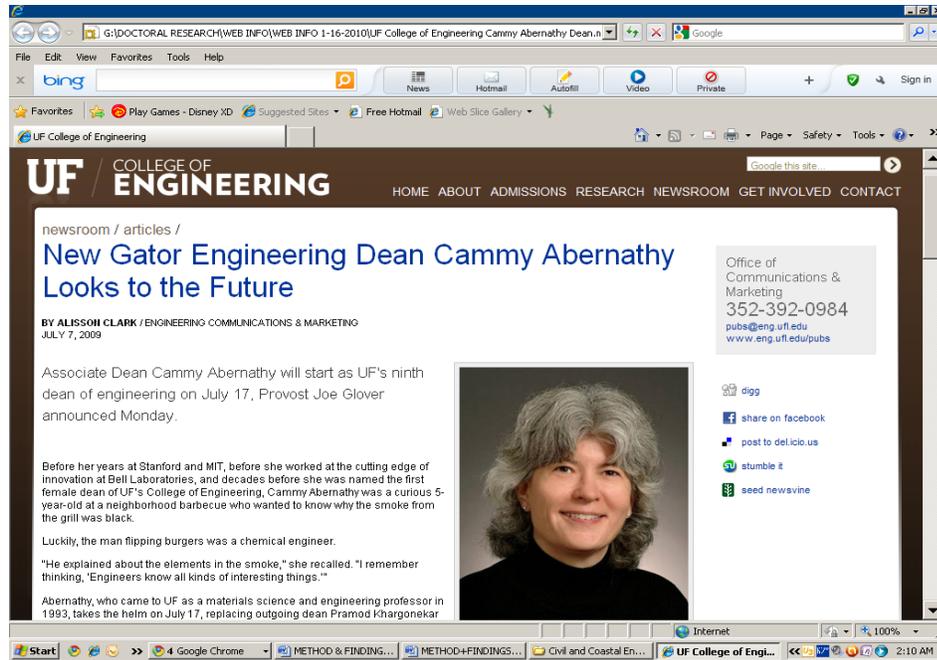
One University of Florida administrator commented on the representation of historically underserved populations in UF Engineering, especially women, in these terms: “Engineering is historically male-dominated. I think that’s changing very, very rapidly. We have been, our freshman class has been 60% women for three years now” (UF-White Male Administrator). It is apparent in this comment that women have been a rarity in the University of Florida College of Engineering. The administrator suggests that women are underrepresented in UF Engineering. This piece of information is consistent with what researchers such as Bix (2004), Ogilvie (1986), and Oldenziel (2000) have found in their different studies. The UF Website also highlights critical historical facts relating to this matter (University of South Florida Facts 2011). But one interesting point made by the University of Florida administrator is that the numbers of women engineers at the University of Florida have been increasing dramatically over the years given that, according to him, women now make up more than half (60% ) of overall engineering enrollments at the University of Florida. Along those lines, the “STEM Workforce Data Project” – a research initiative conducted in 2006 by the Commission on Professionals in Science and Technology (CPST) – revealed that current trends in STEM fields indicate the increasing participation of women and racial and ethnic minorities. However, on a somewhat different note, one USF White female administrator observes that:

There is a lack of minorities and females in sciences, technology, engineering, and math. What they call the STEM. We have programs here where we reach out to those groups of people to encourage them if they have any interest at all, to get them interested in that type of...We have a lot of programs that reach down to the middle school (USF-White Female Administrator).

This University of South Florida's College of Engineering administrator points out that women and racial and ethnic minority students are underrepresented in STEM fields. This statement stands in sharp contrast with the findings of the CPST (CPST 2006) and suggests that more women may be entering STEM but many of them are not necessarily staying. Furthermore, the USF administrator comments on the recruitment efforts of her university in addressing the current shortages of women and racial and ethnic minorities in STEM. Women and men may not be represented on an equal footing in STEM fields as research suggests (Bix 2004; Ogilvie 1986; Oldenziel 2000), but women seem to be becoming increasingly visible in Florida Engineering. Women engineering students proudly acknowledge the presence and contribution of women engineers in the discipline as the following excerpt suggests:

Um, just to know that, just to know that um, like women could easily get jobs, and, and um, I don't know, I mean I-I think that, I think that the world of engineering is changing and that women are, um, doing the same thing that guys are...As a women, yeah, I think that there are plenty of women professors and um, and, I mean, I've had a lot of women, um, TAs, and yeah, I guess, it's nice to see other women, um, succeeding and flourishing in engineering (UF-White Female Student).

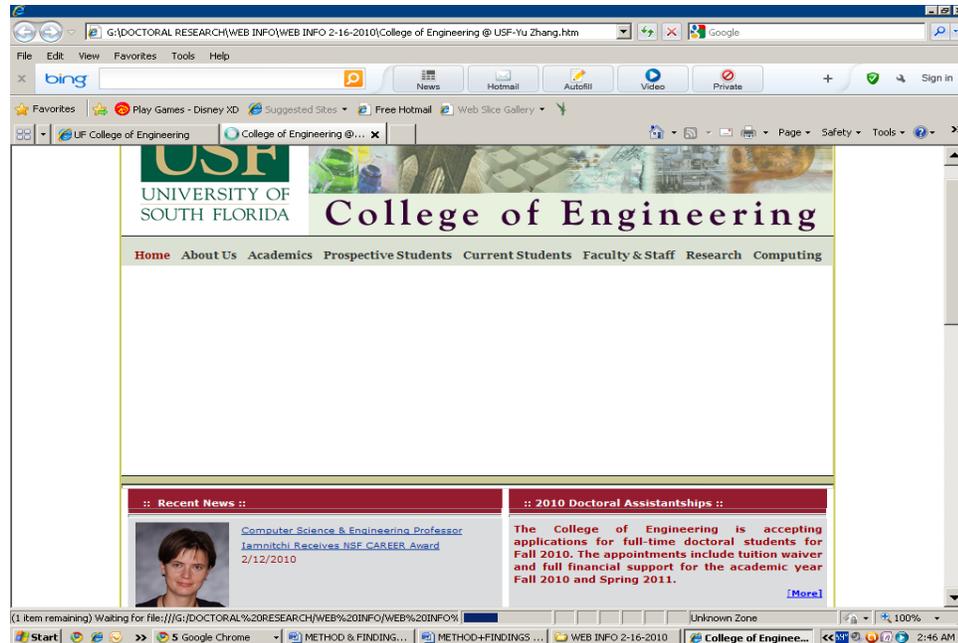
As is suggested in this statement, at the University of Florida, women engineers seem to compete and perform at a level equal to that of their male counterparts. Moreover, women engineers have taken on highly important administrative roles and received awards recognizing their professional and academic achievements. The Web pages below may serve as an illustration of the accomplishments and progress made by women engineers at the University of South Florida and the University of Florida.



**Figure 4.12** UF College of Engineering Web page showcasing the first female Engineering Dean at UF, accessed November 16, 2009.

The above Web page (Figure 4.12) displays a picture of a woman in engineering – the first woman to ever serve as Dean of Engineering at the University of Florida. This female engineer started as the ninth Dean of Engineering at the University of Florida in July of 2009. The appointment of a Caucasian woman as Dean of Engineering at the University of Florida sets a precedent and proves that engineering is no longer the exclusively Caucasian male discipline it used to be back in the late 1940s when the first “Gator Girlies” entered the University of Florida (University of Florida 1947 Year Book).

Likewise, the Web page below (Figure 4.13) is a clear reflection of the theory that women engineers are in the forefront of the engineering discipline, both in the teaching and research realms. Figure 4.13 displays the picture of a female engineer featured in the USF College of Engineering online news rubric. The female engineer (a Computer Science and Engineering professor) received an NSF Career Award in February of 2010 for her contribution to the discipline (Figure 4.13).



**Figure 4.13** USF College of Engineering Web page showcasing an award winning female engineering professor, accessed February 16, 2010.

This Web page is a testimony that women are represented in USF Engineering. Women engineers are progressively becoming an integral part of USF’s engineering programs; and their scientific achievements are being recognized by the entire scientific community through the USF College of Engineering’s as well as the program’s Websites (Figure 4.13). Additionally, women civil engineering students are not just involved at the academic level. They have also taken on a wide range of leadership roles in their departments and beyond:

We’re definitely trying to step up, you know, beside to being the minority we want to do something. So, um, we’re trying to get involved. And we actually did this semester with the (American) Society of Civil Engineers...Girls are very involved actually, they’re more involved than boys, I will have to say (USF-Latina Student).

They updated it, though, the College of Engineering website. They have like interactive thing, that group of people who's talking; then each of them says something about what they are doing. And they have like four women on there. They talk about their conditions in the College of Engineering, what are they doing. I thought that was really cool (USF-White Female Student).

These statements suggest that women engineers are increasingly active in the Department of Civil and Environmental Engineering at USF. From the perspectives of two women civil engineering students, the USF CEE Department values women a great deal. Some women civil engineering students believe that when it comes to assuming leadership roles, especially in student organizations such as the USF chapter of the American Society of Civil Engineers (ASCE), women have raised the bar even higher than their male counterparts.

The contribution of women civil engineers is undeniable. However, concerns have been expressed about the pace of progress in the discipline of engineering. For many, women are still disproportionately underrepresented in civil engineering in particular and in engineering in general:

Total enrollments, women usually have 20%. It hasn't changed very much in the past 10 years... Our population has become more diverse in the past 10 years [...] but the female proportion hasn't really changed much at all. It's pretty constant (UF-White Male Administrator).

In fact, this White male administrator, who is himself an engineer, seems to suggest that there has not been much progress in a decade in regard to the representation of women in the UF Department of Civil and Coastal Engineering. The following statement by one University of South Florida female civil engineering student has a somewhat similar tone:

I definitely think the women like who was in our Static class, I know we had 110 people and only 12 girls in it...That's Static the first engineering class that we take, the big engineering class called the weed out class or whatever (USF-Eastern European Student).

It is apparent in the above comment that the "Static" class, a class considered to be a "weed out"<sup>20</sup> option comprised a limited number of women engineers (12 women students out of 110). Weed out classes represent "pass or fail" classes that generally cause many students to switch out of engineering (Seymour & Hewitt 1997; Tyson et al. 2010). Apparently, a gendered engineering is still in place. Until pretty recently women were unable to become a part of a predominantly male technical world (Bix 2004; Oldenziel 2000).

When asked about actual numbers reflecting women's participation in civil engineering at the University of Florida, one professor observed that, "I don't have any figures. In my class, I would say I've had maybe 1 to 2 percent minorities and maybe 2 to 5 percent women" (UF-Black Professor). These numbers, albeit approximations, provide some indication that women are underrepresented in the UF CCE Department. A statement very similar in tone demonstrates how women and racial and ethnic minority students are disproportionately represented in the UF CCE Department:

I taught Pavement Design class...I would see 10 to 15 percent women, probably 5 to 10 percent Hispanic, and very few Black, African American students. Zero to 5 percent (African Americans) in the classes I taught (UF-Latino Professor).

Judging from the numbers in the above statements, it seems as though women have had a slight advantage over racial and ethnic minorities, at least when it comes to enrollment numbers for some civil engineering courses (i.e., Pavement Design, Capstone

---

<sup>20</sup> In the engineering culture, the phrase *weed out* refers to some core required courses that have the potential to "assess" the academic preparation of every student. Weed out classes often distinguish persisters from switchers.

Design, and Static). That trend has a historical precedent. Women from the Caucasian group certainly were among the first “Gator Girlies” to arrive on the Gainesville campus of the University of Florida in 1948 and to enroll as students (University of Florida 1947 Year Book). The following artifact suggests that White women may enter the engineering discipline as educators as well.



**Figure 4.14** Poster supporting women educators in engineering in the University of Florida Civil and Coastal Engineering Department’s hallways. *Source:* Dissertation Fieldwork 2009-2010.

In a sense, white women are becoming more visible (Figure 4.14) in the UF Civil and Coastal Engineering program in comparison to other underrepresented groups such as Blacks and Latinos. Based on the comments and artifacts presented in this section, one may argue that not only civil engineering classes are White male-dominated racial, but women are better represented (at least in some required civil engineering courses) than ethnic minorities such as Blacks and Latinos. In the next section, I discuss the

representation of racial and ethnic minorities in civil engineering and on the USF and UF Civil Engineering programs' Websites. This part of the work is also an opportunity to reflect on some of the issues confronting these different groups in the discipline of engineering.

#### 4.2.3.2 Race and Ethnicity

As I discuss in the previous sections, women and racial and ethnic minority students are a rarity in engineering disciplines (Bix 2004; May & Chubin 2003; Cross & Vick 2001; Oldenziel 2000), although women have been entering the discipline in significant numbers recently. Studies have indicated that the overall representation of women in the sciences and engineering exceeds by far that of racial and ethnic minorities (CPST 2006; Cross & Vick 2001; NACME 2008). In this study, individuals from racial and ethnic groups, both males and females, discussed the representation of minorities in engineering in general and civil engineering in particular. The prospect of having an increasing number of Blacks and Latinos, for instance, in engineering schools entails dealing with a number of larger societal issues. Discussing engineering "fit", one University of South Florida female student who switched out of engineering for a different major declared:

Well, I'm not a guy (laughs) and-... Yeah, and I'm not from India or even Africa or any of those countries, and it seemed like there was not a lot of girls in classes, there wasn't a lot of black people in the classes... Yeah, there is a lot of like Indian, there were like Indian born people, you know, south Asian, more ethnicity, and then, I talked to one guy in there that was African, and he was from Nigeria, or Algeria, one of the two. But it just seemed like there was you know a lot of foreign students that, and I think that's why they understood because they can relate to the professors maybe just with the accents, you know they are used to listening to accents...(USF-Latina Switcher).

Without equivocation, this female engineer switcher exposes feelings of isolation by raising the critical question of underrepresentation in engineering of America-born minorities (i.e., African Americans, Latinos, American Indians) compared to foreign-born minorities (e.g., Algerians, Nigerians, Indians). The switcher observes that the majority of successful minority students in her program were non-U.S. citizens, predominantly from South East Asia and Africa. In addition, the switcher's comment implies that students from these parts of the world were thriving in engineering because most engineering professors in her program were foreigners speaking English with foreign accents.

Feelings of isolation caused by ethnic or gender differences may hinder a student's determination to thrive or persist in engineering. In a statement very similar in tone, one USF African American female engineering switcher outlines the double burden of being a Black woman in engineering:

That's why I'm here [laughs]. I mean people were expecting that you know, it's only gonna [sic] be men there and you rarely find a Black man in there so it's like, okay, me being a Black woman, I just had a lot against me so I was just wanting to prove a point. I just wanted to prove that just because I'm a minority and I'm a woman that doesn't mean that I'm less than anybody else, you know, I can still do it and I still believe that if I would have devoted my entire time into doing my best, I could have done better, I could have but I took the easy route out. I did (USF-African America Female switcher).

This sentiment highlights that this student experienced double minority status (in this case, being Black and being a woman) in the USF College of Engineering and that her being an African American woman was not an advantage at all. Rather it was a weakness. Underling the impact of "persisting racism on African American individuals, families, and communities", St. Jean & Feagin (1998) have pointed out how a Euro-

American dominant paradigm “physically, morally, and spiritually stigmatizes” African American women (St. Jean & Feagin 1998:3). Stereotypes that depict engineering as a White male discipline have pervaded our cultural environments (Steinke 2004). While in the USF College of Engineering, this switcher experienced the burden of multiple sociocultural identities (Henwood 1994). Women and students of color have issues adjusting to a dominant Eurocentric educational system that not only stigmatizes women and racial and ethnic minority students but negate their cultural values and life experiences (Cammarota & Romero 2011; González 2004; González et al. 2005; Olmedo 2003). Medina and Luna (2000) documented the different types of occurrences of racism experienced by Latina women. Like the African American female switcher, Latina women at predominantly white institutions “face a type of double oppression—being female and being Latina” (Medina & Luna 2000:53). The switcher’s statement shows that she is determined to educate herself despite racist and sexist views in the USF Department of Civil and Environmental Engineering. Additionally, this comment ascribes to the *Funds of Knowledge* construct showing that there exist other forms of cultural capital beyond the one-dimensional, racialized assumptions of the elite group (Cammarota & Romero 2011). Racial and gender stigmas have a lasting effect on the educational outcomes of African American females.

Along those lines, one University of Florida student admitted that, “Being a Florida school, we have a large Hispanic population and it’s pretty diverse, just no girls, it’s pretty diverse between males” (UF-White Male Student). This statement is a clear indication that Latino students represent an important segment in the University of Florida student body. Nevertheless, the White male student stresses that the UF CCE

Department is more of a racially diverse department, suggesting that female are not as equally represented as men are. The above comment is in line with the reality college and university admissions and retention patterns reveal. Higher education has not successfully recruited and retained minority students at levels proportionate to white students (Crowley et al. 2004; Jones et al. 2002). However, the following quote brings to our attention that despite the low numbers of women in the CCE Department, women and ethnic minorities are encouraged to be a part of the whole University of Florida engineering community:

There's a, I think there's a lot of support of advancement, or, opportunities for minorities, there's a, several groups, there's the SWE? SWE, I think? Women Engineering Society there's the Hispanic Engineering Society, Professional Hispanic Engineering Society, at the school, um, there are several other societies that are just (UF-Latino Student).

University of Florida women and Latino engineering students are provided with educational opportunities that would help them adjust to predominantly white male campus life and to thrive in engineering. Student organizations such as the UF student chapters of the Society of Women Engineers (SWE) or the Professional Hispanic Engineering Society (PHES) are a part of the University of Florida's retention intervention to make diversity a fact on campus and to provide a space for many non-traditional undergraduate students to feel accepted in the UF College of Engineering. But with all that being said, it is important to examine how diversity manifests itself on the Internet. Are women and racial and ethnic minority students, professors, or administrators being represented on all fronts of the University of South Florida and the University of Florida Civil Engineering Departments, including on the Websites?

The Internet and Websites project themselves not as means of communication but as outreach devices for colleges and universities to use (Kang & Norton 2006; McAllister-Spooner & Taylor 2007; Mechitove et al. 2001). In the process, these USF and UF have utilized the Internet, and more specifically, Web pages to depict women, African American and Latino civil engineering students. No doubt, “[T]he Internet is a place where race happens; even in the absence of users of color, images of race and racialism proliferate in cyberspace” (Nakamura 2002:xii). The new media technology calls for a wide variety of ideological uses. The University of Florida’s Websites have served as a platform to promote diversity (i.e., gender, race and ethnicity). The following assertion by one University of Florida professor testifies on that: “Yeah, we have had some of our students, minority students, on the university website as well...I’m not sure if we have a specific place that highlights research projects” (UF-Black Professor). Pictures of Latino civil engineering students are occasionally displayed on the UF Civil and Coastal Engineering Department’s Web pages (Figures 4.15).



**Figure 4.15** UF CCE minority undergraduate students doing fieldwork, accessed December 16, 2009.

The photograph on the right hand side of Figure 4.15 shows two University of Florida Civil and Coastal Engineering students (one of them is a minority undergraduate student) at work during the Key Royale Bridge Replacement Project. The UF CCE Department's Web page not only emphasizes that Latino students are welcome in the CCE Department, but it shows that minority students can take on any leadership roles.

Likewise, the following Web page (Figure 4.16) demonstrates that the University of South Florida has taken a step forward in acknowledging minority undergraduate students' achievement on its Website.



**Figure 4.16** USF CEE undergraduate student featured on ‘USF Profiles’ for his outstanding work, accessed December 16, 2009.

The student shown in Figure 4.16 is a junior in the College of Engineering at USF majoring in Civil and Environmental Engineering. The student participated in a team effort to build a steel bridge, one that was the first to earn students in USF’s American Society of Civil Engineers (ASCE) student chapter a third place award in the 2009 National Student Steel Bridge Competition’s Southeast Regional Conference – USF’s first ranking in the prestigious intercollegiate challenge, and a first-ever invitation to nationals. The purpose of Web pages like the ones presented above (Figures 4.15 & 4.16) is to promote undergraduate research at USF, while demonstrating that undergraduate minorities are capable of tremendous accomplishments in the field of civil engineering.

Civil engineering professors and, more important, civil engineering minority professors are promoted on engineering schools’ Websites as well. What follows is a Web page displaying different images, including pictures of two professors in the USF Department of Civil and Environmental Engineering.



**Figure 4.17** USF College of Engineering homepage showcasing minority civil engineering students and professors, accessed January 12, 2011.

Figure 4.17 displays a photograph of one civil engineering professor (center of the Web page) and two civil engineering students. I have to outline that this Web page is set up as an interactive page in which engineers introduce themselves to the public. Each individual on the Web page briefly says something about their areas of expertise. Another photograph (lower side to the right) is a portrayal of one woman civil engineering professor who apparently received an NSF grant for a research project. By displaying the two Civil and Environmental Engineering professors - who appear to be of Asian descent – the University of South Florida is stressing that diversifying the engineering professoriate is a priority in this institution. But with that said, it is important to ponder over the purpose of an online representation of women and students of color for universities like USF and UF. The evidence provided in this case study helps address the question.

In fact, the majority of participants in this research reported that one goal of posting information about women and minority students, professors, or administrators on the USF and UF Departments of Civil Engineering's Websites was to make individuals from these categories feel accepted at these institutions. One female student, for example, observed that, "I thought they changed it (Website content) around towards 'it's not just White guys'" (USF-White Female Student). Seemingly, one goal for USF College of Engineering marketing experts is to present the USF Civil and Environmental Engineering program as a diverse and welcoming learning environment. Along those lines, one University of Florida professor contended that:

I think people tend to, and again I think, people are going to tend to, um, feel like they can fit in and be more comfortable; and be successful if others like them have been successful... (UF-Latino Professor).

The UF College of Engineering's Websites are designed to make prospective students from historically underserved populations feel confident about their potential as engineers; Websites are destined to send minority prospective students a clear message: "You could belong to UF engineering culture if you want to". A statement using a very similar tone suggests that online images of women and minority serve the purpose of multicultural recruiting:

Prospective students, high school and younger, are gonna see that and think. They gonna associate themselves and their friends with that and say, "Alright if she can do it I can do. Or she's Spanish and doing it and I'm Spanish I can do it too." Instead of looking at a poster of ten White guys and be like, "Damn! I wish I can do that" (USF-White Female Student).

For this woman civil engineering student, the best way for USF communication and marketing experts would be to engage prospective underrepresented women and racial and ethnic minority students is to use online techniques of multicultural recruiting.

Resorting to multicultural recruiting is justifiable to the extent that diversity represents a wide range of advantages for society and for institutions of higher learning (Hurtado et al. 1998; Jones 2007). Relatedly, one UF woman administrator noted that images of women and women and students of color on the University of Florida Websites are destined to, “[H]elp those same people to feel connected to the department or university, whatever...It’s a basic marketing strategy to look like the people you want to attract” (UF-White Female Administrator). This marketing expert literally acknowledges that the UF Civil and Coastal Engineering Department cannot attract students of color unless its Web pages on the Internet include images of those students. A view like this tends to lead or mislead to a certain conceptual simplification of the construct of “race” because, “[I]mages of race on the Net are both ‘stereotyped’ at times...and at other times, race is deployed in creative coalition building that creates a sense of community and racial identity online” (Nakamura 2002:xiii). Racial identities negotiated online would pursue ideological and cultural agendas that stand in sharp contrast with the complexities and realities of race and racism. As Carter and Goodwin (1994) once suggested:

[T]he prevailing interest in multiculturalism, diversity, and cross-cultural education subsumes race. When race is subsumed, the current and historical role that it has played and continues to play in the educational arena is distorted and clouded (Carter & Goodwin 1994:N.p.).

This statement problematizes the true aims of diversity in education. The promotion of historically underserved populations in engineering schools is a part of the multiculturalism prospects of some educational leaders, including African Americans educators Booker T. Washington and W.E.B Dubois (Provenzo Jr. 2002). Furthermore, one USF civil engineering student reflected on the rationale behind promoting images of traditionally underrepresented groups on the USF College of Engineering’s Web pages in these terms:

Hispanics are the fastest growing, you know, group in the country as far as population. It is projected based on those statistics and demographics that in the future not too far from now, um no single group of people will constitute the majority in the United States; um so, it's important to get all these people engaged um, to have, you know, so that education gaps and income gaps between, you know, Whites and other groups of people are closed. And I think that doing that is a feasible, important step; and a way of doing that is attracting students who in another time period had been disenfranchised to have the same opportunities and the same skills and jobs, training and education as anybody else. I think that's one of the reasons they do it. Also, um, you know when government promotes diversity and promotes having minorities being in leadership positions and having a lot of, just being on equal footing with everybody else. So, by having some incentives universities and institutions like USF, um, have a motivation to try to attract minority students and women (USF-Latino Student).

This statement is a clear illustration that institutions of higher learning such as UF or USF have a motivation to promote images of traditionally underrepresented groups (African Americans and Latinos among others) on their Civil Engineering Departments' Websites owing to federal government's push for diversity. For this Latino undergraduate student, institutions of higher education in general and engineering schools in particular try and attract women and minorities through their Websites in an effort to comply with state and federal regulations. This assertion shows that the desire to recruit students of color is not a deliberate choice of universities. Institutions receiving federal monies have an obligation to "diversify" their student body, professoriate, as well as their staff. This statement provides a critical insight on the workings of power in the USF Civil and Environmental Engineering program. This last point leads me to question the foundations of the multicultural marketing enterprise at USF and UF. The ultimate question is whether women and students of color as agential subjects are the centerpiece of USF and UF's recruiting and retention strategies or whether these institutions are just following the course of a multicultural Internet marketing trend that makes good economic sense.

In the following chapter, I further discuss the research findings presented in this section. I provide a critical analysis of each finding and shed light on how they facilitate or complicate the question of why despite recruiting and retention efforts women and students of color remain underrepresented in the USF CEE and the UF CCE Departments. Ultimately, I present the relevance of the research findings in providing an insight on the workings of power in the University of South Florida and the University of Florida's respective Civil Engineering Departments.

## CHAPTER FIVE: DISCUSSION

### 5.1 MARKETING ENGINEERING PROGRAMS ONLINE

This study found that colleges and universities use new media technology (the Internet and Websites) as marketing tools destined to reach out to the world outside college campuses. University administrators at both the University of South Florida and the University of Florida reported that university and departmental Websites are primarily designed to serve marketing purposes for these two institutions. Of the 40 individuals that participated in the study, 30% (13% at USF and 17% at UF) reported that the USF and UF Departments of Civil Engineering's Websites primarily serve marketing purposes. Today, the University of South Florida and the University of Florida have completely adopted the Internet and Websites as their primary means of communication. Thanks to its ability to open up a host of opportunities to colleges and universities and to serve as an interactive platform for marketers and customers, the Internet has proved to be a remarkable marketing tool (Stafford 2005; Schoenfeld et al. 1997). Websites represent an alternative to old forms of recruiting techniques used by colleges and universities as they compete to reach out to potential students. Schofield and Davidson (2002) illustrate this point well while noting that computer networks have been described as "a possible antidote to the chronic isolation that plagues educational institutions, as 'communications gateways'..."(Schofield & Davidson 2002:64). Today, the coming together of Internet technologies and marketing techniques, also known as Internet marketing (Stafford 2005), appears to hold the promise of a bright future for higher

education, one in which online communications are decisive. This finding is consistent with a 2009 study conducted by Maringe and Gibbs. These authors have observed that, “The University has had to embrace the technologies of the market and consumerism; strategic planning with its emphasis on mission, vision and value, matching resources to opportunities and of course marketing” (Maringe & Gibbs 2009:4). Therefore, developing their own marketing strategies is imperative for all universities. Institutions of higher learning desiring to remain competitive in the 21<sup>st</sup> century must and should be able to come to grips with marketing knowledge. Previous research somewhat parallels this formulation. Gray (1991), for example, once commented that educational organization must clearly recognize that, “[T]hose who use their services *are* customers with needs, rights, and expectations” (Gray 1991:2). The implication of this is that many colleges and universities are run like businesses governed by the law of supply and demand.

In her article, *The Urgency of Marketing to Save the Academy*, Jane Albert (2000) questioned the capacity of higher education to develop genuine marketing strategies when stating: “We all say we do it in higher education, but how many colleges and universities truly are structured to allow marketing to be the driving force behind the institution’s plans and activities?” (Albert 2000:51). What Jane Albert meant was that a large number of institutions of higher learning may not be ready to fully embrace what Maringe and Gibbs (2009) referred to as the “technologies of the market”. Albert further made her case adding:

Most institutions are designed compartmentally, led by the primary activity of academic affairs. Academics dominate, and everything else follows – and everything else competes for attention. The word “marketing” is one that academicians are not comfortable with and marketers themselves try to shield under other terminology and umbrellas. The structure of the formal organization restrains marketing efforts. Colleges and universities must be structured to create a marketing driven institution and one that looks globally at all activities and opportunities to advance the institution (Albert 2000:51).

This statement indicates there is an apparent lack of clearly defined marketing policies in many colleges and universities. In fact, traditionally, colleges and universities have placed little emphasis, if any, on marketing. Research parallels this thought and stands in clear support for the need to adopt the marketing operations of industrial and commercial organizations to help higher education achieve its global outreach mission (Gray 1991; Albert 2000; Guliana 2000). Implications follow that the more marketing is an afterthought in higher education, the greater the likelihood that colleges and universities may not reach their full potential, especially in terms of global outreach. Gray’s (1991) idea that schools, colleges and other educational organizations must have an opportunity to identify students’ needs and to determine whether they are sufficiently responsive to those needs makes sense. It is certainly with this in mind that the University of South Florida and the University of Florida administrators interviewed for the purpose of the current study commented on the function of Websites as their institution’s marketing or outreach tools of choice. But with that being said, several questions emerge. Do USF and UF really want to recruit women and students of color to engineering? Is there any monetary incentive? How far can colleges and universities go in “meeting the needs” of students? Would USF Engineering and UF Engineering be willing to address the systemic issues of race and gender that particularly affect historically

underrepresented groups? What would be the implications of letting women and racial and ethnic minority students get a hold of their own “selves” and become agental subjects in their own right?

It is my contention that colleges and universities that place the specific needs of students at the core of their Web-based, online marketing strategies will be able to develop truly responsive recruiting and retention policies. It is central to recall that Websites are the virtual locales where information delivery takes place and where meaningful communication occurs between colleges and universities and interested students (Kang & Norton 2006; McAllister-Spooner 2008; McAllister-Spooner & Taylor 2007). As Kent and Taylor (2002) have argued, the prerequisite to a better dialogic-relationship building process between organizations (i.e., USF and UF) and their publics (i.e., civil engineering students) is to connect and examine the past, present, and future of each party within a meaningful whole. It is undeniable that today Florida universities continue to struggle with important systemic problems of race, racism, and sexism. Dr. Cornell West’s 2005 address to USF students was an interesting reflection on where America was, where it is, and where it should be. In West’s words, the United States cannot develop into a truly democratic nation until the “mortalities” and “realities” of its past are fully examined (Morehouse 2005). And the “mortalities” and “realities” of the American past have impacted the U.S. education system, including Florida universities.

In the process of developing their Web-based outreach efforts, public universities like USF and UF must be aware that the “realities” of American history and the academic achievement gap involving students of color are narrowly linked. Morris and Monroe (2009) have demonstrated how the intersection of race and place shape the contemporary

educational outcomes of African Americans. Race, racism, and White privilege have functioned as powerful barriers to the educational attainment of students of color (Carter & Goodwin 1994; Yosso et al.2004). Web pages on the Internet, interviews with university administrators and civil engineering professors, and focus groups with pre-civil engineering students revealed that race and gender are important constructs in USF Engineering and UF Engineering. Equally important, the USF and UF Websites, focus groups with pre-engineering students and Switchers interviews showed that the social context of the two Civil Engineering Departments isolate women and racial and ethnic minority students. The Eurocentric, one-dimensional education model of U.S. engineering schools stigmatizes women and racial and ethnic minority students and causes these students to experience feelings of anxiety. The truth of the matter is the cultural backgrounds and personal life experiences of minority students are not perceived to be valuable in the school system (Cammarota & Romero 2011; González 2004; González et al. 2005). Because the systematic oppression of communities of color benefit Whites (Yosso et al. 2004), researchers have analyzed and deconstructed “Euro-American cultural bias and deficit perspectives of communities of color promoted in traditional schools” (Cammarota & Romero 2011:492) as the root causes of the educational conditions of women and racial and ethnic minority students. Women and racial and ethnic minority students at USF and UF have been completely subjugated as “customers” by the powerful institutions in which they are educated.

I believe that considering users of educational services as mere “customers”, as Gray (1991) once suggested, may have the implication of further depriving women and students of color of their agency. A business-like *modus operandi* where students are

deemed as mere “customers” has caused colleges and universities to negotiate the relationship with the principal beneficiaries of educational services (i.e., students) less in terms of academic needs or educational attainment and more in terms of marketing, consumerist priorities. This economic imperative of 21<sup>st</sup> century higher education has subjugated women and racial and ethnic minority students even further since they are now being displayed on university Web pages as monolithic groups (Essed 1994). Women and racial and ethnic minority students have to look “attractive” on the World Wide Web. Not as individuals with valued cultural experiences but as products. USF and UF Women and racial and ethnic minority students have no decision power over their online relationships with the organizations (i.e., USF and UF). As Yosso et al. (2004) have explained, “With its macro and micro, interpersonal and institutional, and overt and subtle forms, racism is about institutional power, and communities of color in the United States have never possessed this form of power” (Yosso et al. 2004:7). USF Engineering and UF Engineering the power to negate or ascribe identities. And this process occurs both at the off- and online levels. The key issue with schooling practices, González, Moll, and Amanti (2005) would concede, is “who has the power to decide the nature of schooling” for individuals from disenfranchised populations (Moll 2005:276). Heyman observed that the human engagement with “strategic” social relationships has made it possible to observe that people’s “experience of and statements about power are complex and shaped substantially by its presence” (Heyman 2003:144). Power shapes the different experiences of women and students of color at USF and UF.

Thinking of power in relational terms rather than as a totality is important because power is an attempt to describe “subjects in societies – who experience great anxiety

about the pressure their cultures place upon them to construct and maintain stable identities” (Jermier, Knights, & Nord 1994:8). Likewise, in discussing the methods for “understanding accounts of racism”, Essed demonstrated how “Black women expose clues and hidden message enclosed in situations”. Essed explained that “[T]o conceptualize and to analyze racism as a process, it is relevant to look at the different dimensions of experience” (Essed 1991:144). The experience of the African American woman switcher was critical to discern the contours of power in the USF College of Engineering. Additionally, one University of South Florida civil engineering student pointed out how financial considerations (i.e., the federal monies schools collect for promoting students of color on the Web) have led Colleges of Engineering across the U.S. to show off their minority students at the expense of genuinely conceptualized, student-center recruiting and retention policies. The economic variable within Website marketing questions the capacity of institutions of higher learning to achieve their primary mission in society – which is educating all individuals regardless of gender or color or class (Maringe & Gibbs 2009).

In the next section I review a critical element in USF and UF’s online “promotional campaigns”, to paraphrase Albert (2000). I discuss how the University of South Florida and the University of Florida are represented online. The purpose of this subsection is to provide an in depth understanding of the meaning of written texts and images displayed on both institutions’ Websites. Participants, mostly engineering students and switchers, reflected on the relevance of the USF and the UF Colleges of Engineering’s and Civil Engineering programs’ Website contents in a way that is relevant to the present study.

## 5.2 RELEVANCE OF WEB-BASED INFORMATION

This study supports the evidence that the University of South Florida and the University of Florida Websites (College of Engineering and Departments of Civil Engineering) serve as platforms for information delivery and that it is the usefulness of Web-based, online information (i.e., the quality of the message) that matters the most to both future applicants and current students. In essence, successful online communication campaigns begin with a clearly drafted, straight-to-the-point message (Schoenfeld et al. 1997; McAllister-Spooner 2008). Schoenfeld et al. (1997) noted the role of electronic media as a conveyor of the University's message:

One of the most important, and most liberating, aspects of Internet has been that colleges and universities can take their messages directly to the public. Most institutions – and many divisions and departments – have their own World Wide Web home pages, a sort of electronic front door through which people can visit them and gain access to all sorts of information (Schoenfeld et al. 1997:377).

Both the “message” (i.e., the content) and “World Wide Web homepages” (i.e., the structural design) play a critical role in Website information delivery. The qualitative evidence gained from interviews and focus groups confirmed the above statement. One major finding in this study was that 45% of the 40 respondents in the study reported that the Internet and Websites serve information delivery. A 1997 study by Schoenfeld et al. and research results from a study published eleven years later by McAllister-Spooner (2008) echoed this finding. Results from both studies support the view that Web pages on the Internet constitute a revolutionary information delivery system allowing colleges and universities to take their messages directly to interested audiences. But it is important to ponder about how Website content affects Internet users. More specifically, it is worth

examining how the “messages” contained in the USF and UF Colleges of Engineering’s Websites are perceived by women and racial and ethnic minority students.

Educators and ICT experts have queried users’ perceptions of college Websites (Abrahamson 2000; Guliana 2000; Stoner & Lincoln 2000; Will & Callison 2006), but Mechitove et al. (2001) are among the researchers that seem to have fully addressed the issue of Website information content. In their study, Mechitove et al. (2001) found that for students, information content represented one of the most critical parameters influencing overall perception of Website effectiveness. Likewise, a study by Hachigan and Hallahan (2003) revealed that Website content quality is of paramount importance for organizations and that information quality includes the value of the Website’s information content as well as its usability. It is true that the “unstated assumption behind any Web site is that the site host has something of value – a product, information, or ideology – to share with visitors” (Taylor et al. 2001:278). There is a symbolic value attached to any Websites. The nature of the Website ideology contributes a great deal to information effectiveness.

The USF and UF respective Websites support a certain ideology. As qualitative evidence shows, USF and UF have attempted to promote their campuses as more inclusive environments. Research shows that colleges and universities in the U.S. South were less integrated as a result of segregation policies (Morris & Monroe 2009; Cobb-Roberts & Shircliffe 2007). The ideology behind the USF and the UF Colleges of Engineering’s Website involves presenting those campuses as progressive and diverse. As I discuss in the previous section those two institutions are recruiting and enrolling students from all walks of life from across the U.S. and around world (University of

South Florida 2006; University of Florida 1947 Year Book). This piece of information appears to be a central element in the marketing strategies of both USF and UF. The University of Florida, for example, has developed a Web page providing relevant information on historical events concerning the university. Marketing experts at this school are making sure interested publics are aware that UF has evolved from an all-White male seminary in 1850s to a diverse Research One institution (University of Florida Facts 2011). Universities seem to be increasingly aware of their image and increasingly concerned about prospective student perceptions of their image (Guliana 2000; Synes 1996). This information is critical because it shows that perceptions are critical to the University's well-being. As Guliana (2000) convincingly suggests, "[A] negative image lowers (university) enrollments with the effect being most noticeable in [...] minority recruitment (Guliana 2000:79). Universities transmitting stereotypes about Women and students of color are likely to experience a drop in their enrollment numbers. Women and students of color would not attend a college or a department in which they do not feel welcome.

Using a very similar argument, Seymour and Hewitt (1997) analyzed the reasons why student switch out of STEM majors and articulated the concept of "more pushed than pulled" (Seymour & Hewitt 1997:292-293). In a sense, sociocultural stigmas within engineering environments would cause non-traditional students, especially women and racial and ethnic minorities, to leave engineering (Cross & Vick 2001). Engineering students do not just look for the "best schools" or "cool" sites. They are attracted by engineering programs that are able to meet their sociocultural needs by providing adequate retention services, such as advising.

Like many other colleges and universities across the country, the University of South Florida and the University of Florida have used the Internet, one of the most significant technological advances in information delivery, according to Sweaney et al. (1999), both to deliver valuable information to interested publics and to articulate their ideologies at all levels of academia and beyond. By “all levels”, I mean that the Internet has allowed universities and members of academia to achieve public relations goals at the institutional (i.e., institution to institution) and interpersonal (i.e., person to person) levels. But today this goal cannot be achieved unless colleges and universities use new discourses and practices to communicate to historically underserved populations. Relatedly, although in a slightly different context, Jacqueline Messing (2005) outlined the endless “possibilities and new forms of communication” to which restructuring of common practices in educational settings give way. She noted that, “Getting to know a student in a different light, in a different context, as a whole person, rather than just as a “little machine” opens up many possibilities for teachers, and also for parents” (Messing 2005:192). Connecting with students with a view to understanding their complex “whole” has the potential to create new forms of dialogic relationships between universities and students. The USF and the UF Websites have the possibility to redefine the hierarchical institutional relationships characterizing the recruiting process for women and students of color.

An examination of the University of South Florida and the University of Florida’s College of Engineering’s Websites showed the persistence of an “assimilationist” perspective in engineering department. This perspective defines science and science achievement in terms of the Euro-American science tradition and gives little

consideration, if at all, of alternative views of science and “ways of knowing from diverse backgrounds” (Lee 1999:90). I was struck by the observation that students of color appeared to be invisible not only from a virtual but from an offline perspective.

Herskovits (1958) described science and engineering programs as dominant systems of knowledge that tend to devalue the culture of the oppressed and give preeminence to a dominant culture. Educational anthropologists such as Cammarota and Romero (2011), Medina and Luna (2000), and Moll (2005) have echoed the sentiment of oppression experienced by women and students of color at predominantly White institutions.

According to Lee (1999), “when a group in power determines what knowledge should count as science and should be taught in school science, without recognition of students’ experiences in home and community cultures, it is a rejection of the students themselves and a disregard for their cultures” (Lee 1999:89). Interestingly, Lee (1999) suggests that a paradigm shift taking into account *Funds of Knowledge* (González et al. 2005) needs to occur before women and students of color can feel completely “integrated” in engineering fields. Additionally, Lee (1999) implies that efforts to recruit and retain women and racial and ethnic minority students are worthless so long as the reproduction of scientific knowledge is not based on a more holistic, all encompassing worldview, that is one which includes the cultural values and life experiences of women and students of color. The USF and UF Web pages, therefore, should display much more than “[P]ictures of the campus, course descriptions, faculty biographies, information about student organizations, and campus maps” (Schoenfeld et al. 1997:377). Taking up Lee’s (1999) postulate, I argue that the USF and UF Websites have failed to operate the shift from instruments of cultural reproduction into culturally responsive communication

devices for, besides the pictures displayed on the Web pages, there is no obvious sense of how these schools support the educational attainment of incoming women and students of color. In other words, the Websites should not just depict pictures of women, African American, and Latino student engineers. They must show what kind of educational services they provide to these students on campus and what foundational principles drive their retention policies.

The following section is an analysis of information displayed on the University of South Florida and the University of Florida Colleges of Engineering's Websites. I discuss the meaning behind texts and pictures employed on the websites and focus on civil engineering program climate. I discuss the intersection of written texts, images (women and people of color), and climate. As I outline in Chapter 4, 9% of UF student participants indicated that they browsed the Web during their senior year to look for specific engineering program information compared to only 4% at USF. It was, indeed, interesting to see that a few students were interested in "getting a feel" of the campus environment before they applied. School diversity, among other elements, can be represented on school Websites. The following section reflects on the implications of promoting information (written text and images) of women and minority engineers on engineering schools' Websites. This section demonstrates that online climate is a factor in recruiting and retaining women and students of color.

### 5.3 ENGINEERING SCHOOL CLIMATE AND WEBSITES

The findings of this study suggest that University of South Florida and University of Florida civil engineering students and professors, and university administrators perceived clear implications to providing more visibility (i.e., through the Internet) in

engineering schools to individuals from disenfranchised populations such as women and racial and ethnic minorities. The vast majority of the 40 individuals who participated in this study, (90%, with 40% respondents at USF and 50% at UF) reported that posting written texts or images of women and students of color on the USF and the UF Colleges of Engineering's Websites would encourage members from these groups to apply to and enroll in these programs. The implication of this finding is that online climate affects recruiting and retention activities.

The findings relating to the types of recruitment strategies colleges and universities implement to diversify their student body were also interesting. This study provided some evidence to support the assumption that the USF and the UF Civil Engineering programs have attempted to develop effective marketing and outreach policies to make engineering more inviting to women and racial and ethnic minority students. These findings seem to reinforce the notion that historically underrepresented populations represent a pool to tap into to make diversity a reality in engineering. However, this position proves theoretically simple and practically difficult to materialize. Outreach efforts have been initiated at the school, state, and federal levels to encourage women and students of color to enter engineering. But as Cross and Vick (2001) once observed, the sociocultural environments of engineering schools seem to cause many women and racial and ethnic minority students to switch out of engineering at a higher rate than their White male counterparts. Discussing the ramifications of sociocultural values in secondary schools, Gore (2005) used the construct of "social curriculum" to explain that the "social curriculum of any school could be negative, positive, or mixed, and would create a specific school climate with the same variants" (Gore 2005:277). In

other words, school climate can bear mixed attributes and, positively or negatively, affect the school experience of students. The following statement is consistent with the notion that dominant social and cultural values permeate colleges and universities:

Universities not only express intellectual and scientific values directly through their mission of teaching and research, but also embody in their practices powerful organizational, instrumental values, and wider social and cultural values (Maringe & Gibbs 2009:3).

Apparent in this comment is that school culture can impact college social life in a variety of ways. In the case of engineering, women and students of color can thrive in engineering depending on the extent to which they overtly assume acceptance or rejection of the dominant culture in their program or depending on whether they can assess or ignore the repercussions of engineering program climate.

The existence of powerful social and cultural forces on college campuses is likely to cause engineering programs to remain selective. Students with the appropriate cultural capital (see discussion of Bourdieu's concepts of *habitus* and *cultural capital* in Chapters 2 & 4) would have an advantage over students that are not equipped to navigate the system and to successfully complete a bachelor's degree in engineering. As I discuss in Chapter 4, "engineering culture" involves a host of written and unwritten rules guiding and shaping engineers' own behaviors and experiences of work; and these rules serve as the means through which engineers try to impact the behaviors and experiences of others (Kunda 2006). In today's world, to be trained as an engineer requires assuming the overwhelming presence of an engineering culture and adhering to its implicit and explicit modalities or rules. "Engineering culture" endorses the modalities of assimilationist perspectives:

The assimilationist perspective does not consider diversity of students' language, culture, gender, and socio-economic backgrounds as important because science is represented as universal knowledge. Educational efforts focus on providing students with equal access and opportunities for positive science experiences already available to mainstream males (Lee 1999:90)

In the context of engineering, assimilationist perspectives imply that by integrating civil engineering programs' existing White male dominant culture, women and students of color annihilate their own selves. Engineering programs like the USF and the UF Civil Engineering Department, therefore, involve Euro-American dominant cultural values that deprive women and racial and ethnic minority students of their agency. In the process of rejecting the *Funds of Knowledge* (González et al. 2005) and negating the subjectivity of students from disenfranchised groups, engineering programs reproduce existing forms of cultural practices.

Using a critical race theory framework that considers how the structural condition of racism interacts with African American students' individual agency in their pursuit of academic excellence and upward social and economic mobility, Carter's (2008) research points to the evidence that African American students' perceptions of schooling as a "racialized and classed process inform the way they adjust to the learning environment, and their behaviors can play out as either adaptive or maladaptive for school success" (Carter 2008:2). Lee (1999) used a very similar line of thinking observing that, "[I]n the absence of justice or fairness for these students (African Americans), equal opportunities to learn the way science is defined lead to unjust outcomes" for these students (Lee 1999:89). Relatedly, Oakes (1990) noted that fair distribution of economic and social opportunities is a prerequisite for substantial increases in the achievement and participation of women and minority group members in science and mathematics. Lee

(1999) and Oaks (1990) point out that financial support along with other forms of educational opportunities offered at the school level are among the factors determining persistence in engineering.

On the other hand, the qualitative evidence presented in the previous chapter (Chapter 4) demonstrates that women and students of color have used Websites as information providers. In her article, *Science in Cyberspace: Science and Engineering World Wide Web Sites for Girls*, Steinke (2004) provides a critical insight into the gender divide in science, technology, engineering, and mathematics (STEM) fields. Steinke (2004) uses a content analysis of Websites to assess the impact of Web-based, online information of women's participation in science and engineering fields. Scholars from various disciplines and with different interests have argued that the Internet or Websites are among some of the most influential media technologies in society today (DiMaggio et al. 2001; Steinke 2004; Stoner & Lincoln 2000). And it totally makes sense that today's college students totally embrace the belief that websites are "more influential than other college-produced information sources – guidebooks, catalogs, viewbooks" (Stoner & Lincoln 2000:117). In the previous sections (see the discussion on Internet marketing in engineering programs), I extensively discuss the role of Websites in the University of South Florida and the University of Florida's marketing and communication plans. Additionally, I articulate the ways in which Websites shape students' perceptions of colleges and universities (Guliana 2000). Representations of scientists and engineers in the mass media broadly speaking and on the Internet specifically have shaped our understanding of what it means to be an engineer.

Making the case for an increased representation of women in science and engineering education, Steinke (2004) once observed that, “Stereotypical representations of scientists and engineers in the mass media can influence women’s perceptions of scientific, engineering, and technological careers” (Steinke 2004:8). Stereotypical views of the discipline and profession of engineering may have kept many interested individuals out of engineering just as they may have encouraged several others to embrace an engineering career. This postulate is especially true because website content information can affect prospective students’ perceptions of an institution in a positive or negative way (Guliana 200; Stoner & Lincoln 2000; Synes 1996). Civil engineering students interviewed at the University of South Florida and the University of Florida reported that information or images displayed online was useful as it helped them to make an informed decision about what school to apply. Too often, images and models women or minority men and women see in their everyday lives through T.V., books, newspapers, or the Internet perpetuate gender- and race-based stereotypes that limit the potential of students from these categories (Steinke 2004). Undeniably, information (images and texts) about women or minorities displayed on the University of South Florida or the University of Florida Colleges of Engineering’s Websites has the potential to help reach out to groups in the U.S. population (and beyond) that have long been excluded from engineering education. However, I cannot state with confidence that online outreach efforts have the power to help counter the seemingly deeply rooted systemic issues of race and gender which have been affecting the discipline of engineering for centuries.

Research shows that educational institutions (and consequently, their Websites) are designed to reproduce and perpetuate the values of the dominant social group

(Cammarota & Romero 2011; Ek 2009; González et al. 2005; Kingston 2001; Sullivan 2001). Colleges and universities reproduce cultural stereotypes. Steinke (2004) analyzed the role of the mass media as agents of cultural reproduction. Steinke (2004) convincingly supported this claim by stating that, “The overall paucity of images of female scientists and engineers in the mass media, however, reinforces a cultural stereotype that defines science, engineering, and technology as masculine domains” (Steinke 2004:8). This statement is an illustration that Web pages on the Internet have a reproductive mission in society. In fact, stereotypical perceptions of engineers, partly contribute to the existing gender gap in science, engineering, and technology (Steinke 2004). This analysis corroborates the aforementioned view and demonstrates that racial and gender identities continue to be produced, reproduced, and transmitted in school settings through the Internet (Kolko et al. 2000; Nakamura 2002). The Web-based evidence in this study shows that the USF and UF’s Web pages depict women and minorities. These portrayals involve both students and professors. However, there was little evidence on those Web pages (as well as in the other data sources) that the “languages, cultures, and consciousness” of non-White students are being “valued as a means of empowering and improving the educational success” of women and students of color (Romero 2002:250). This formulation makes perfect sense, especially when learning from Lee (1999) that when disparities abound between “Western science and alternative views”, it would be unjust or unfair if the values, meanings, or practices espoused by Euro-American science are forced upon students who do not share those values, meanings, or practices. Facing such conflicts, some USF or UF civil engineering students may avoid or resist learning science or even marginalize their cultural ways of

knowing. This issue seems to become more acute as demographics of the student population in the U.S. become more diverse (Hodgkinson 1985). In light of these arguments, one could argue that science knowledge benefits white students more than it does for minority students.

Critical theorists, postmodernists and radical feminists have studied science and engineering learning and achievement as a political process. Unlike the assimilationist perspective, critical theory, postmodernism and radical feminism maintain that as marginalized students gain access to science and engineering, they learn to appropriate the language and discourse of science and use it for their own intentions. As components of resistance theories, critical theory, postmodernism, and radical feminism view students as active agents capable of transforming the nature of science and establishing more equitable power structures than the existing systems of hegemony, domination, and oppression supported by engineering schools (Calabrese Barton 1998). Using a critical race theory framework, Carter's (2008) study points to the evidence that African American students' perceptions of schooling as a "racialized and classed process inform the way they adjust to the learning environment, and their behaviors can play out as either adaptive or maladaptive for school success" (Carter 2008:2). Critical race theory considers how the structural condition of racism interacts with African American students' individual agency in their pursuit of academic excellence and upward social and economic mobility. Henwood (1994), however, commented on the failure of resistance theories and critical identity theories. She convincingly discussed the subtleties and processes of racisms and sexism affecting Blacks in educational settings.

Henwood (1994) observed that “feminist research must involve challenging racism(s)” because any individual women may be the subject of multiple forms of discriminations. Because sexism manifests itself in many different ways, feminist identity studies must be concerned about capturing the hidden and silenced voices of oppressed women of color (Henwood 1994:42). Likewise, because racism(s) has moved from overt, “crude assumptions of racial and cultural inferiority” to notions that “differences between groups are simply natural, intractable and non-negotiable”, new racism needs to be addressed as a multi-layered social construct not as a highly visible or distinctive physical characteristic (Henwood 1994:44). It is true that in the U.S. racism has changed ground. It has moved from being ‘legal’ to becoming a ‘normal’ state of affairs. New racism is subtle but potent. Dominant groups employ the same discourse (i.e., equal opportunity, Affirmative Action) and binary classifications (i.e., Black and White) as in the past but have the power to market or communicate or reproduce those classifications at a faster pace using the *communication superhighways*<sup>21</sup>. While I support the view that Web pages showing women or minorities in position of high prestige in engineering are likely to portray USF and UF as “integrated” or diverse campuses, I am not sure how online portrayals of women and students of color address issues relating racial and gender stereotypes. The following chapter is a reflection on recommendations for future research. Before I get to set forth said recommendations, I discuss study limitations, articulate research implications for policy and practice, and address potential ethical concerns relating to the study.

---

<sup>21</sup> The phrase was coined by then-Senator Al Gore, a strong and knowledgeable proponent of the Internet, who promoted legislation that resulted in President George H.W Bush signing the *High Performance Computing and Communication Act of 1991*.

## **CHAPTER SIX: RECOMMENDATIONS**

### **6.1 THE STREAMLINE APPROACH**

This study sought to address the reason(s) why efforts from public institutions of higher learning like the University of South Florida and the University of Florida to use Websites as marketing tools in attracting women and students of color into STEM fields have not allowed women and minorities to enroll in the USF Department of Civil and Environmental Engineering and the Department of Civil and Coastal Engineering in numbers that are proportional to their population in society. In an effort to understand the extent to which USF and UF's climate was a factor in recruiting and retaining women and racial and ethnic minority students in the USF CEE Department and the UF CCE Department, I drew on a variety of data sources, including interviews, focus groups, Web pages, demographic sheets, field notes, and university artifacts.

This study found that the University of South Florida and the University of Florida use Internet marketing as a strategy in attracting women and students of color into STEM fields. In addition, the study revealed that civil engineering students use the Internet for different reasons, including applying to or enrolling in engineering programs. Ultimately, an important research finding was that engineering department climate can be reflected on the USF and UF's Websites and that climate is a significant factor in recruiting and retaining women and students of color at USF and UF. Those findings are useful to get an insight into the root causes of STEM field attrition. In fact, the study demonstrated that problems of persistence in engineering are intricately related to issues

of agency. As the study shows science and engineering departments often cause women and students of color to feel isolated. Feeling of isolation derives from the fact that the cultural values and personal life experiences of students from underrepresented groups are not taken into consideration by the educational institutions in which these students find themselves. I fully agree with Lee (1999) that when a student is stripped of his or her agency and that there is the overwhelming impression that a certain worldview with a set of different values, meanings, or practices is being imposed upon the student, there may be resistance to being a part of the engineering culture. Fuligni (2007) supports this view when he points out that, “Persistent disparities in educational opportunities and achievement are often created and sustained by academic stereotypes that are ascribed to different social groups by the larger society and its institutions” (Fuligni 2007:1). It is important to acknowledge retaining diverse students is a pretty delicate enterprise. I do not pretend I can offer magic bullets, one-size-fits-all type of retention model that could be applied to colleges and universities across the 50 states of the U.S. I believe, however, that there are ways of streamlining successful recruiting and retention practices for engineering departments. I am aware that retention is context specific and requires complex organization (Moxley, Najor-Durack, & Dumbrigue 2001). What I propose is a sustainable framework for retention in higher education that has room for improvement.

Research shows that keeping students in their studies is one of the greatest challenges of higher education both in the United States and around the world (Crosling et al. 2008; Moore 2005; Moxley et al. 2001). Additionally, many studies have reported that higher education has not successfully recruited and retained women and students of

color (Crowley et al. 2004; Griffin 1992; Harper & Antonio 2008; Henley, Powell, & Poats 1992; Jones et al. 2002; Lang & Ford 1992; Moore 2005). Equally important, Cross and Vick (2001) have noted that an important reason for the shortage of scientists and engineers in the U.S. is that qualified students have not been recruited and retained in these fields. One key fact all of the above outlined studies appear to suggest is that retention is an extremely complex endeavor; perhaps more complex than recruiting. At any rate, a streamline approach imposes to consider that it is one thing to recruit students and it is quite another to retain them. This approach draws on a student-centered philosophy, which requires placing the aspirations and well-being of the student at the center of recruiting and retention efforts. If one considers the definition of the word, “streamline” (both in its verbal and nominal forms), one takes notice of the many different patterns of meanings it calls for.

According to the Webster Dictionary (2011), a “streamline” represents: 1) a line that is parallel to the direction of the flow of a fluid at a given instant; 2) a contour of a body constructed so as to offer minimum resistance to a fluid flow. On the other hand, to “streamline” implies to: 3) improve the appearance or efficiency of; to modernize; 4) organize; simplify. These different definitions are critical. They show that a streamline approach to recruiting and retention imposes to align a number of cardinal values with the recruiting and retention strategies. I identify three components within a streamline approach to recruitment and retention, which are intentionality, organization, and consistency. In the following sections, I briefly discuss each of the components and attempt to demonstrate how they speak to the issue at stake.

### 6.1.1 Intentionality

The first aspect of the *streamline approach* to student recruitment and retention has to do with intentionality. Jones et al. (2002:21) pointed out that, “Historically, most predominantly white institutions, in wake of the school desegregation era, reluctantly permitted the establishment of cultural centers for ethnic minority student populations.” Intentionality is prerequisite for successful recruiting and retention practices and strategies (Figure 6.1). Recruiting or retention policies that are unintentional would not help students thrive in their program of study.



**Figure 6.1** Streamline Model of Student Recruitment and Retention. *Source:* Dissertation Fieldwork 2009-2010.

As Harper & Antonio (2008) once explained, “Intentionality requires courage, consciousness, assessment, and planning. Courageous educators recognize the presence of various –isms (e.g., racism, sexism, heterosexism, ableism, etc.) and oppressive conditions in campus environment, call them to the attention of several others, and respond with deliberation” (Harper & Antonio 2008:11). In a sense, intentional university educators must be willing to identify the problems their students face on campus regardless of their gravity. Policies that are reluctant in addressing the issues students confront on a daily basis in racially charged campus environments would have “[T]he

consequence of heightening the minority status stress among black students and of relegating a significant and disproportionate number of ethnic minority students to attrition, stop out, and drop out” (Jones et al. 2002:21). Intentionality entails recognizing that problems of racism and sexism exist on our campuses. Lack of intentionality concerning diversity may cause students from disenfranchised groups to exit predominantly white institutions. Students need to feel accepted and valued in their learning environment. Persistence in fields like engineering, for instance, appears to be possible when the cultural and social dimensions of college life integrate students’ cultural values and personal experiences.

#### 6.1.2 Organization

The second component of a streamline approach to recruiting and retention involves organizing (Figure 6.1). One way to help recruit or retain historically underserved populations at predominantly white institutions is to organize cultural awareness projects. Raising cultural awareness among students is must, especially on campuses where certain are willing to interact with peers from different cultural backgrounds but do not know how to do so (Harper & antonio 2008). This can be done through organizations like “cross-cultural centers”. As (Jones et al. 2002) once suggested, “Today, particularly during this time of demographic change, cultural centers have been pivotal in providing safe havens for ethnic minority student groups who have traditionally been denied full access and, in most instances, any access to PWIs” (Jones et al. 2002:21). Social or cultural organization present on campus may help students from different backgrounds develop a sense of inclusion, rather than feelings of isolation.

Similarly, for women who choose to pursue a degree in science or engineering, there are

a number of barriers to persistence frequently perceived at each stage of their education (Brainard & Carlin 1998). The most frequently reported barriers for female first-year students and sophomores are lack of self-confidence, isolationist behavior, and concern about not being accepted into their department when they apply at the end of their sophomore year (Brainard & Carlin 1998). Student organizations like the Society for Women Engineering (SWE) or National Society of Black Engineers (NSBE) or the Society of Hispanic Professional Engineers (SHPE) may help build social support systems and psychological well-being for women, African American, and Latino students at predominantly white male colleges and universities.

### 6.1.3 Consistency

The last component of the *Streamline Approach* has to do with consistency. This component requires that recruiting strategies be thought out simultaneously with retention strategies. At this level, it will be possible to anticipate errors and to adjust both plans as during the course of recruiting implementation. Likewise, there should not be a disconnection between the set of ideas or ideologies the institution promotes (e.g., through different media such as newspapers, magazines, or Websites) and what is actually taking place on campus. Research on campus racial and social climates points to “perceived disconnection between espoused and enacted values concerning diversity. Racial and ethnic minority students believed most talk about diversity was rhetorical and merely for institutional publicity” (Harper & Antonio 2008:10). As I discuss in Chapters 4 & 5, the sociocultural setting of the institution plays a critical role in student college departure. Contradictory discourses within the institution may create a climate of tension and lead many students of color to social isolation (Hurtado et al. 1998; Harper & Antonio

2008; Harper & Hurtado 2007; Tinto 1993). Additionally, Jones et al. (2002) have reported that African American students pointed out that the “institution administrators spoke a lot about diversity but acted minimally toward creating a culturally diverse, tolerant and sensitive environment” (Jones et al. 2002:28). This does justice to the argument that “African American students are dropping out of college not because they don’t value education but because of not identifying with the school they attend (Hobson-Horton & Owens 2004:89). Thus, the climate of the learning environment is critical to school success. Likewise, Crowley et al. (2004:27) have argued that “research laboratories along with other places represent complex settings where climate can be crucial to maximizing the quality and creativity of individuals”. But more important, these authors support the view that “our perceptions and experiences are mediated by the multiple roles that we play in our daily lives” (Crowley et al. 2004:27). Ultimately, scientific environments make individuals from racial and ethnic minority groups think that members of the majority group create and maintain a campus climate that is not culturally responsive (Harper & Antonio 2008; Hurtado et al. 1998; Jones et al. 2002; Crowley et al. 2004). The institution needs to ensure that espoused ideology is consistent with enacted values concerning the promotion of underrepresented minorities. Lack of consistency would result in negative perceptions of the school climate. Negative perceptions may discourage interracial socialization and friendship.

A streamline approach to recruitment and retention represents an attempt to document strategies that can be used or adapted by institutions of higher learning interested in engaging diverse students on their campuses. This approach is not meant to be a groundbreaking, one-size-fits-all type of marketing tool. Rather the streamline

perspective comes in the tradition of the anthropology of education to attempt to, “Fulfill a public role as a legitimate participant in the conversations about understanding and transforming schooling” (Varenne 2008:356). The realization that “[W]e face multiple institutions enforcing a cultural arbitrary that we cannot escape, even as we struggle to transform it” (Varenne 2008:356) makes the use of a streamline approach timely and appropriate. This is of paramount importance because it is one thing to recruit women and students of color and it is quite another to make them feel welcomed in a predominantly white campus environment. As Moxley et al. (2001) pointed out, “Retention is a complex personal, social and academic enterprise. It requires institutional-community-personal partnership” (Moxley et al. 2001:12). At the higher education level, retention efforts require from university leaders and educators a certain degree of openness which is crucial in facilitating community partnership building. Although partnerships among institutions of higher learning, communities, and students suggest complicated relationships (i.e., race relations and gender roles), those partnerships provide the necessary foundations for successful recruitment and retention practices.

A streamline approach to recruitment and retention builds on complex campus relationships and provides an opportunity to better value non-traditional students in engineering environments. This approach involves harmonizing colleges and universities’ recruitment and retention efforts and the stated intentions of these institutions – especially toward women and students of color. To put it differently, statements by USF and UF civil engineering professors and administrators that Web-based marketing can contribute to attracting women and students of color into civil engineering must align with adequate policies and resources to substantiate these statements and make diversity a reality on

campus. Claiming diversity is one thing; and working toward a diverse engineering program is quite another. Equally important, a streamline approach aims at improving the efficiency of marketing techniques destined to attract women, African American, and Latino students in STEM majors. In more pragmatic terms, a streamline perspective ensures, for example, that the USF and UF Colleges of Engineering's inclusiveness promoted online through providing information about women and minorities translates offline. A streamline approach provides the opportunity to give diversity a more concrete form through a wide variety of academic services, educational opportunities and policies, including 1) hiring more women and minority faculty to teach in STEM majors and to reinforce faculty-student interactions in engineering disciplines; 2) designing intensive courses destined to train culturally responsive educators (i.e., professors, administrators, and staff); 3) creating a host of appropriate academic services supporting 'pre-engineering advising', 'pre-engineering tutoring', and 'pre-engineering mentoring'; and 4) establishing professional organizations and multicultural services (i.e., cultural centers, engineering student organizations, fraternities, and sororities) as a key component of on campus socialization.

Illinois State University's "Resource Guide for Faculty Teaching First-Year Students" may serve as an example of reinforcing faculty-student relationships or raising awareness of the necessity to create culturally responsive civil engineering programs (RRHE 2006:3). This guide represents an effort to stress the role of faculty members who teach first-year students in freshmen's academic achievement. The document is intended to: 1) raise awareness of the importance of the first-year experience; 2) inform faculty of support services available on campus; 3) give faculty a holistic understanding of the first-

year experience and the important role they play; and 4) enhance the importance and prestige of teaching first-year students (RRHE 2006). It is of vital importance to provide faculty with the information they need to better assist students in an easily accessible format. By delivering the “Resource Guide for Faculty Teaching First-Year Students” in an electronic format, Illinois State University opted for a cost-effective approach to creating an educational database. An online version of the guide saves money on printing and makes the document much easier to update (RRHE 2006). No doubt the “Resource Guide for Faculty Teaching First-Year Students” has played a critical part in the retention strategies of Illinois State University.

On the other hand, if the University of South Florida and the University of Florida’s Colleges of Engineering are really interested in recruiting and retaining women and students of color, their respective Websites must employ innovative Web-based approaches destined to engage students from these groups. One must be aware that while browsing the Web potential pre-engineering students are interested in specific types of information, including program course schedules, fieldwork, hands-on activities, or student social organizations. Most importantly, information accessibility is a key element in the recruiting process. Prospective students could be easily turned off by some presentation of information on college Websites. Additionally, one way to promote online interactions between potential pre-engineering students and USF Engineering or UF Engineering is to develop interactive features like the one developed by institutions hosting the nation’s top civil engineering programs such as Massachusetts Institute of Technology (MIT) or Northumbria University in the North East of England.

The implementation of Northumbria University's off- and online responsive system for (potential) applicants constitutes an interesting model for university-students online dialogic communications (Slee, Watts, & Thomas 2009). This interactive system is meant to help applicants make an informed decision as they navigate the application process. Current student or "Friends" are trained to provide information and advice to potential applicants and to encourage them to ask relevant questions about all aspects of university life" (Slee, Watts, & Thomas 2009:144). Through online interactive communications, prospective students can send instant messages or emails to program advisors to get relevant information or facts on a given program. An interactive feature would offer the convenience of enhancing "Q & A" (i.e., questions and answers) sections that are often difficult to keep up to date. If they want to attract and retain students from historically underserved groups, USF Engineering and UF Engineering ought to make admissions requirements as well as information relevant to minorities readily available and easily accessible through the Internet. To sum it up, students' needs, including cultural, social, economic, and academic needs must be the center of recruitment and retention policies. Marketing strategies designed even by the most experienced experts will not suffice to attract diverse applicants unless they take the student's "complex whole" (González 2004) into account.

## 6.2 LIMITATIONS

This dissertation includes a number of limitations due to the research design. First, this study involved a low representation of women and racial and ethnic minority participants at the two institutions investigated. Of the 23 students recruited for the purpose of this study, 6 were Latinos (4 at USF and 2 at UF) and 2 were Blacks (UF

students), which represents a 26% participation rate. In terms of gender, the USF sample was made up of 4 female students, including 2 White females, 1 Latina female, and 1 female student that identified as “Other”. On the other hand, the UF sample only comprised 2 female students (one White and one Latina).

As I outline in Chapter 3, the majority of the University of South Florida and University of Florida pre-civil engineering or undergraduate students, civil engineering professors, and university administrators who volunteered their time in this study were from the White group (60%). As a matter of fact, the White category in total was more than all the other categories of participants combined. My goal was to create a sample that included an overrepresentation of women and minority students. The minimal representation of minorities (see discussion in Chapter 3) in the study sample is problematic for women and students of color constitute the focus of this study. Although it involved men and women from various backgrounds (i.e., African Americans, Caucasians, Latinos, and Asian Americans) and representing the two genders (i.e., males and females), the sample used in the current study is not representative of the population of the USF and UF Civil Engineering programs.

Second, an important limitation inherent in the study has to do with data collection techniques. Retrospective interviewing was used as a technique to help students recall what Web-based, online information helped them decide to apply to their engineering programs. It appears that only 13% of the students interviewed in this study were able to recall with exactitude their Internet use during their senior year and during the very first months or weeks following graduation. Very few students discussed the impact of engineering programs’ Websites on their college plans. Retrospective

interviewing can be a tough data collection technique to employ in qualitative research, especially for a design including focus groups. Focus groups constitute a more complex approach for retrospective interviews because they do not just involve one individual trying to recall past events, but several individuals reminiscing and sharing their past within a relatively limited amount of time.

Last, the pre-civil engineering student, civil engineering professor, and university administrator voices in this study represent only the perceptions of pre-civil engineering students, civil engineering professors, and university administrators at the two public universities investigated in this study, that is the University of South Florida and the University of Florida. The scope of this research limits the generalizability of the findings presented in this study. The following sections review implications for future research, outline the intersection between research findings and policy and practice, discuss ethical questions raised by the present study, and explore ways to address study limitations.

### 6.3 IMPLICATIONS FOR POLICY AND PRACTICE

A number of implications for policy and practice are suggested by both the findings and limitations of this study. As I underline earlier, the existence of a relatively limited amount of evidence-based research on the impact of Web-based, online information on women and minority students' STEM participation (at the post-secondary level). The absence of a body of empirical research may constitute a major impediment, especially when policy proposals must be ensured of safe landing in the lawmakers' arena.

A close look at the U.S. education system makes it possible to notice that the existence of a vast body of knowledge on K-12 education may have prompted the federal

government to be “concerned with improving the quality of public education” broadly conceived (Fuhrman et al. 2007:43). The federal government’s concern to increase access to educational resources for all American students probably culminated in passage of a set of federally-backed pieces of legislation such as the Elementary and Secondary Education Act (ESEA) of 1964, the Improving America’s Schools Act (IASA) of 1994 or, more recently, the No Child Left Behind (NCLB) Act of 2001 (Fuhrman et al. 2007). Federal educational policies appear to have the might to meet the sole K-12 exigencies. Judging from this fact, it is tempting to observe that one way to address shortages in the U.S. science and engineering workforce is to work on developing a substantial, multifocal, and multivocal body of evidence-based studies on undergraduate STEM education. By “substantial”, “multifocal”, and “multivocal” I mean the work must be of a considerable bulk (i.e., quantitatively and qualitatively), have several focusing areas (e.g., civil engineering, mechanical engineering, and computer science), and must be disseminated in a wide range of formats (i.e., peer- and non peer-reviewed journals, reports, pamphlets, dissertation theses, magazines). This effort has the potential to carry limitless possibilities, including to enhance our understandings of the importance of U.S. STEM education and to pave the way for the enactment of, at least, one sweeping piece of legislation dealing with post-secondary STEM participation for American youths, and for women and students of color in particular. There seems to be a need for colleges and universities, including engineering colleges and departments, to work more proactively and imaginatively towards creating sound recruiting and retention strategies. University or engineering school officials must be prompted to endorse university-wide policies encouraging a culturally responsive use of Internet marketing and recruiting and retention

approaches. The implication of this statement is that forces need to be marshaled and resources mobilized not only at the college and departmental but at the institutional levels. The systemic problems that plague the U.S. education system and engineering schools can be addressed through intentional, deliberate policies. I believe that by providing women and racial and ethnic minority scientists more visibility on Websites may help attract women and students of color civil engineering departments. However, it is my perception that addressing racism and sexism and all the other possible “-isms” in the University of South Florida and the University of Florida Colleges of Engineering will necessitate more than just Web pages on the Internet.

The Internet has its pluses and minuses. As a new technology, the Internet needs a legislative frame capable of ensuring a harmonious development alongside its millions of user and many organizations in society. The complexity of the technology and the absence of a legislative frame for the Internet may well discourage many colleges and universities and other Internet fans, especially if specific policies must be enacted to govern the use of images on the Internet, for example. This makes even more sense when you realize that: “Even established entities like the Smithsonian Institution are unable to precisely tell you their policies governing the use of their images on the Internet – the whole area is so new that laws and policies are only just now being addressed” (Schoenfeld & Weimer 1997:382). The implication of this formulation is that more time, efforts, and first-hand knowledge are needed for educators, policymakers and practitioners to familiarize themselves and, eventually, to propose meaningful Internet laws and policies. The educational challenges faced by each of our communities are unique, and interventions which work for one may not be effective in others. That is why

it is so important to have data and research providing policymakers, education experts, community leaders and service providers with relevant information to set priorities and allocate needed resources to address particular disparities in our school system.

Linda Wallinger (1998) warned that different colleges and universities have different opinions on what society rewards, what the institution deems valuable, and what is taught and how. It would represent extreme naïveté to believe that institutions of higher learning in the U.S. have the flexibility to do without policymaking. As scholars have shown, educational policies and politics in the U.S. are well-thought out and carefully worded from start to finish, from Congress to the very classroom (Levinson et al. 2009; Opfer 2001; Stein 2004; Weaver-Hightower 2008). Education policy affects multiple layers of higher education. As a result, knowingly or unknowingly, the USF and the UF Websites will tend to mirror the culture and values espoused by the dominant group within these institutions. Website content analysis indicated that the information posted on both the USF and the UF Web pages reflected the Caucasian group's culture and values. Freire's (1985) perception that power is diffused in cultural representations and in education institutions makes enormous sense. In the following section, I examine areas for ethical concern in cyberculture research.

#### 6.4 ETHICAL CONCERNS

From day one of the research until its conclusion, I have been in compliance with official regulations set forth by the Institutional Review Board (IRB). As a researcher conducting research with human subjects, I was required to ensure research integrity, which I strove to do. Throughout the research process, I ensured that data collected were kept in locked cabinets in an office at the Alliance for Applied Research in Education and

Anthropology (AAREA). One major step in ensuring confidentiality of the data was to anonymise interview transcripts and demographic information sheets. Those data sources, therefore, did not have personally identifiable information and were stored on password protected secure servers.

With that being said, this study still raises important ethical concerns. The main research-related ethical dilemma that I ran into had to do with use or misuse of the Web-based data collected to support the research analysis. In fact, the Internet provides an easily accessible route to data that were not accessible in the past at the touch of a button or a click (Illingworth 2001). The Web offers a breadth of virtual data made available to the public and falling under public domain (Berg 2007; Illingworth 2001; Waskul 1996). Qualitative researchers and social scientists are increasingly using the Internet as a unique research tool (Beddows 2008; Berg 2007). Even though I was aware that the Web pages examined in this study were a part of public knowledge (Waskul 1996), I still knew I was facing an ineluctable ethical conundrum. Research has reported a host of issues relating to potential use or misuse of the Internet as a research tool (Beddows 2008; Berg 2007; Illingworth 2001; Thomas 1996; Thomas 1999). Scholars such as Berg (2007) and Beddows (2008) offer insights into new ethical concerns pertaining to cyberculture.

At any rate, one interesting ethical issue in my dissertation research is that some of the Websites I used for analysis include pictures and (first and last) names of individuals whom I did not get consent from. Researchers have documented ethical concerns in social research arising from unethical use of Internet-based data (Beddows 2008; Waskul 1996). Waskul (1996) warns that, “[R]esearchers should *not* assume that where access to the Web is ‘public’, then the information available in such domains is

also ‘public’ and ‘up for grabs’, without informed consent” (Waskul 1996:N.p.). Not any information available online can be used as part of the public domain. At one point in the research, I was confronted with the question of whether to keep or leave out of the study Web pages including photographs and names of individuals on display. Not only did I believe this to be an important decision to make, but I considered it an ethical concern of paramount importance (for current and future research alike). I negotiated my role in the field being aware that I was potentially infringing on the anonymity of the individuals represented on the University of South Florida and the University of Florida Web pages used for the purpose of the study. The course of action I used to address this conundrum was to contact the Institutional Review Board (IRB) and ascertain that this was not going to constitute a major ethical problem down the road. I also found that there are currently very few guidelines for ethical codes of conduct regarding Web-based social research. Nevertheless, the regulations set forth by the University of South Florida’s Institutional Review Board (IRB) as well as the guidelines of the Association of Computing Machinery have been extremely helpful for that matter. The following section stresses the need to advance STEM research and articulates a few grounds for future research efforts.

## 6.5 FUTURE RESEARCH

Higher education research – as well as STEM education research – has suffered from a disproportionate emphasis on research in grades K-12. In addition, there is a scarcity of research-based evidence on the relationships between Website information content and access to civil engineering programs for women and racial and ethnic minority students’ applications and enrollments. Therefore, it would be fair to recommend, for that matter, a greater focus on institutions of higher learning for any

future research looking into ways to increase participation of historically underserved populations in STEM fields. Another fertile ground for research efforts involves addressing methodological issues relating to research participants recruiting or sample representativity. It would be useful to explore imaginative recruiting techniques to constitute diverse samples of students. This is especially critical if women and racial and ethnic minorities are the focus of the study. Research that focuses on methodological issues of sampling could build on the sampling weaknesses identified in this dissertation in order to offer better approaches to cross-cultural research sampling. In focusing on the types of Web-based information that students search for to apply to engineering programs, I have not examined how social networks (e.g., Facebook and Twitter) impact applications and enrollments in engineering programs. Additionally, in an era where online social media are complementing and, in some instances, replacing person-to-person social interaction and redefining the diffusion of information, it would be of great value to look at how social networks as information resources and sources contribute colleges and universities' recruiting and retention efforts. Mining, visualizing, tracking, classifying, mapping, and analyzing social network interactions between engineering colleges or departments and potential students would be a great research niche for the anthropology of online communities.

Last, but certainly not least, a comprehensive research providing a Website information content analysis of the top 5 engineering programs in the nation and how these programs recruit and retain women and students of color would be of significant value. Likewise, comparing recruitment and retention strategies and practices for engineering students at historically Black colleges and universities to recruitment and

retention strategies developed in top tier engineering programs at predominantly White institutions would provide a new angle from which issues of access to STEM fields can be understood. Examining if problems relating to the representation of African American students in civil engineering pose themselves in the same terms at historically black colleges and universities like FAMU or Bethune Cookman as they have at predominantly white institutions like UF or USF would be extremely valuable in and of itself. The next and last chapter of this study discusses the intersection between the steams of theories used to support the analysis and the research questions and concludes the study.

## CHAPTER SEVEN: CONCLUSION

### 7.1 HOW THEORY INFORMS THE RESEARCH QUESTIONS

The theoretical groundings of this study involved two streams of complementary theoretical positions critical in addressing issues of racism and sexism in educational institutions. Cultural reproduction theories and public relations “dialogic loop” theories were essential in answering the study’s research questions. The two overarching research questions of this study are as follows: 1) Do applicants to civil engineering undergraduate programs use Web-based materials to select the USF Civil and Environmental Engineering and the UF Civil and Coastal Engineering programs? If so, what kinds of information are both appealing and informative?

2. What are the implications of providing more prominence and visibility to women and minority students, professors, and administrators on engineering colleges and departments’ websites? I used the cultural reproduction theories and public relations theories address the issue at stake in ways that are relevant to the entire analysis. It must be noted that the role of theory at the outset of the study was to provide a framework on which to analyze the research findings, which it has accomplished.

The theory of cultural reproduction was applied to code informants’ perceptions of Web-based information and Web page content. This theoretical position was useful to demonstrate that racial and gender identities continue to be produced, reproduced, and transmitted in the Department of Civil and Environmental Engineering at the University of South Florida and the Department of Civil and Coastal Engineering at the University

of Florida through the superhighways of information, to paraphrase then-U.S. Senator Al Gore. On the other hand, public relations theories were utilized to code interview and focus group transcripts to provide insight into the types of information provided by USF and UF through their Websites (Kang & Norton 2006). This approach helped demonstrate that Web pages on the Internet constitute interesting loci where information delivery occurs. Information delivery sustains the exchanges taking place between USF Engineering and UF Engineering and potential applicants or enrollees for communication, recruiting, and retention purposes. Dialogic “loop” perspectives helped to understand that Internet technologies and, more specifically Websites, have established themselves as the recruiting and retention tools of choice for engineering schools and colleges, capturing the imagination of the public. The following section summarizes the study and draws a conclusion to the current analysis.

## 7.2 SUMMARY OF FINDINGS AND INFERENCES

An investigation of the role of Websites in helping women and students of color participate in STEM showed that the University of South Florida and the University of Florida have developed remarkable online marketing approaches to recruit and retain diverse students. However, women and students of color are still underrepresented in the USF Department of Civil and Environmental Engineering and the UF Department of Civil and Coastal Engineering. Efforts to diversify engineering have helped increase representation of women and racial and ethnic minority in higher education in general and in engineering in particular (Thompson & Sekaquaptewa 2002; The JBHE Foundation 2003:98; The Florida Engineer 2009) but there is more work to do in terms of making engineering truly accessible to historically underserved groups. I somewhat agree

with Bernadine Healy<sup>22</sup>. NIH's former director's view that "an important reason for the potential shortage [in U.S. science and engineering workforce] is that qualified students have not been recruited and retained in these fields" (Cross & Vick 2001:820) should be done justice. However, what Healy seems to ignore is that proficiency in science and mathematics is not all it takes to thrive in engineering (May & Chubin; Tyson et al. 2010). Cultural barriers have frequently been cited as a major cause for engineering departure. Perhaps, as studies (Cross & Vick 2001; Jones et al. 2002) have shown, qualified women and students of color are leaving STEM majors because scientific and engineering environments and the cultures they embody tend to incorporate prejudices held against women and racial and ethnic minorities in larger society.

This study has concluded that Web pages on the Internet constitute an important component of the University of South Florida and the University of Florida's Colleges of Engineering's recruitment and retention strategies. However, the Internet and Websites remain a complex technological innovation to come to grip with. The Web impacts the recruitment and retention efforts of the University of South Florida and the University of Florida because the USF and UF Colleges of Engineering's school climate is evidenced on the two colleges' Websites. It would take a tremendous amount of time and work to determine how shared cultural values are infused into the Internet and how the new media technology can avoid reproducing and transmitting the cultural stigmas of racism and sexism in the discipline of engineering.

The Internet is a new technology but this technological innovation is first and foremost a by-product of culture (Bird & Barber 2007; Wilson & Peterson 2002). To

---

<sup>22</sup> Bernadine Healy is the former director of NIH (the National Institutes of Health). Many have acknowledged him as a leading authority in the sciences. Healy often made comments on the future of U.S. science and technology and the current shortage of the country's science and engineering workforce.

paraphrase Bird and Barber (2007), “[T]oday, we live in a media-saturated world; the media do not merely affect culture –they are actually embedded in our culture. They provide us with many of our shared cultural references, and it is through the media that American culture is moving so quickly across the globe” (Bird & Barber 2007:139). It is true that cyberculture has revolutionized communicative practices in the U.S. and around the world. Websites are used to mediate or negate cultural values. But it also holds true that the Internet “Has not replaced other forms of communication; it has simply added another medium” (Schoenfeld & Weimer 1997:381) to our every day communicative practices. The Internet and culture are inherently tied and cannot be taken apart. One of Websites’ functions is to reproduce the interlocking academic, social, and cultural environments in which students live (with both their positives and negatives). When showing texts or images of engineering departments chaired by Caucasian men or engineering school projects carried out by all-men teams or engineering programs where the student body is predominantly made up of Caucasian men, Web pages reproduce stereotypes and perpetuate assumptions that engineering was, is, and, probably, will remain an all-Caucasian male field. A statement made by the former President of Harvard, Lawrence Summers during a conference in 2005, illustrates this view persuasively. Summers, in fact, suggested that “innate differences in sex may explain why fewer women succeed in science and math careers” (Dillon 2005). Many view the “feminization” of engineering as the end of the discipline.

In a sense, it is in the context of the power structure that the Internet fulfills a reproductive role and endorses the *ideology* of Caucasian male-dominated civil engineering programs. Research shows that “the relationship between technology and

society is never unidirectional. Rather technologies are often developed in response to the agendas of powerful social actors” (DiMaggio et al.2001:327). The power structure in engineering has unequivocally put Caucasian males on top of the discipline’s hierarchy and ranked them among the best engineers and scientists that ever existed. For centuries, engineering had been closed to qualified men and women of color. And when the field finally diversified, it was white women (then called, “co-ed” or “engineeresses”) who primarily benefited from the measure<sup>23</sup>. This explains why today there are more White women in leadership roles in engineering than men and women of color.

This case study revealed that existing power structures in engineering have permeated the Web. At times, the power relations at work in engineering departments appear to be unshakable – owing to the relatively low number of women and racial and ethnic minorities in the USF and the UF Civil Engineering Departments. The question is, can the Internet really be instrumental in reshaping engineering culture? About ten years ago, Wilson and Peterson (2002) offered a possible answer to the question: “The realization has grown that though online communication may happen faster, over larger distances, and may bring about the reformulation of some existing power relationships, the rapid and fundamental transformations of society that some foresaw have not come to pass” (Wilson & Peterson 2002:462). More than twenty years after it took the media realm by storm, the Internet has yet to accomplish its “revolutionary” mission. For some, the Internet still has a long way to go before it can bring about the power relationships transformations many predicted years ago.

---

<sup>23</sup> Massive departure of men for the Second World War caused lack of adequate workforce in plants and factories. The situation urged U.S. authorities to finally agree to revise their position on female involvement in the engineering profession.

On another level, it was interesting that a vast majority of the research participants (38 respondents out of 40) in this study reported that they believe providing more visibility to women and minority engineers and scientists on the University of South Florida and the University of Florida's Websites would affect the participation of women engineers and engineers of color. To put it differently, more women or African American or Latino students would be able to enter the USF and the UF Civil Engineering programs if students, or professors, or administrators from these groups were represented on the schools' Websites. Undeniably, Web pages on the Internet have created new possibilities for "group and self-representation". The rise of the Internet brings a glimmer of hope to those who stand up for social justice. Nonetheless, the Internet alone cannot guarantee that reform will actually take place in our education system (and that it will be the right reform with the right agenda at the right time) and that social equality will become a reality *de facto* in our schools. It takes much more than an online marketing to attract women and students of color. Furthermore, funding is probably a bigger player, but these things cannot be decoupled.

Societal transformations foreseen by many may occur through online communication but these changes will not occur overnight. Change is a process and its outcomes cannot be completely anticipated. I think Websites have played a key role in helping promote engineering as a profession and field of study. Some of the gains of the Internet revolution – for the discipline of engineering – are seemingly self-evident: the University of South Florida and the University of Florida's Colleges of Engineering have employed their respective Websites to help attract or promote prospective students, faculty, and staff. To achieve this goal, written texts about and images of women and

minority students, professors, and administrators from all walks of life (i.e., Blacks, Whites, Latinos, Asians or Middle Eastern) are constantly displayed on those institutions' Websites. Web recruiters or marketers at USF and UF are aware of the transformative potential of the Internet. They know this technology may have a social impact: "The social uses of the Internet, in the few years of its existence, have been astonishing and almost completely unanticipated..." (Wilson & Peterson 2002:462). The Internet and Websites have probably helped advance engineering as a discipline. However, the new media technology has not radically altered existing power structures in engineering.

Besides, one important claim the qualitative evidence in this case study helped substantiate is that giving more visibility or prominence to individuals from historically underserved populations on the University of South Florida and the University of Florida's Civil Engineering Departments' Websites represents a good marketing strategy but it is not all it takes. It is critical to go beyond the appearances of the Web and to initiate culturally responsive retention policies capable of sustaining the advantages provided by the USF and UF Civil Engineering Department's Websites. I believe giving more visibility to women and students of color on engineering Web pages may help promote STEM fields among women and racial and ethnic minority youth across America and, eventually, increase applications and enrollments in engineering. One prerequisite for that is to work imaginatively toward developing truly inclusive engineering schools. I support Albert's (2000) view that colleges and universities must be responsive to the changes and demands brought about by emerging and rapidly evolving information and communication technologies (ICT) like the Internet.

On another level, I think it is critical that college and university leaders and educators understand and take ownership of emerging marketing and information and communication technologies as tools capable of radically transforming the academic as well as the administrative realms. However, colleges and university leaders and educators must do so using *Funds of Knowledge* (González et al. 2005; Cammarota & Romero 2011) or norms that foster student agency and value the importance of cultural differences. I could not think of a better way to conclude this case study than quote USF President Judy Genshaft. In a recent St. Petersburg Times article, President Genshaft commented on the value of experiencing different cultures. The following two statements summarize President Genshaft's line of thought and sit well with the *Funds of Knowledge* construct:

It's part of what business leaders want. They say, 'You have a student who goes to elementary school in Florida, secondary school in Florida, college in Florida and then you're sending them to me at a multinational company? I shouldn't be the one to teach them about tolerance and understanding and cultural differences, you should be the one (St. Petersburg Times 2011).

You become more tolerant and understanding of one another once you learn about the other person. To me, that's all a part of this. You've been on the campus [referring to the USF Tampa campus], you know how diverse it is. Everybody has a right to pursue their interests, but they should learn about the cultures of each other (St. Petersburg Times 2011).

One key point in these statements is that they highlight the importance of valuing cultural differences at the University of South Florida. As a university leader, Dr. Genshaft sets forth her vision for USF as a 21<sup>st</sup> century campus. The implication of her assertions is that the only way American students will be able to remain competitive in a globalized world is by becoming responsive to the different cultures of the world. Openness toward world or foreign cultures is a seductive prospect for business leaders.

However, cultural responsiveness has also become an essential element in today's higher education. I think it is vital for American college students to learn to negotiate their own cultural differences (i.e., cultural differences among African Americans, Caucasian Americans, Latinos, Native Americans, Asian Americans, etc.). Awareness of cultural issues pertaining to the U.S. may better prepare American youth for the "multinational" realm. Genshaft's statements somewhat parallel Vadeboncoeur's (1998) emancipatory knowledge model. Vadeboncoeur's (1998) model builds on interviews with students involved in a teacher training program. This approach suggests three interconnected circles of knowledge construction (i.e., "Self"; "Other People"; and the "Environment") and summarizes the importance of cultural differences in educational settings.

Vadeboncoeur (1998) concedes that in an educational context, it is critical for teachers or instructors or administrators to have an understanding of their own selves before they can pretend understanding their students'. In a nutshell, knowledge of self is a prerequisite of knowledge of other people as well as knowledge of the social, cultural, political, and historical dimensions of the environment. Knowledge of self is a central element in critical thinking.

When online marketing strategies or information and communication technologies ignore the social, cultural, political, and historical exigencies of students, they keep the University away from its noble educational missions of teaching and research. Recruiting and retaining minorities off- and online is a delicate endeavor. An online approach to recruiting and retaining women and students of color in STEM majors imposes upon educators the responsibility to develop Web pages that include vital, well-presented information about specific academic services and educational opportunities designed to

support non-traditional pre-engineering students in the process of adjusting to college life. The online climate reflected on the USF and UF Colleges of Engineering's respective Websites is a significant factor in attracting historically underrepresented groups into these colleges. Recruitment and retention of women and racial and ethnic minority students in the USF and UF Civil Engineering Departments intersect deeper social, cultural, political, and historical issues that the Websites of these two institutions cannot silence.

## REFERENCES

- Abrahamson, T.  
2000 Life and death on the Internet: To Web or not to Web is no Longer the Question. *The Journal of College Admissions* 68:6-11.
- Accreditation Board of Engineering and Technology  
2009 Criteria for Accrediting Post-secondary Education Programs in Applied Science, Computing, Engineering, and Technology.  
<http://clte.asu.edu/active/ABET%20Student%20Outcomes.pdf>, accessed November 16, 2009.
- Adair, Vivyan C., and Sandra L. Dahlberg, eds.  
2003 *Reclaiming Class: Women, Poverty, and the Promise of Higher Education in America*. Philadelphia: Temple University Press.
- Adair, Vivyan C., ed.  
2003 Disciplined and Punished: Poor Women, Bodily Inscription, and Resistance through Education. *In Reclaiming Class: Women, Poverty, and the Promise of Higher Education in America*, eds. Vivyan C. Adair and Sandra L. Dahlberg. Pp. 25-52. Philadelphia: Temple University Press.
- Adeli, Hojjat  
2009 Vision for Civil and Environmental Engineering Departments in the 21st Century. *Journal of Professional Issues in Engineering Education and Practice* 135(1).
- Adler, Mortimer J.  
1977 *Reforming Education*. Boulder: Westview Press.
- Agar, Michael H.  
1996 *The Professional Stranger: an Informal Introduction to Ethnography*. New York: Academic Press.
- Albert, Jane  
2000 Symposium for the Marketing of Higher Education November 5-8. Pp.51-57. Baltimore, MD.
- Allison, Clinton B.  
1995 *Present and Past: Essays for Teachers in the History of Education*. New York: P. Lang.

- Angrosino, Michael V.  
2002 *Doing Cultural Anthropology: Projects for Ethnographic Data Collection*. Prospect Heights: Waveland.
- Aschaffenburg, Karen, and Ineke Maas  
1997 *Cultural and Educational Careers: The Dynamics of Social Reproduction*. *American Sociological Review* 62:573-587.
- Association of Computing Machinery. (The)  
2011 *ACM Code of Ethics and Professional Conduct*.
- Astin, Alexander W.  
1984 *Student Involvement: A Developmental Theory of Higher Education*. *Journal of College Student Personnel* 25:297-308.
- Beddows, Emma  
2008 *The Methodological Issues Associated With Internet-Based Research*. *International Journal of Emerging Technologies and Society* 6(2):124-139.
- Bennet, Peter D.  
1995 *Dictionary of Marketing Terms*. Lincolnwood: NTC Business Books.
- Berg, Bruce L.  
2007 *Qualitative Research Methods for the Social Sciences*. Sixth Edition. Long Beach: Pearson.
- Berger, Joseph B., and Jeffrey F. Milem  
1999 *The Role of Student Involvement and Perceptions of Integration in a Causal Model of Student Persistence*. *Research in Higher Education* 40:641-664.
- Bix, Amy Sue  
2004 *From "Engineeresses" to "Girl Engineers" to "Good Engineers": A History of Women's U.S. Engineering Education*. *Feminist Formations* 16(1):27-49.
- Bird, Liz, and Jessica Barber  
2007 *Doing Cultural Anthropology: Projects for Ethnographic Data Collection*. Long Grove: Waveland Press.
- Blackburn, R., S. Wenzel, and J. P. Bieber  
1994 *Minority vs. Majority Faculty Publication Performance: A Research Note*. *Review of Higher Education* 17:217-282.
- Bogdan, R. C. and Biklen, S. K.  
2003 *Qualitative Research for Education: An Introduction to Theories and Methods*. New York: Allyn and Bacon.

- Borman, Kathryn M., and Nancy P. Greenman  
1994 *Changing American Education: Recapturing the Past or Inventing the Future?* New York: SUNY.
- Borman, Kathryn M., Bridget Cotner, M. Yvette Baber, Theodore Boydston, William Katzenmeyer, Gladis Kersaint, Jeffrey Kromrey, Reginald Lee, and Kazawaki Uekawa  
2004 Rhetoric versus Reality in Educational Reform: The Case of the National Science Foundation's Urban Systemic Initiative. *Journal of Educational Change* 5:249-266.
- Borman, Kathryn M., and Sherman Dorn  
2007 *Education reform in Florida: Diversity and Equity in Public Policy*. New York: SUNY.
- Borman, Kathryn, Will Tyson, and Rhoda Halperin, eds.  
2010 *Becoming an Engineer: STEM Pathways for Women and Minorities*. New York: Palgrave Macmillan.
- Bourdieu, Pierre  
1974 The School as a Conservative Force. *In* J. Eggleston, ed. *Contemporary Research in the Sociology of Education*. London: Methuen.
- Bourdieu, Pierre  
1977 Cultural Reproduction and Social Reproduction. *In* J. Karabel and A. H. Halsey, eds. *Power and Ideology in Education*. Oxford: Oxford University Press.
- Bourdieu, Pierre  
1984 *Distinction: A Social Critique of the Judgment of Taste*. London: Routledge.
- Bourdieu, Pierre, and Passeron, Jean-Claude  
1990 *Reproduction in Education, Society and Culture*. Newbury Park: Sage.
- Brainard, Suzanne G., and Linda Carlin  
1998 A Six Year Longitudinal Study of Undergraduate Women in Engineering and Science. *Journal of Engineering Education*, N.p.
- Brainard, S., S.S. Metz, and G. Gillmore  
1999 National WEPAN Pilot Climate Survey: Exploring the Environment for Undergraduate Engineering Students. *Proceedings of the 1999 IEEE/ISTAS Conference on Women and Technology: Historical and Professional Perspectives*.

- Braxton, John M.  
2000 *Reworking the Student Departure Puzzle*. Nashville: Vanderbilt University Press.
- Breen, R, R. Lindsay, A. Jenkins, and P. Smith,  
2001 The role of Information and Communication Technologies in a University Learning Environment. *Studies in Higher Education* 26 (1):95-114.
- Brotcorne, P.  
2005 'Making Sense of the Internet: Exploring Students' Use of Internet-Based Information Resources in University'. Paper presented at the British Educational Research Association Annual Conference, University of Glamorgan, September 14-17.
- Calabrese, Barton A.  
1998 Teaching Science with Homeless Children: Pedagogy, Representation, and Identity. *Journal of Research in Science* 35(4):379-394.
- Cammarota, Julio, and Augustine Romero  
2011 Participatory Action Research for High School Students: Transforming Policy, Practice, and the Personal with Social Justice Education. *Educational Policy* 25(3):488-506.
- Camara, Babacar  
2008 *Marxist Theory, Black/African Specificities, and Racism*. Lanham: Lexington Books.
- Campbell, George, Ronnie Denes, and Catherine Morrison  
2000 *Access Denied: Race, Ethnicity, and the Scientific Enterprise*. Oxford: Oxford University Press.
- Carter, Dorinda J.  
2008 Achievement as Resistance: The Development of a Critical Race Achievement Ideology Among Black Achievers. *Harvard Educational Review* 78(3):1-22.
- Carter, Robert T., and A. Lin Goodwin  
1994 Racial Identity and Education. *Review of Research in Education* 20:291-336.
- Castenell, Jr. Louis A., and William F. Pinar  
1944 Understanding Curriculum as Racial Text: Representation of Identity and Difference in Education. Albany: SUNY.
- Cheung, W., and Huang, W.  
2005 'Proposing a Framework to Assess Internet Usage in University Education'. *British Journal of Educational Technology* 36 (2):237-253.

- Cobb-Roberts, Deidre, and Barbara Shircliffe  
 2007 The Legacy of Desegregation in Florida. *In* Education reform in Florida: Diversity and Equity in Public Policy. Kathryn M. Borman and Sherman Dorn, eds. Pp. 19-51. New York: SUNY.
- Cole, S., and E. Barber  
 2003 Increasing Faculty Diversity: The Occupational Choices of High-Achieving Minority Students. Cambridge: Harvard University Press.
- Coleman, E. Gabriella  
 2010 Ethnographic Approaches to Digital Media. *Annual Review of Anthropology* 39:1-19.
- Commission on Professionals in Science and Technology  
 2006 STEM Workforce Data Project. September 11. Washington, D.C.
- Cook, Anthony, ed.  
 2009 The Roots of Attrition. *In* How to Recruit and Retain Higher Education Students: A Handbook of Good Practice. Anthony Cook and Brian S. Rushton, eds. Pp. 1-12. New York: Taylor & Francis.
- Cook, Anthony and Brian S. Rushton, eds.  
 2009 How to Recruit and Retain Higher Education Students: A Handbook of Good Practice. New York: Taylor & Francis.
- Cotner, Briget A., Cassandra Workman Whaler, Will Tyson  
 2010 Producing STEM Graduates in Florida: Understanding the Florida Context. *In* Becoming an Engineer in Public Universities. Kathryn M. Borman, Will Tyson, and Rhoda H. Halperin, eds. Pp. 21-51. New York: Palgrave Macmillian.
- Council for Higher Education Accreditation  
 2009 Science & Engineering Program Accreditation  
<http://www.chea.org/Directories/regional.asp>, accessed January 16, 2009.
- Crosling, Glenda, Liz Thomas, and Margaret Heagney  
 2008 Improving Student Retention in Higher Education: the Role of Teaching and Learning. New York: Routledge.
- Cross, Susan E., Niki V. Vick  
 2001 The Interdependent Self-Construal and Social Support: the Case of Persistence in Engineering. *Personality & Social Psychology Bulletin*. 27:820-832.

Crowley, Sue, Deena Fuller, Wendy Law, Denise McKeon, Julio J. Ramirez, Keith A. Trujillo, and Eileen Widerman

2004 Improving the Climate in Research and Scientific training environments for Members of Underrepresented minorities. *The Neuroscientist* 10:26-30.

Cushner, Kenneth, Averil McLelland, and Philip Safford

1992 *Human Diversity in Education: An Integrative Approach*. New York: McGraw-Hill.

Davis, Judy

2000 *A Guide to Web Marketing: Successful Promotion on the Net*, Dover: Kogan Page.

Denzin, Norman K., and Lincoln, Yvonna S., eds.

1994 Introduction: Entering the Field of Qualitative Research. In Norman K. Denzin and Yvonna S. Lincoln, eds. *Handbook of Qualitative Research*. Pp. 1-17. Thousand Oaks: Sage Publications.

Department of Education (U.S.)

2007 *Federal Register*/Vol. 72, No. 202 / Friday, October 19/Notices.

DeVillar, Robert A., Christian Faltis, and Jim Cummins

1994 *Cultural Diversity in Schools: From Rhetoric to Practice*. Albany: State University of New York.

Diamond, Jared

2009 *Race without color*. In *Applying Cultural Anthropology: An Introductory Reader*. Aaron Podolefsky, Peter J. Brown, and Scott M. Lacy. Eight Edition. Pp.75-80. New York: McGraw-Hill.

Dillon, Sam

2005 Harvard Chief Defends His Talk on Women. *The New York Times*. January 18.

DiMaggio, Paul, Eszter Hargittai, W. Russell Neuman, and John P. Robinson

2001 Social implications of the Internet. *Annual Review of Sociology* 27:307-336.

DuBois, W.E.B

1982 *The Souls of Black Folks*. New York: Bantam.

Durkin, Glen C.

1975 Engineering-A 'Weird' Career for Women? *Penn State Engineer* January, 19.

- Ek, Lucila D.  
2009 "It's Different Lives": A Guatemalan American Adolescent's Construction of Ethnic and Gender Identities across Educational Contexts. *Anthropology and Education Quarterly* 40(4):405-420.
- Erickson, Frederick  
1987 Transformation and School Success: The Politics and Culture of Educational Achievement. *Anthropology and Education Quarterly* 18:335-356.
- Erickson, Paul A., and Liam D. Murphy  
2006 *Readings for a History of Anthropological Theory*. 2<sup>nd</sup> ed., Peterborough, Ontario, Canada: Broadview Press.
- Essed, Philomena  
1991 *Understanding Everyday Racism: An Interdisciplinary Theory*. Newbury Park: Sage.
- Essed, Philomena  
1994 Contradictory Positions, Ambivalent Perceptions: A Case Study of a Black Woman Entrepreneur. *In Shifting Identities Shifting Racisms: A Feminism and Psychology Reader*. Kum-Kum Bhavnani and Ann Phoenix, eds. Pp. 99-118. Thousand Oaks: Sage.
- Federal Register. (November 30, 1978) Protection of Human Subjects: Institutional Review Boards, 943 FR 56174.
- Fisher, Anthony D.  
1998 Anthropology and Education in Canada, the Early Years (1850-1970). *Anthropology and Education Quarterly* 29(1):89-102.
- Flores-Gonzalez, Nilda  
2002 *Kids/Street Kids: Identity Development in Latino Students*. New York: Teachers College Press.
- Florida Engineer. (The)  
2009 Truth Be Told. Vol 94:20-27. Spring Issue. The University of Florida.
- Florida: Magazine of the Gator Nation  
2009 Integration Champion. p.30. Fall Issue. The University of Florida.
- Florida Board of Governors  
2011 About State University System.  
<http://www.flbog.org/aboutsus/universities/usf.php>, accessed October 12, 2011.

- Florida Board of Governors  
2011 Undergraduate Enrollments.  
[http://www.flbog.org/resources/iud/enrollment\\_search.php](http://www.flbog.org/resources/iud/enrollment_search.php), accessed October 12, 2011.
- Foley, Douglas  
2005 Elusive Prey: John Ogbu and the Search for a Grand Theory of Academic Disengagement. *International Journal of Qualitative Studies in Education* 18(5):643-657.
- Foley, Douglas A., Bradley A. Levinson, and Janise Hurtig  
2001 Anthropology Goes Inside: The New Educational Ethnography of Ethnicity and Gender. *Review of Research in Education* 25:37-98.
- Fordham, Signithia  
1999 "Dissin" "the Standard": Ebonics as Guerilla Warfare at Capital High. *Anthropology & Education Quarterly* 30(3):272-293.
- Fordham, Signithia  
2008 Beyond Capital High: On Dual Citizenship and the Strange Career of "Acting White". *Anthropology & Education Quarterly* 39(3):227-246.
- Foster, Lenoar  
2001 The Not-so-invisible Professors: White Faculty at the Black College. *Urban Education* 36(5):611-629.
- Freire, Paulo  
1985 *The Politics of Education*. South Hadley: Bergin & Garvey.
- Freire, Paulo  
2009 From Pedagogy of the Oppressed. *In The Critical Pedagogy Reader*. Second Edition. Antonia Darder, Marta P. Baltodano, and Rodolfo D. Torres, eds. Pp. 52-60. New York: Routledge.
- Fuhrman, Susan, David K. Cohen, and Fritz Mosher  
2007 *The State of Education Policy Research*. Malwah: Lawrence Erlbaum Associates.
- Fuligni, Andrew J.  
2007 *Contesting Stereotypes and Creating Identities: Social Categories, Social Identities, and Educational Participation*. New York: Russell Sage Foundation.
- Fullinwider, Robert K., Judith Lichtenberg  
2004 *Leveling the Playing Field: Justice, Politics, and College Admissions*. Lanham: Rowman & Littlefield.

- Gershenvorn, Jerry  
2004 *Melville J. Herskovits and the Racial Politics of Knowledge*. Lincoln, NE: University of Nebraska Press.
- Gibb, Camilla  
2006. Deterritorialized people in Hyberspace: Creating and Debating Harari Identity Over the Internet. *In* *Native on the Net: Indigenous and Diasporic Peoples in the Virtual Age*. Kyra Landzelius, eds. Pp. 169-185. New York: Routledge.
- Giroux, Henry A.  
2001 *Theory and Resistance in Education: Towards a Pedagogy for the Opposition*. Wesport: Bergin & Garvey.
- Giroux, Henry A.  
2009 *Critical Theory and Educational Practice*. *In* *The Critical Pedagogy Reader*. Second Edition. Antonia Darder, Marta P. Baltodano, and Rodolfo D. Torres, eds. Pp. 27-51. New York: Routledge.
- Gladieux, L., and W.S. Swail  
1999 *The Virtual University and Educational Opportunity: Issues of Equity and Access for the Next Generation*. Washington, D.C.: College Board.
- González, Jennifer  
2000 *The Appended Subject: Race and Identity as Digital Assemblage*. *In* *Race in Cyberspace*. Beth E. Kolko, Lisa Nakamura, and Gilbert B. Rodman, eds. Pp. 27-50. New York: Routledge.
- González, Norma  
2004 *Disciplining the Discipline: Anthropology and the Pursuit of Quality Education*. *Educational Researcher* 33:17-25.
- González, Norma, Luis C. Moll, and Cathy Amanti  
2005 *Theorizing Practices in Households, Communities, and Classrooms*. Mahwah: Erlbaum.
- Gould, Stephen J.  
1996 *The Mismeasure of Man*. New York: Norton.
- Gradebook Blog  
2011 *Disparities in Internet Access*.  
<http://www.tampabay.com/blogs/gradebook/>, accessed October 10, 2011.

- Griffin, Oris T.  
1992 The Impacts of Academic and Social Integration for Black Students in Higher Education. *In Strategies for Retaining Minority Students in Higher Education*, eds. Marvel Lang and Clinita A. Ford. Pp.25-44. Springfield: Charles C. Thomas.
- Guliana, Barbara A.  
2000 Symposium for the Marketing of Higher Education. November 5-8. Pp.77-85. Baltimore, MD.
- Hachigian, D., and Hallahan, K.  
2003 Perceptions of Public Relations Web Sites by Computer Industry Journalists. *Public Relations Review* 29:43-62.
- Hakken, David  
1999 *Cyborgs. Cyberspace?: An Ethnographer Looks to the Future..* New York: Routledge.
- Hall, Kathleen  
1999 Understanding Educational Processes in an Era of Globalization: The View from Anthropology and Cultural Studies. *In Issues in Educational Research*. E. Lagemann and L. Shulman, eds. San Francisco: Jossey Bass.
- Hanson, Sandra L.  
2007 Success in Science Among Young African American Women: the Role of Minority Families. *Journal of Family Issues* 28:3-32.
- Harper, Shaun R., and anthony lising antonio, eds.  
2008 Not By Accident: Intentionality in Diversity, Learning, and Engagement. *In Creating Inclusive Campus Environments for Cross-Cultural Learning and Student Engagement*, ed. Shaun R. Harper. Pp.1-18. National Association of Student Personnel Administrators (NASPA).
- Harris, Marvin  
2001 *The Rise of Anthropological Theory: A History of Theories of Culture.* Updated Edition. Lanham: Altamira.
- Harris, Thomas E.  
1993 Analysis of the Clash Over the Issues Between Booker T. Washington and W.E.B. DuBois, New York, NY: Garland Publishing.
- Harrison, Barbara  
2001 Shifting Sands: Reflections from the Field of Higher Education. *Anthropology & Education Quarterly* 32(4):493-501.

- Heat, Shirley Brice  
1983 What No Bedtime Story Means: Narrative Skills at Home and School. *Language in Society* 11(1):49-76.
- Henley, Barbara, Theresa Powell, and Lillian Poats  
1992 Achieving Cultural Diversity: Meeting the Challenges. *In Diversity, Disunity, and Campus Community*, ed. Melvin C. Terrell. Pp.2-29. National Association of Student Personnel Administrators (NASPA).
- Henwood, Karen L.  
1994 Resisting Racism and Sexism in Academic Psychology: A Personal/Political View. *In Shifting Identities Shifting Racisms: A Feminism and Psychology Reader*. Kum-Kum Bhavnani and Ann Phoenix, eds. Pp. 41-80. Thousand Oaks: Sage.
- Herskovits, Melville J.  
1958 *Acculturation: The Study of Culture Contact*. Gloucester: Peter Smith.
- Heyman, Josiah McC.  
2003 The Inverse of Power. *Anthropological Theory* 3(2):139-156.
- Hill, Susan T.,  
2000 Science and Engineering Degrees, by Race/Ethnicity of Recipients. NSF 02-329.
- Hobson-Horton, Lisa D., and Lula Owens  
2004 From Freshman to Graduate: Recruiting and Retaining Minority Students. *Journal of Hispanic Higher Education* 3:86.
- Hodgkinson, H. L.  
1985 *All One System: Demographics of Education, Kindergarten through Graduate School*, Washington, D.C.: Institute for Educational Leadership.
- Holland, Dorothy C., and Margaret A. Eisenhart  
1990 *Educated in Romance: Women, Achievement, and College Culture*. Chicago: The University of Chicago Press.
- hooks, bell  
2009 *Confronting Class in the Classroom*. *In The Critical Pedagogy Reader*. Second Edition. Antonia Darder, Marta P. Baltodano, and Rodolfo D. Torres, eds. Pp. 135-141. New York: Routledge.
- Hunt, Robert C.  
2007 *Beyond Relativism: Rethinking Comparability in Cultural Anthropology*. Lanham: Altamira.

- Hurtado, Sylvia, Walter Allen, Jeffrey Milem, and Alma Clayton-Pedersen  
1998 Enhancing Campus Climates for Racial/Ethnic Diversity. *Educational Policy and Practice in Review of Higher Education* 21(3):279-302.
- Illingworth, Nicola  
2001 The Internet Matters: Exploring the Use of the Internet as a Research Tool. *Sociological Research Online* 6(2).
- Jackson, Antoinette T.  
2011 Shattering Slave Life Portrayals: Uncovering Subjugated Knowledge in U.S. Plantation Sites in South Carolina and Florida. *American Anthropologist* 113(3):448-462.
- Jackson, Shirley Ann  
2002 "The Quiet Crisis: Falling Short in Producing American Scientific and Technical Talent". *Building Engineering and Science Talent*. Best Report.
- Jaeger, Audrey J., and Courtney H. Thornton  
2006 Institutional Culture and Civic Responsibility: An Ethnographic Study. *Journal College Student Development* 47(1):52-68.
- Jermier, John M., David Knights, and Walter R. Nord  
1994 *Resistance and Power in Organizations*. New York: Routledge.
- Jones, Steven  
1995 *Cybersociety: Computer-Mediated Communication and Society*. Thousand Oaks: Sage.
- Jones, Susan R., Vasti Torres, and Jan Arminio  
2006 *Negotiating the Complexities of Qualitative Research in Higher Education: Fundamental Elements and Issues*. New York: Routledge.
- Jones, S.  
2002 *The Internet Goes to College*. Washington D.C.: Pew Internet and American Life Project.
- Jones, Wayne A.  
2007 Living With a Majority-Minority Mindset. *Diverse Issues in Higher Education*. 24(15):29.
- Journal of Blacks in Higher Education. (The)  
2003 Blacks Strive to Build a Bridgehead in Academic Engineering. 41:98-108.

- Kaenzig, Lisa  
2011 STEM Success: the talent process of successful academic Women Scientists at elite research universities in New York State. Paper Presented at the Annual Meeting of the American Educational Research Association, New Orleans, April 8-12.
- Kang, Seok, Hanna E. Norton  
2006 Colleges and Universities' Use of the World Wide Web: A Public Relations Tool for the Digital Age. *Public Relations Review* 32:426-428.
- Kanter, Rosabeth Moss  
1993 *Men and Women of the Corporation*. New York: Basic Books.
- Kent, Michael L., and Maureen Taylor  
1998 Building a Dialogic Relationship Through the World Wide Web. *Public Relations Review* 24:321-340.
- Kent, Michael L., and Maureen Taylor  
2002 Toward a Dialogic Theory of Public Relations. *Public Relations Review* 28:21-37.
- Kingston, Paul W.  
2001 The Unfulfilled Promise of Cultural Capital Theory. *Sociology of Education* 74:88-99.
- Kirby, Justin, and Paul Marsden  
2006 *Connected Marketing: The Viral, Buzz and Word of Mouth*. 1<sup>st</sup> Edition. Oxford: Butterworth- Heinemann.
- Kolko, Beth E., Lisa Nakamura, and Gilbert B. Rodman, eds.  
2000 *Race in Cyberspace* New York: Routledge.
- Krueger, Richard A.  
1988 *Focus Groups: A Practical Guide for Applied Research*. Newbury Park: Sage Publications.
- Lang, Marvel, and Clinita A. Ford, eds.  
1992 *Strategies for Retaining Minority Students in Higher Education*. Springfield: Charles C. Thomas.
- Lavenda, Robert H., and Emily A. Schultz  
2010 *Core Concepts in Cultural Anthropology*. Fourth Edition. New York: McGraw-Hill.

- LeCompte, Margaret D, and Jean J. Schensul, eds.  
1999 *Ethnographer's Toolkit*, vol 5 *Analyzing and Interpreting Ethnographic data*. Walnut Creek: Altamira.
- LeCompte, Margaret D, Jean J. Schensul, Margaret R. Weeks, and Merrill Singer, eds.  
1999 *Ethnographer's Toolkit*, vol 6: *Researcher Roles and Research Partnerships*. Walnut Creek: Altamira.
- Lee, Okhee  
1999 Equity Implication Based on the Conceptions of Science Achievement in Major Reform Documents. *Review of Educational Research* 69(1):85-115.
- Levinson, Bradley, Douglas Foley, and Dorothy C. Holland  
1996 *The Cultural Production of the Educated Person: Critical Ethnographies of Schooling and Local Practice*. Albany: SUNY.
- Levinson, Bradley A. U., Margaret Sutton, and Teresa Winstead  
2009 Education Policy as a Practice of Power: Theoretical Tools, Ethnographic Methods, Democratic Options. *Educational Policy* 23(6):767-795.
- Luhrmann, T. M.  
2006 Subjectivity. *Anthropological Theory* 6(3):345-361.
- Markham, Annette N.  
1998 *Life Online: Researching Real Experience in Virtual Space*. Walnut Creek: Altamira.
- Maringe, Felix, and Paul Gibbs  
2009 *Marketing Higher Education: Theory and Practice*. New York: McGraw Hill.
- MatchCollege.com  
2011 *Facts About Florida Colleges and Universities*.  
<http://www.matchcollege.com>, accessed October 15, 2011.
- May, Gary S., and Daryl E. Chubin  
2003 A Retrospective on Undergraduate Engineering Success for Underrepresented Minority Students. *Journal of Engineering Education* 1-6.
- McAllister-Spooner, Sheila M., and Taylor, M.  
2007 Community College Web Sites as Tools for Fostering Dialogue. *Public Relations Review* 3:1-3.
- McAllister-Spooner, Sheila M.  
2008 User Perceptions of Dialogic Public Relations Tactics via the Internet. *Public Relations Journal* 2(1):1-18.

- McCarty, Teresa L., and Fred Bia  
2002 Place to Be Navajo: Rough Rock and the Struggle for Self-determination in Indigenous Schooling. Mahwah, N.J.: Lawrence Erlbaum Associates.
- McCarty, Teresa L., Mary Eunice Romero-Little, Ofelia Zepeda  
2008 Indigenous Language Policies in Social Practice: the Case of Navajos. *In* Sustaining Linguistic Diversity: Endangered and Minority Languages and Language Varieties. Kendall A. King et al., eds. Pp. 159-172. Washington, D.C.: Georgetown University Press.
- McConnel Castle, Evangeline  
1993 Minority Student Attrition Research: Higher Education's Challenge for Human Resource Development. *Educational Researcher* 22:24-30.
- McDermott, R. P.  
1987 The Explanation of Minority School Failure, Again. *Anthropology and Education Quarterly* 18:361-364.
- McLaren, Peter  
2009 Critical Pedagogy: A Look at the Major Concepts. *In* The Critical Pedagogy Reader. Second Edition. Antonia Darder, Marta P. Baltodano, and Rodolfo D. Torres, eds. Pp. 61-83. New York: Routledge.
- McMillan, Sally J., and Margaret Morrison  
2006 Coming of age with the Internet: a qualitative exploration of how the Internet has become an integral part of young people's lives. *New Media & Society* 1:73-95.
- Mechitove, Alex, Helen M. Moshkovich, and R. Taylor  
2001 Comparative Analysis of Academic Web Sites. Retrieved October 1, 2005, from ProQuest database.
- Medina, Catherine, and Gaye Luna  
2000 Narratives from Latina Professors in Higher Education. *Anthropology & Education Quarterly* 31(1):47-66.
- Messing, Jacqueline  
2005 Social Reconstructions of Schooling: Teacher Evaluations of What They Learned From Participation in the Funds of Knowledge Project. *In* Theorizing Practices in Households, Communities, and Classrooms. Norma González, Luis C. Moll, and Cathy Amanti, eds. Pp.183-194. Mahwah: Erlbaum.
- Metzger, L. Paul  
1971 American Sociology and Black Assimilation: Conflicting Perspectives. *The American Journal of Sociology* 76(4):627-647

- Moll, Luis C., ed.  
2005 Reflections and Possibilities. *In* Theorizing Practices in Households, Communities, and Classrooms. Norma González, Luis C. Moll, and Cathy Amanti, eds. Pp.275-287. Mahwah: Erlbaum.
- Morehouse, Lateefa  
2005 Western Philosophy. *The Oracle*, March 11.
- Moore, Jamillah  
2005 Race and College Admissions: A Case for Affirmative Action. Jefferson: McFarland & Co.
- Morris, Jerome E., and Carla R. Monroe  
2009 Why Study the U.S. South? The Nexus of Race and Place in Investigating Black Student Achievement. *Educational Researcher* 38:21-36.
- Morris, V. G., and C. L. Morris  
2002 The price They Paid: Desegregation in an African American Community. New York: Teachers College Press.
- Morrow, Raymond Allen, and Carlos Alberto Torres  
1995 Social Theory and Education: A Critique of Theories of Social and Cultural Reproduction. Albany: SUNY.
- Moxley, David, Anwar Najor-Durack, and Cecille Dumbrigue, eds.  
2001 Keeping Students in Higher Education: Successful Practices and Strategies for Retention. London: Kogan Page.
- Nagda, Biren A., Sandra R. Gregerman, John Jonides, William von Hippel, and Jennifer S. Lerner  
1998 Undergraduate Student-Faculty Research Partnerships Affect Student Retention. *The Review of Higher Education* 22(1):55-72.
- Nakamura, Lisa  
2002 Cybertypes: Race, Ethnicity, and Identity on the Internet. New York: Routledge.
- National Action Council for Minorities in Engineering  
2008 Confronting the “New” American Dilemma. *Underrepresented Minorities in Engineering: A Data-Based Look at Diversity* by Lisa M. Frehill, Nicole M. Di Fabio, Susan T. Hill. White Plains, New York: 2008.
- National Science Board  
2010 Science and Engineering Indicators 2010. Arlington, VA: National Science Foundation (NSB 10-01).

National Science Foundation

2002 Division of Science Resources Statistics, Science and Engineering Degrees,  
by Race/Ethnicity of Recipients: 1991-2002, NSF 02-329,  
by Susan T. Hill. Arlington, VA.

Nelson, Donna J., and Diana C. Rogers

2005 A National Analysis of Diversity in Science and Engineering Faculties at  
Research Universities. Report.

Nelson, Donna J., and Christopher Brammer

2010 A National Analysis of Diversity in Science and Engineering Faculties at  
Research Universities. Report.

Nelson, Donna J., and Diana C. Rogers

2004 A National Analysis of Diversity in Science and Engineering Faculties at  
Research Universities. Report.

Nicovich, Stef, and T. Bettina Cornwell

2001 An Internet Culture?: Implications for Marketing. *In* Internet Marketing:  
Readings and Online Resources, eds. Paul Richardson. Pp.147-158. New  
York: McGraw-Hill

Nieto, Sonia

2005 Public Education in the Twentieth Century and Beyond: High Hopes, Broken  
Promises, and an Uncertain future. *Harvard Educational Review* 75(1).

Oakes, Jeannie

1990 Opportunities, Achievement, and Choice: Women and Minority Students in  
Science and Mathematics. *Review of Research in Education* 16:153-222.

Ogan, Christine L., Muzaffer Ozakca, and Jacob Groshek

2008 Embedding the Internet in the Lives of College Students: Online and Offline  
Behavior. *Social Science Computer Review* 26:170-177.

Ogbu, John

1987 Variability in Minority School Performance: A Problem in Search of an  
Explanation. *Anthropology and Education Quarterly* 18:312-334.

Ogbu, John

2003 Black American Students in an Affluent Suburb: A Study of Academic  
Disengagement. Mahwah: Lawrence Erlbaum Associates, Inc.

Ogilvie, Marilyn B.

1986 Women in Science. Cambridge: MIT Press.

- Oldenziel, Ruth  
 2000 Multiple Entry Visas: Gender and Engineering in the U.S., 1879–1945. *In* Crossing Boundaries, Building Bridges: Comparing the History of Women Engineers, 1870s–1990s eds. Annie Canel, Ruth Oldenziel, and Karin Zachmann, 11–50. Harwood Academic Publishers.
- Opfer, V. Darleen  
 2001 Beyond Self-Interest: Educational Interest Groups and Congressional Influence. *Educational Policy* 15(1):135-152.
- Ortner, Sherry B.  
 2005 Subjectivity and Cultural Critique. *Anthropological Theory* 5(1):31-52.
- Pink, Sarah  
 2001 Doing Visual Ethnography: Images, Media, and Representation in Research. Thousand Oaks: Sage.
- Podolefsky, Aaron, Peter J. Brown, and Scott M. Lacy, eds.  
 2009 Applying Cultural Anthropology: An Introductory Reader. Eighth Edition. New York: McGraw-Hill.
- Porter, Michael E., and Debra van Opstal  
 2001 U.S. Competitiveness 2001: Strengths, Vulnerabilities, and Long-Term Priorities. Washington D.C.: Council on Competitiveness
- Provenzo Jr., Eugene F.  
 2002 DuBois On Education. Lanham: Altamira.
- Quigley, B. Allan  
 1990 Hidden Logic: Reproduction and Resistance in Adult Literacy and Adult Basic Education. *Adult Education Quarterly* 40:103-115.
- Ratkiewicz, Jacob, Michael Conover, Mark Meiss, Bruno Gonçalves, Snehal Patil, Alessandro Flammini, Filippo Menczer.  
 2010 Detecting and Tracking the Spread of Astroturf Memes in Microblog Streams.
- Recruitment and Retention in Higher Education. vol. 20 No 7, 2006.
- Richardson, Paul, ed.  
 2001 Internet Marketing: Readings and Online Resources. New York: McGraw-Hill
- Robinson, Michael, and Cleborne D. Maddux  
 1999 What do Secondary Science and Mathematics Teachers Know About Engineering? *Bulleting of Science, Technology & Society* 19(5):394-402.

Rogers Hamlen, Bard

1992 The Fenway Retention Consortium Model: Progress to Date and Lessons Learned. *In* Strategies for Retaining Minority Students in Higher Education. Marvel Lang and Clinita A. Ford, eds. Pp. Springfield: Charles C. Thomas.

Sandler, B. R., and R. M. Hall,

1986 The Campus Climate Revisited: Chilly for Women Faculty, Administrators, and Graduate Students. Project on the American Colleges, Washington, DC.

Schoenfeld, Clay, Linda L. Weimer, and Jean Marie Lang

1997 Reaching Out: How Academic Leaders Can Communicate More Effectively with their Constituencies. Madison: Atwood Pub.

Schofield, Janet Ward, and Ann Locke Davidson, eds.

2002 Bringing the Internet to School: Lessons from an Urban District. San Francisco: Jossey-Bass.

Selwyn, Neil

2008 An Investigation of Differences in Undergraduates' Academic Use of the Internet. *Active Learning in Higher Education* 9(1):11-22.

Seymour, Elaine, and Nancy M. Hewitt

1997 Talking About Leaving: Why Undergraduates Leave the Sciences. Boulder: Westview Press.

Shanafelt, Robert

2004 Conservative Critiques of African American Culture. *Anthropological Theory*. 4(1):89-110.

Shircliffe, Barbara

2005 The Best of That World: Historically Black High Schools and the Crisis of Desegregation in a Southern Metropolis. Cresskill: Hampton Press.

Shor, Ira

2009 What is Critical Literacy. *In* The Critical Pedagogy Reader. Second Edition. Antonia Darder, Marta P. Baltodano, and Rodolfo D. Torres, eds. Pp. 282-304. New York: Routledge.

Slater, Don, and Daniel Miller

2000 The Internet: An Ethnographic Approach. New York: Berg.

Slater, R. B.

1993 White Professors at Black Colleges. *Journal of Blacks in Higher Education* 1(1):67-70.

- Slee, Peter, Chris Watts, and Martin Thomas  
2009 'I'll Be There For You': The Impact of Northumbria 'Friends' on Recruitment and Retention. *In* How to Recruit and Retain Higher Education Students: A Handbook of Good Practice. Anthony Cook and Brian S. Rushton, eds. Pp. 144-155. New York: Taylor & Francis.
- Spindler, George, ed.  
2000 Fifty Years of Anthropology and Education 1950-2000. A Spindler Anthology. Mahwah: Erlbaum.
- Spindler, George D., ed.  
1955 Education and Anthropology. Stanford: Stanford University Press.
- Spindler, George, and Louise Spindler  
1987 Cultural Dialogue and Schooling in Schoenhausen and Roseville: a Comparative Analysis. *Anthropology and Education Quarterly* 18(1):3-16.
- St. Jean, Yanick, and Joe R. Feagin  
1998 Double Burden: Black Women and Everyday Racism. Armonk: M.E. Sharpe.
- St. Petersburg Times. Sunday, October 30, 2011.
- Stanley, Christine A.  
2006 Coloring the Academic Landscape: Faculty of Color Breaking the Silence in Predominantly White Colleges and Universities. *American Educational Research Journal* 43(4):701-736.
- Stein, Sandra J.  
2004 The Culture of Education Policy. New York: Teachers College.
- Steinke, Jocelyn  
2004 Science in Cyberspace: Science and Engineering World Wide Web Sites for Girls. *Public Understanding of Science* 13(1):7-30.
- Sterk, Claire E.  
2009 Tricking and Tripping: Fieldwork on Prostitution in the Era of AIDS. *In* Applying Cultural Anthropology: An Introductory Reader. Aaron Podolefsky, Peter J. Brown, and Scott M. Lacy. Eight Edition. Pp. 13-20. New York: McGraw-Hill.
- Stoner, Michael, and Greg Lincoln  
2000 Symposium for the Marketing of Higher Education. November 5-8. Pp.117-119. Baltimore, MD.

- Sullivan, Alice  
2001 Cultural Reproduction and Educational Attainment. *Sociology* 35(4):893-912.
- Swisher, Karen Gayton  
2001 Solid Ground: Comment on 'Shifting Sands: Reflections from the Field of Higher Education. *Anthropology & Education Quarterly* 32(4):502-506.
- Synes, Carol  
1996 Selling Futures: A New Image for Australian Universities? *Studies in Higher Education* 21(2):133-147.
- Taylor, Maureen, Michael L. Kent, and William J. White  
2001 How Activist Organizations are Using the Internet to Build Relationships. *Public Relations Review* 27:263-284.
- Thomas, Jim  
1999 Balancing the Ethical Conundrums of Internet Research – An Existential View from the Trenches. *Iowa Journal of Communications* 31:8-20.
- Thomas, Jim  
1996 Introduction: A Debate about Ethics of Fair Practices for Collecting Data in Cyberspace. *The Information Society* 12:107-117.
- Thompson, Michael D.  
2001 Informal Student-Faculty Interaction: Its Relationship to Educational Gains in Science and Mathematics among Community College Students. *Community College Review* 29:35-56.
- Tinto, Vincent  
1993 *Leaving College: Rethinking the Causes and Cures of Student Attrition*. Chicago: The University of Chicago Press.
- Trouillot, Michel-Rolph  
1995 *Silencing the Past: Power and the Production of History*. Boston: Beacon Press.
- Tschopp, Douglas  
2000 Symposium for the Marketing of Higher Education. November 5-8. Pp.144-146. Baltimore, MD.
- Turner, Caroline S.V., and Samuel L. Myers, Jr.  
2000 *Faculty of Color in Academe: Bittersweet Success*. Boston: Allyn & Bacon.

- Tyson, Will, Chrystal A.S. Smith, and Arland Nguema Ndong.  
2010 To stay or to switch? Why students leave engineering programs. *In*  
Becoming an Engineer in Public Universities. Kathryn M. Borman, Will  
Tyson, and Rhoda H. Halperin, eds. Pp. 53-80. New York: Palgrave  
Macmillian.
- Umbach, Paul D.  
2006 The contribution of faculty of color to undergraduate education.  
Research in Higher Education. 47(3):317-345.
- University of Florida  
2011 Undergraduate Catalog 2011-2012.  
<https://catalog.ufl.edu/ugrad/current/advising/info/declaring-a-major.aspxs>,  
accessed November 3, 2011.
- University of Florida  
2010 Civil Engineering Faculty by Specialization.  
<http://www.ce.ufl.edu/divisionslist1.htm>, accessed October 10, 2010.
- University of Florida  
2011 UF Facts. <http://www.ufl.edu/facts/>, accessed September 10, 2011.
- University of Florida, 1947 Year Book.
- University of South Florida  
2006 The first fifty years: 1956-2006. Tampa: University of South Florida.
- University of South Florida  
2010 Civil Engineering Faculty & Staff.  
<http://www2.eng.usf.edu/cee/facultyAndStaff/facultyAndStaff.htm>  
accessed October 10, 2010.
- University of South Florida  
2011 Undergraduate Catalog 2011-2012.  
<http://www.ugs.usf.edu/pdf/cat1112/08acapol.pdf>,  
accessed November 3, 2011.
- University of South Florida  
2011 USF Info Center. <http://usfweb3.usf.edu>, accessed October 12, 2011.
- University of South Florida  
2011 Pocket Facts. [http://www.usf.edu/pdfs/USF\\_PocketFacts.pdf](http://www.usf.edu/pdfs/USF_PocketFacts.pdf), accessed  
September 10, 2011.

- University of South Florida  
2011 USF Facts 2011. <http://www.usf.edu/brand/messaging/USF-FACTS2011-12.pdf>, accessed September 10, 2011.
- U.S. Census Bureau  
2011 Internet Use in the United States: October 2009.  
<http://www.census.gov/hhes/computer/publications/2009.html>,  
accessed November 3, 2011.
- U.S. Commission on National Security  
2001 Twenty-First Century. Hart-Rudman Commission Phase III. Washington  
D.C.: Department of Defense.
- U.S. Department of Education  
2001 National Center for Education Statistics. Digest of Education Statistics,  
2000, NCES 2001-034, by Thomas D. Snyder and Charlene M. Hoffman.  
Washington, DC.
- U.S. Department of Education  
2011 New Race and Ethnicity Guidelines for the Collection of Federal  
Education Data.  
<http://www2.ed.gov/policy/rschstat/guid/raceethnicity/index.html>,  
accessed September 15, 2011.
- Vadeboncoeur, Jennifer  
1998 Emancipatory Knowledge Construction in Teacher education: Developing  
Critically Conscious Roles through Metaphor and Service Learning. Ann Arbor,  
MI: UMI dissertation Services.
- Valentine, David  
2007 Imagining Transgender: An Ethnography of a Category. Durham: Duke  
University Press.
- Varenne, Hervé  
2008 Culture, Education, Anthropology. *Anthropology and Education Quarterly*  
39(4):356-368.
- Venegas, Kristan M  
2006 Internet Inequalities: Financial Aid, the Internet, and Low-Income Students.  
*American Behavioral Scientist* 49:1652-1669.
- Wallinger, Linda Moody  
1998 What Principals and Students Should Know About Admissions, *NASSP*  
*Bulletin* 82:67-76.

- Ward, Nadia L.  
2006 Improving Equity and Access for Low-income and Minority Youth into Institutions of Higher Education. *Urban Education* 41(1):50-70.
- Warschauer, Mark  
1998 Online Learning in a Sociocultural Context. *Anthropology and Education Quarterly* 29(1):68-88.
- Waskul, Dennis  
1996 Ethics of Online Research: Considerations for the Study of Computer Mediated Forms of Interaction. N.p.
- Weaver-Hightower, Marcus B.  
2008 An Ecology Metaphor for Educational Policy Analysis: A Call to Complexity. *Educational Researcher* 37(3):153-167.
- Wharton, Tim  
2009 *Pragmatics and Non-Verbal Communication*. Leiden: Cambridge University Press.
- White House. (The)  
2011 Office of Management and Budget Federal Regulations Standards. [http://www.whitehouse.gov/omb/fedreg\\_1997standards](http://www.whitehouse.gov/omb/fedreg_1997standards), accessed September 15, 2011.
- Wild, Linda and Larry Ebbers  
2002 Rethinking Student Retention in Community Colleges. *Community College Journal of Research and Practice* 26:503-519.
- Will, Elizabeth M., and Callison, Coy  
2006 Web Presence of Universities: Is higher Education Sending the Right Message Online? *Public Relations Review* 32:180-183.
- Wilson Scott, Karen, and Dana Howell  
2008 Clarifying Analysis and Interpretation in Grounded Theory: Using a Conditional Relationship Guide and Reflective Coding Matrix. *International Journal of Qualitative Methods* 7(2).
- Wilson, Samuel M., and Leighton C. Peterson  
2002 The Anthropology of Online Communities. *Annual Review of Anthropology* 31:449-467.
- Winant, Howard  
2004 *The New Politics of Race: Globalism, Difference, Justice*. Minneapolis: University of Minnesota Press.

- Winthrop, Robert H.  
1991 Dictionary of Concepts in Cultural Anthropology. New York: Greenwood Press.
- Wolcott, Harry F.  
1977 Teachers Versus Technocrats: An Educational Innovation in Anthropological Perspective. Center for Educational Policy and Management, Eugene, Oregon: University of Oregon Press.
- Wolf, Eric R.  
1999 Envisioning Power: Ideologies of Dominance and Crisis. Berkeley: University of California Press.
- Yon, Daniel A.  
2003 Highlights and Overview of the History of Educational Ethnography. Annual Review of Anthropology 32:411-429.
- Yosso, Tara J., Laurence Parker, Daniel G. Solórzano, and Marvin Lynn  
2004 From Jim Crow to Affirmative Action and Back Again: A Critical Race Discussion of Racialized Rationales and Access to Higher Education. Review of Research in Education 28:1-25
- Young, Robert  
1996 Intercultural Communication: Pragmatics, Genealogy, Deconstruction. Bristol: Multilingual Matters.
- Zack, Naomi  
1997 Race/Sex: their Sameness, Difference, and Interplay. New York: Routledge.
- Zinkhan, George M.  
2005 The marketplace, Emerging Technology and Marketing Theory. Marketing Theory 5:105-115.

## APPENDIX A: Student Focus Group Protocol

### STUDENT FOCUS GROUP

#### ENGINEERING INTERESTS/BACKGROUND

1. Please tell me your name and briefly state what it is that attracted you to enroll in the USF/UF Department of Civil Engineering?

#### INTERNET HABITS

2. How has your use of the Internet changed in comparison to before you entered this program? Do you use the Internet more or less often now than you used to when you were in high school?
3. Could you tell me how familiar you are with the Civil Engineering department's website?
4. How would you describe the kinds of information or images posted on the Department of Civil Engineering's website? What does all of that mean to you? [IF "I DON'T KNOW/NOT SURE, ETC.", SKIP TO Q9]

#### WEBSITES AND PROGRAM SELECTION

5. Thinking back to when you first applied to the Civil Engineering department/ College of Engineering at this university, did you search the department/College of Engineering/university Website at least once? [IF "YES", CONTINUE TO Q6? IF "NO", SKIP TO Q10]
6. What kinds of information were you specifically looking for when you searched your department's Website?
7. How important was the Civil Engineering department/College of Engineering Website in providing you the information you needed to apply?
8. What types of Website information helped you most to decide to apply to the [USF/UF] civil engineering program? And in what ways was this information appealing and informative?
9. Is there any specific information that you missed at the time you applied that you would like to see posted on the Civil Engineering department/College of Engineering/university Website now? If so, what is it?

#### WOMEN, MINORITIES AND WEB-BASED INFORMATION

10. Can you tell me a little bit about the representation of women and minority students in the Department of Civil Engineering today?
11. Have you ever seen information or images of women and/or minority students, professors or administrators on the Civil Engineering department's Website? If so, how would you evaluate the representation of these two categories on the Department of Civil Engineering's Website? [IF "I DON'T KNOW/NOT SURE, ETC." SKIP TO Q12]
12. What would you say is the purpose of promoting images of women and minority students, professors or administrators on the Civil Engineering department's Website?

## APPENDIX B: Faculty Interview Protocol

### FACULTY INTERVIEW

#### BACKGROUND

1. Could you briefly describe your position here at USF/UF, please?
2. What specific experiences attracted you to become a civil engineering professor? At what points growing up did these occur? (approximations are fine)

#### WEB-BASED MATERIALS

3. How familiar are you with the Civil Engineering department's Website? [IF "NOT FAMILIAR/NOT SURE, ETC." SKIP TO Q6]
4. Can you briefly tell me about the kinds of information or images posted on the Department of Civil Engineering's Website?
5. What do you think is the primary reason for creating and maintaining a Website for the Department of Civil Engineering? What are other purposes for the departmental Website?
6. What is the ultimate goal of posting information and images on the Civil Engineering Website?

#### WEBSITES AND PROGRAM SELECTION

7. How critical has the Civil Engineering department's Website been in providing undergraduate students with the information they need to apply to the civil engineering program at this university?
8. What type of Web-based materials you think help undergraduate students to decide to apply to the [USF/UF] civil engineering program?

#### WOMEN, MINORITIES RECRUITMENT AND WEB-BASED INFORMATION

9. What is the representation of women and minority undergraduate students in the Department of Civil Engineering in comparison to non-minority undergraduate students?
10. Have you ever seen information or images of women and/or minority students, professors or administrators on the Civil Engineering department's Website? If so, how would you evaluate the representation of these categories on the Department of Civil Engineering's Website? [IF "I DON'T KNOW/NOT SURE, ETC." SKIP TO Q12]
11. What would you say is the purpose of promoting images of women and minority students, professors or administrators on the Civil Engineering department's Website?

## APPENDIX C: Administrator Interview Protocol

### ADMINISTRATOR INTERVIEW

#### BACKGROUND

1. Could you briefly describe your position here at USF/UF, please?
2. What specific experiences attracted you to accept this position?

#### WEB-BASED MATERIALS

3. What is the primary reason for creating and maintaining departmental websites? What are other purposes for the departmental Website?
4. What is the ultimate goal of posting information and images on the Civil Engineering website?

#### WEBSITES AND SCHOOL VALUES

5. What are some of the values or characteristics promoted by this institution?
6. Are these values being reflected on the university/College of Engineering/departmental Website? If so, in what way(s)?
7. Who writes the information posted on the university or College of Engineering or departmental website? Who manages the sites?

#### WOMEN, MINORITIES RECRUITMENT AND WEB-BASED INFORMATION

8. Does the admissions office develop any marketing strategies/tools destined to attract undergraduate students to each department?
9. Do you receive applications from students representing historically underserved populations? What is the representation of women and minority undergraduate students in the Department of Civil Engineering in comparison to non-minority undergraduate students?
10. Has the admissions office ever taken any steps to recruit women and minority undergraduate students? If so, what are they?
11. Has the Web ever been utilized as a tool for recruiting and admitting minority undergraduate students? If so, how has it worked?
12. What would you say is the purpose of promoting images of women and minority students or professors or administrators on the Civil Engineering department's website?