


Spring 2002

# Major Factors That Influence the Employment Decisions of Generation X Consulting Engineers

Robert William Mayfield  
*Old Dominion University*

Follow this and additional works at: [https://digitalcommons.odu.edu/emse\\_etds](https://digitalcommons.odu.edu/emse_etds)

 Part of the [Engineering Commons](#), [Organizational Behavior and Theory Commons](#), and the [Work, Economy and Organizations Commons](#)

## Recommended Citation

Mayfield, Robert W. "Major Factors That Influence the Employment Decisions of Generation X Consulting Engineers" (2002). Master of Science (MS), thesis, Engineering Management, Old Dominion University, DOI: 10.25777/t41p-rd52 [https://digitalcommons.odu.edu/emse\\_etds/102](https://digitalcommons.odu.edu/emse_etds/102)

This Thesis is brought to you for free and open access by the Engineering Management & Systems Engineering at ODU Digital Commons. It has been accepted for inclusion in Engineering Management & Systems Engineering Theses & Dissertations by an authorized administrator of ODU Digital Commons. For more information, please contact [digitalcommons@odu.edu](mailto:digitalcommons@odu.edu).

**MAJOR FACTORS THAT INFLUENCE THE EMPLOYMENT  
DECISIONS OF GENERATION X CONSULTING ENGINEERS**

by

Robert William Mayfield  
B.S. March 1994, The Ohio State University

A Thesis Submitted to the Faculty of Old Dominion University  
in Partial Fulfillment of the Requirement for the Degree of

MASTER OF SCIENCE  
ENGINEERING MANAGEMENT  
OLD DOMINION UNIVERSITY  
May 2002

Approved by:

---

Charles Keating (Director)

---

Paul Kauffmann (Member)

---

Andres Sousa-Poza (Member)

## **ABSTRACT**

### **MAJOR FACTORS THAT INFLUENCE THE EMPLOYMENT DECISIONS OF GENERATION X CONSULTING ENGINEERS**

Robert William Mayfield  
Old Dominion University, 2002  
Director: Dr. Charles Keating

The purpose of this research was to study Generation X consulting engineers (those born between the years 1964 and 1980) in Lynchburg, Virginia, to determine the major factors that influence their employment decisions. Engineering consulting firms throughout the United States, particularly those in Lynchburg, have struggled to recruit young engineers in recent years. The recruiting of young engineers has been regarded by managers and executives as the single greatest challenge to the consulting profession. Despite the consensus within the profession that the problem existed, recommended solutions have been mostly speculative in nature and unsubstantiated by supportive data. This study focused on the perspective from Generation X engineers on recruiting and employment, and examined the key factors that led them to become consulting engineers in Lynchburg.

This study explored the perspective of young engineers through a two-phase sequential mixed method research approach (Creswell, 1994). In Phase One, semi-structured interviews with Generation X engineers were investigated through Grounded Theory analysis (Strauss and Corbin, 1998) to determine major themes; in Phase Two, the major themes were transitioned into a Likert-scale cross-sectional Internet-based survey questionnaire to determine which themes were supported by the quantitative findings. The results were nineteen major themes discovered, seventeen of which were then supported by the survey findings and subsequently identified as major factors that influence employment decisions.

The study contributed to the academic realm a specifically defined two-phase research approach created to investigate the employment decisions of Generation X consulting engineers. The study explained the research methodology and design that was developed to deal with the unique challenges of the research. The study also provided an

in-depth view of the interview data and the coding process, and addressed major concerns of reliability and validity in the two-phase mixed method research effort.

This study's contributions include development of a specific mixed method research approach to study recruiting of Generation X engineers, creation of knowledge that can be used as a foundation for future research, and the identification of factors that influence employment decisions of Generation X engineers that has practical use for improving recruiting techniques used by the consulting engineering profession.

This work is dedicated to my beloved Debbie, who has endured  
this pursuit of knowledge with the patience of a saint:  
And for my parents John and Susan, who from my first steps  
watched over me until I could learn to run.

## ACKNOWLEDGMENTS

When I set out to conduct research for a thesis on Generation X consulting engineers, I thought I had prepared myself for the time and energy commitment that would be required for the study. As I suppose is true with any research effort, I underestimated the work that lay ahead, and I could not have completed it without the support of the Engineering Management Department at Old Dominion University. What was most surprising about the project was the amazing and wonderful development that I went through as a person, a student, and a manager; for that, I thank everyone involved, which includes a long list of participants, managers and executives, peers, family, and mentors.

Through coursework with Dr. Rochelle Young at Old Dominion University, I began to see how psychology and personality play an important role in management systems. I came to realize that the recruiting issues in the consulting profession had not been considered from the perspective of those being recruited. Dr. Young deserves much of the credit for inspiring me to pursue this study.

This research would have been impossible without the support of the faculty of the Engineering Management graduate program at Old Dominion University. The support of these individuals inspired me through many late evenings of research. Dr. Charles Keating deserves special credit for continually pointing me in the right direction and providing me the resources to understand how to perform a quality research project. He helped me to understand the value of earnest research and was indispensable in aiding me to develop an overall format of study, and without his scrutiny of this work I never would have fully appreciated what the term "rigorous research" truly meant. I also want to thank the committee members who supported my research efforts and provided their insight: Dr. Paul Kauffmann and Dr. Andres Sousa-Poza.

Ms. Gerri Dutton in the Engineering Management Department also gets my thanks for her kindness and attention to detail.

## PREFACE

This research study was pursued to help future researchers and engineering recruiters to better grasp the unique challenges involved with young engineers and the employment decisions that they make. The researcher's motivation for selecting and investigating the research problem stemmed from his experiences as a consulting engineer, as a manager of consulting engineers, and as a member of Generation X. As a candidate for employment and later as a manager making hiring decisions, he was allowed to see that the practical understanding of the recruiting problem had two sides: If the candidate knows what he wants why can he not tell the employer? And, how can the employer offer what the candidate wants if the employer does not know what that is? The research study addressed this problem by investigating the perspectives of young consulting engineers in Lynchburg, Virginia, to determine which factors influenced their employment decisions.

The practical significance of this study was two-fold. First and unexpectedly, the data and findings from the study changed how the researcher viewed recruiting and hiring. It also made an immediate impact on how the researcher managed young engineers. A surprising contribution of the research was that it gave the researcher a greater sense of awareness about younger engineers, and this allowed him to generate new ideas about managing work processes and motivating younger engineers to increase their performance levels. The second part of the practical significance was to share the findings and results of the study within the academic arena and the consulting profession so that others might benefit from the discovery of factors that influence Generation X consulting engineers. The qualitative study used in Phase One of the research could be examined by consulting engineering managers to increase their understanding of potential employee candidates and younger employees. The findings from the survey in Phase Two could be incorporated into their recruiting efforts to increase the likelihood of hiring the best possible candidates.

This study was performed to fulfill the requirement of preparing a thesis to earn a master's of science degree in Engineering Management. The researcher carried out this

study without outside financial support and therefore had no pressure to strive for a particular set of findings. Although publication of the thesis or its results was possible, this was not the researcher's prime motivation. Prior to beginning the study, the researcher had already developed an interest in how Generation X engineers impacted the management systems and work processes of consulting firms, and vice versa. In a casual and random fashion, the researcher had already been seeking out articles and data that would seek to explain the interaction between Generation X engineers and the consulting profession. The research effort for this study allowed the researcher to create a narrow focus and to perform investigations into the phenomena that could redefine how consulting firms approached their recruiting difficulties.

The importance of setting off on a new course of research and using a new methodology was especially important because so much of what had been written about improving recruiting for consulting firms had been based on the opinions of senior members of the consulting profession. Age, technology, and cultural differences between generations were often ignored or assumed not to exist. So much focus had been given to discussing the effects of the problem on the consulting industry that few stopped to ask, "Who are these individuals we are trying to recruit, and why can we not appeal to them?"

The researcher has been a consulting engineer, a manager of consulting engineers, and is a member of Generation X. As an engineer who has sought employment with consulting firms, he has watched interviewers struggle to interest him in their company. As a manager, he himself has struggled to attract other engineers to work in the consulting industry. These experiences made him ask the question "What factors influence Generation X engineers when they make employment decisions concerning consulting firms?" The first time he asked this there was no reply, not in his own mind and not from the consulting profession. This research study helped answer that question.



## TABLE OF CONTENTS

	Page
LIST OF TABLES .....	xi
LIST OF FIGURES.....	xii
INTRODUCTION .....	1
THE MAIN RESEARCH QUESTION .....	3
SIGNIFICANCE OF THE STUDY .....	3
DELIMITATIONS, LIMITATIONS, AND OBJECTIVITY .....	5
ETHICAL CONSIDERATIONS.....	12
ORGANIZATION FOR THE REMAINDER OF THE STUDY .....	14
SUMMARY .....	16
REVIEW OF RELATED LITERATURE.....	17
DEFICIENCIES OF PAST LITERATURE .....	17
SCHOLARLY LITERATURE.....	19
PRACTICAL LITERATURE .....	23
ENGINEERING STATISTICS .....	26
SUMMARY .....	27
RESEARCH METHODOLOGY .....	28
LIMITATIONS OF SINGLE PHASE METHODOLOGY .....	28
OVERVIEW OF TWO-PHASE METHODOLOGY .....	32
THE MIXED METHOD RESEARCH APPROACH.....	33
SUMMARY .....	35
RESEARCH DESIGN .....	36
THE SUB-PROBLEMS .....	36
RESEACH PLAN FOR PHASE ONE .....	41
DEVELOPMENT OF SEMI-STRUCTURED INTERVIEW .....	41
DATA CODING AND GROUNDED THEORY .....	46
DEVELOPING MAJOR THEMES.....	48
RESEARCH PLAN FOR PHASE TWO.....	49
DEVELOPMENT OF SURVEY QUESTIONNAIRE .....	50
ADMINISTERING THE SURVEY AND DATA COLLECTION .....	54
INTERPRETING THE SURVEY DATA .....	55
RELIABILITY OF FINDINGS.....	55
SUMMARY .....	58

	Page
RESEARCH RESULTS.....	60
RESEARCH EXECUTION – PHASE ONE.....	60
QUESTIONS FOR SEMI-STRUCTURED INTERVIEW .....	60
OVERVIEW OF THE INTERVIEW .....	62
INTERVIEW WITH GENERATION X CONSULTING ENGINEERS FROM LYNCHBURG, VIRGINIA .....	63
ANALYSIS OF DATA COLLECTED FROM INTERVIEW .....	78
DEFINITION OF MAJOR CODING GROUPS .....	82
DEVELOPMENT AND PRESENTATION OF MAJOR THEMES .....	85
SUMMARY FOR PHASE ONE .....	96
RESEARCH EXECUTION - PHASE TWO.....	97
ADMINISTERING THE SURVEY .....	97
DATA INTERPRETATION .....	99
SUMMARY OF PHASE TWO .....	103
FINDINGS.....	104
SUMMARY OF RESULTS FROM SURVEY QUESTIONNAIRE.....	106
OTHER FINDINGS.....	110
SUMMARY.....	111
CONCLUSIONS.....	113
SUMMARY.....	117
BIBLIOGRAPHY .....	119
GLOSSARY .....	121
APPENDICES	
A. LYNCHBURG AND SURROUNDING AREA STATISTICAL INFORMATION.....	123
B. LIST OF GENERAL QUESTIONS FOR SEMI-STRUCTURED INTERVIEW....	125
C. EXAMPLE OF RANDOMLY COLLECTED CODING NOTES.....	126
D. MAJOR THEMES AND RELATED SURVEY QUESTIONS.....	127
E. QUESTION 20 FROM SURVEY QUESTIONNAIRE.....	132
F. POTENTIAL IMPACT OF STUDY ON ENGINEERING MANAGEMENT PRACTICE IN CONSULTING FIRMS .....	133
VITA.....	139

## LIST OF TABLES

Table	Page
1. Criteria for Research Population .....	38
2. Defining Characteristics of Sample Population Participating in Interviews .....	44
3. Example of Transition from Hypothesis to Survey Question .....	52
4. Characteristics of Sample Population for Survey Questionnaire .....	99
5. Themes Not Supported by Quantitative Data .....	101
6. Major Factors that Influence the Employment Decisions of Generation X Consulting Engineers .....	105
7. Major Themes Not Supported by Quantitative Data .....	106
8. Results From Survey Questionnaire .....	107
9. Ranking of Important Factors That Influenced Generation X Consulting Engineers in Lynchburg, Virginia .....	110
10. Contributions of Research .....	113
11. Question 20 from Survey Questionnaire .....	132

**LIST OF FIGURES**

Figure	Page
1. General Diagram of Mixed Method Research .....	31
2. Detailed Map of Mixed Method Research.....	37
3. Research Design for Qualitative Phase of Study .....	41
4. General Design of Grounded Theory Coding Analysis .....	49
5. Research Design for Quantitative Phase of Study .....	50
6. How Major Themes Were Developed Through Grounded Theory Approach .....	81
7. Major Coding Groups.....	83

## INTRODUCTION

Engineering consulting firms in the United States, particularly those in Lynchburg, Virginia have struggled to recruit young engineers in recent years while high-tech industries have monopolized the talent of the best and brightest young engineers. The recruiting of young engineers has been generally regarded by managers and executives as the single greatest challenge to the consulting profession (Sullivan, 1999; Horwitz, 2000). Despite the consensus in the consulting profession that the problem existed, efforts to find solutions have rarely attempted to focus on the perspective of employment as seen by Generation X engineers. Even those managers who came to realize that understanding what motivates young engineers was the best way to recruit and hire Generation X consulting engineers often lacked the data and findings to do much more than speculate about the problem (Horwitz, 2001). This research study has moved beyond the internal scrutiny of recruiting procedures by consulting firms and towards an understanding of why young engineers make employment decisions by determining the factors that influence those decisions. By better understanding the engineers from Generation X the consulting engineering industry will be better prepared to recruit aging Generation X engineers as well as the engineers that will follow in the NET Generation age demographic (those born 1981-?).

The term "Generation X" was a title of book in 1991 by Douglas Copeland that painted an unflattering picture of Americans born between 1964 and 1980 (Bova and Kroth, 1999). The term was originally used by marketing executives to categorize young Americans for consumer spending purposes. Only recently have businesses begun to scrutinize the activities and interests of Generation X as employees across the country in order to obtain the unique set of talents and skills contained within this group. The consulting industry has been left at a significant disadvantage in recruiting and hiring Generation X engineers because they have not adapted their recruiting methods or management practices to meet the demands and expectations of young engineers. This

---

The reference model for this work is the *MLA Handbook for Writers of Research Papers*.

study was developed with the idea of discovering knowledge that would aid the consulting engineering industry in changing its recruiting practices.

In 1999, a national summit of over a dozen engineering leaders in the consulting profession discussed the problem of recruiting talented engineers and the salary competition with high-tech electronics and management consulting firms, but despite considerable agreement with the effect of the problem, there was no consensus on why the problem existed or how to create solutions (Sullivan, 1999). A 1990 study predicted that the shortage of new technical personnel in the United States between 1990 and 2010 would have a major negative impact on economic growth and competitiveness (Atkinson, 1990). Halfway through the twenty-year period and the consulting engineering profession has continued to bear the brunt of Atkinson's predicted negative impact. Atkinson's concerns were supported by Ruch (2000), who reported that by 2010 the number of employees age 25 to 44 is expected to decrease by 15% from year 2000 levels. These problems are particularly true in the consulting engineering industry, because as long as the profession continues to struggle with recruiting then both short- and long-term problems will remain unresolved. The industry will be unable to utilize young engineers to solve simple problems at low cost, and in the long term the profession will lack the talent and labor necessary to solve the complex challenges associated with the construction industry. Owners of new facilities demand that consulting fees remain stable, yet at the same time are expecting engineers to deal with new responsibilities concerning worker comfort and performance, indoor air quality, high-speed telecommunications, homeland defense, and energy consumption. Successful recruiting of young engineers will be necessary to allow the consulting profession to respond to these demands.

While many opinions and theories existed about the recruiting difficulties within the consulting profession, there has been limited research to identify why the recruiting problem was occurring. In addition, the industry has not developed sufficient research methodology to understand the problem from the perspective of young engineers. Without such research methods, the consulting profession will be unable to accurately relate the recruiting problem to the understanding of the young engineers that it is trying to employ. Therefore, the purpose of the research was to investigate the factors that have

influenced the employment decisions of Generation X consulting engineers in Lynchburg, Virginia, in order to create knowledge for the benefit of the consulting engineering profession. Knowledge, data, analysis, and findings from this research study can be used as a solid fundamental foundation, in lieu of speculative opinions, to better understand what changes must occur within the consulting profession to improve recruiting efforts.

### **The Main Research Question**

The main research question that was investigated through this research study was:

**What characteristics, attributes, and experiences were the influencing factors for Generation X engineers in their decision to choose employment in the consulting engineering profession in Lynchburg, Virginia?**

For the purposes of this research study, Generation X has been defined as individuals born in the United States between 1964 and 1980. The research was focused on members of Generation X who were employed as engineers by consulting engineering and consulting architectural/engineering firms in Lynchburg, Virginia.

### **Significance of the Study**

This research effort was valuable because it broke ground on a very specific topic of study and contributed its discoveries to the general body of academic knowledge. Where no specific research methodology had previously existed to research the problem, this study created a methodology and research design that addressed the particular and unique challenges associated with investigating the perspective of Generation X consulting engineers. Both the newly discovered knowledge and the creation of the research method could be used by future academic researchers and could be easily adapted for practical use in the consulting industry.

### Discovery of Knowledge

The research was intended to create a source of knowledge where none existed before. This discovery of knowledge included information on the perspective of young engineers within the consulting profession, specifically engineers from the Generation X demographic employed in central Virginia. While some previous academic research on the recruiting of young engineers did exist, it had been generalized through the inclusion of a multitude of different types of companies in various industries and covering large geographic areas; therefore, these were not appropriate models to describe the unique problem facing consulting firms in central Virginia.

The contribution of this research to the general body of knowledge was two-fold. By creating a source of knowledge, future researchers would be able to further define and modify the major factors discovered by this study through additional research. Secondly, the results of this research could be shared with consulting firms in central Virginia (and elsewhere) to be used as a tool in their recruiting programs (refer to the Potential Impact of Study on Engineering Management Practice in Consulting Firms in Appendix F).

### Creation of a Focused Research Methodology

This research study contributed to the academic realm a scholarly research methodology that was specifically designed to investigate the problem of identifying factors that influenced the employment decisions of engineers. Prior to this study, no such research methodology existed that was uniquely designed to focus on the problem of recruiting consulting engineers as seen from the engineers' perspective. The research methodology for this study could be used as a model for future research into the employment decisions made by young consulting engineers in geographic areas beyond central Virginia. The research was also undertaken with the assumption that the methodology would be a rigorous first step in developing future investigations to generate theory concerning decisions of engineering professionals relating to career path choices.



## **Delimitations, Limitations, and Objectivity**

During the research design and execution, the researcher was careful to ensure that the research effort was kept in scope and to guard against actions that would weaken the research and limit the results of the study. The following sections discuss how the researcher created a research plan that would prevent errors, omissions, and bias that would weaken the credibility of the research results.

### Delimitations

Delimitations of the research are discussed to show how the scope of the research effort was constrained to the specific research problem. The following is a list of delimitations for the research that defined how the parameters of the study were narrowed in scope:

1. The study's focus was to determine the set of important factors that influenced Generation X engineers in their decision to enter into the consulting engineering profession in Lynchburg, Virginia. It was not possible to determine if all possible factors were identified. The research intended to identify, but not to determine, causal explanations for the important factors.
2. This study was focused on the hiring and recruiting of young engineers, not on retention or improving their work performance.
3. The study was limited to engineers born between 1966 and 1980 and who were employed as consulting engineers in Lynchburg, Virginia, during the time the research was conducted. Although none of the questions were specifically designed to be unique to the consulting engineering population used in the study, the researcher did not attempt to generalize the results of the study to represent any other demographic. The intent of qualitative research used in this study was not intended to generalize the findings to any other population, but to form a unique interpretation of events (Creswell, 1994).

4. The study did not include views from executives, managers, and recruiters who were responsible for hiring young engineers. However, the researcher did use inputs from such individuals to better understand the wants and needs of the consulting profession and to establish the importance of the problem, especially from those who worked in Lynchburg. All data that was used in the analysis was from the sample population that met the criteria guidelines.
5. Data for the qualitative study was collected in tape-recorded interviews with multiple informants. The researcher also took notes during the interview sessions to provide additional information that could not be transmitted through a simple transcription of the tape recording. Each interview tape recording was transcribed verbatim by the researcher for analysis.
6. Data for the quantitative study was collected through a Likert scale cross-sectional survey. The notice to begin the survey was via email sent from the researcher to the intended respondent. The respondents took the survey via the Internet to a secure website maintained by Old Dominion University. A password supplied by the researcher was required to gain access to the survey. The survey results were collected and sorted into a database using Inquisite© software developed by Catapult Systems Corporation.
7. The survey type used in the quantitative analysis was cross-sectional. A longitudinal survey might have reduced any short-term bias that stemmed from a strong hiring cycle that began in the mid-1990s, but such an effort was outside the scope of this research.
8. The purpose of the study was to identify factors that influenced the employment decisions of Generation X engineers that were employed in the consulting engineering profession in Lynchburg, Virginia. The research did not attempt to determine if the identified factors were dependent or independent. "Qualitative research does not entail making statements about relationships between a dependent variable and an independent variable..." (Strauss and Corbin, 1998, p41).

The aforementioned delimitations describe the parameters of the research scope. After the scope was defined, the researcher began to identify areas where the research design and method would specifically address potential weaknesses in the study. These are discussed in the following section.

### Limitations

The classic view of qualitative studies was that they were useful only for exploratory forays and for developing themes, and that strong explanations could only be derived through quantitative studies (Miles and Huberman, 1994). The authors argued that this view was mistaken and that qualitative analysis was a very powerful method for accessing causality because it can identify mechanisms that relate process and outcome in complex networks of events and thereby discover underlying factors that are intrinsically linked to the phenomena being observed and studied. The research perspective taken for this study agreed with Miles and Huberman that qualitative research for the purpose of discovering new ideas and revealing previously unknown processes was a valid approach. Therefore, the qualitative approach was well suited to searching for meaning in the employment decisions of Generation X consulting engineers in Lynchburg, Virginia.

This researcher relied upon qualitative research to identify important factors that influenced the employment decisions of Generation X consulting engineers in Lynchburg and to develop general themes. Quantitative research was used primarily to lend credibility to the themes, with the additional advantage of allowing for the themes to be modified based on any additional knowledge that might be revealed. The researcher did not claim to have fully verified (or refuted) the factors developed in the study through either method. Within the parameters of the study, the researcher attempted to create themes based on a rigorous research design that were worthy of future investigation and recognized that the supporting quantitative data were specifically focused on Lynchburg, Virginia.

The researcher recognized that the change from student to employee was a significant transition for those involved. It would be naïve to believe that the exact mindset of those individuals could be revisited to explain exactly what they were thinking

•

during their job search. During the interviews, the researcher stressed the importance of keeping the dialogue within the context of the job search and tried to focus the mindset of the participants to what they felt and thought during their job search. However, it was impossible to determine if all of the answers given by the respondents were kept within the proper context.

The difficulty in repeating this research study and achieving the exact results should be considered a limitation of the research. The uniqueness of this study within the specific context mitigates against replicating it exactly (Creswell, 1994). However, the researcher has attempted to thoroughly and clearly explain the reasons why the research methods were developed, how research instruments were used, the protocols used for data collection and analysis, and how the research was planned and then executed. Therefore, the research has been made "transparent," so that there is clarity of design and execution to withstand scholarly scrutiny. Additionally, the researcher openly discussed potential for bias as well as the values of the researcher. The coupling of transparency in approach, rigorous design for data collection and analysis, and accountability for interpretation increased the probability of similar interpretations and findings given the opportunity for the study to be replicated by other researchers in other settings.

A limitation of the study was the homogeneous nature of the sample population. Each of the participants was a Caucasian male. However, the affects of using this homogeneous sample was not considered significant because the overwhelming majority of consulting engineers are in fact Caucasian males. It could possibly be argued that the homogeneous make-up of the sample population was particularly representative of the study population for this reason; however, with regard to future recruiting efforts by consulting firms, this limitation should be taken into consideration.

The previous sections concerning delimitations and limitations of the study describe how the research method was designed to allow for a strong and realistic research effort and the recognition that despite the researcher's best efforts, the study could never be completely free from bias. The proceeding section on the importance of objectivity discusses how the researcher planned accountability and design controls for eliminating personal bias from the research in order to obtain a high degree of accuracy in the analysis.

## Objectivity

Objectivity was treated by the researcher as the willingness to consider and evaluate competing alternates on their own merits. One of the goals of the researcher was to reduce subjective bias in the data collection and the analysis. "Objectivity enables the researcher to have confidence that his or her findings are a reasonable, impartial representation of a problem under investigation..." (Strauss and Corbin, 1998, p53). The effort to achieve objectivity was attempted by the following:

1. Inductive logic and Grounded Theory were used to categorize factors that emerged from the interviews, rather than from data or factors being identified a priori (Creswell, 1994).
2. The researcher attempted to listen to participants during data collection and to perform the analysis within the context of the participant's perspectives. The quest to find emerging themes focused on the data generated from the interview, not on existing literature or the researcher's personal experience.
3. The analytic tools used in the research to limit bias included developing open-ended questions prior to the interview, choosing the sample population and an interview format that would allow free exchange of information through open dialogue, and using coding techniques according to Grounded Theory methodology.

Many interpretations of the research problem and qualitative analysis were possible. The researcher's experiences included his initial and subsequent job searches, employment interviews, and the declining and acceptance of job offers. The researcher has had informal or formal job interviews with over a dozen different consulting firms. He has been involved in the recruiting, hiring, and managing of young engineers. All of these experiences, despite the researcher's best intentions, have influenced the analysis. To offset the potential bias of his own experiences and opinions, the researcher organized a research plan, created an analytical approach, and then during the research process occasionally stepped back from the project and made reference checks to limit unwanted personal influence on the data. Because the researcher was aware of how easily that

personal bias could enter into the analysis, analytic tools were strictly used to analyze the data collected from focus group.

On the other hand, the researcher's experience allowed him to have intimate firsthand knowledge of the research problem and its context. According to A. Kaplan (Miles and Huberman, 1994, p144), "Explanations are always open: they depend on certain conditions and are partial, approximate, indeterminate in application to specific cases, and typically limited to specific contexts." In the qualitative portion of the study, the researcher was the main measurement device, so this firsthand knowledge was extremely beneficial. The researcher tried to limit his personal knowledge to framing the research problem and to developing open-ended questions that could lead to free discussions of the phenomena. These were guiding questions that began open-ended and evolved into more specific questions during the interview process (Strauss and Corbin, 1998).

Quantitative methods were used to dispel possible notions that the research was weakened by analytic bias and thereby invalidating the results. The research approach was designed to prevent holistic fallacy (interpreting events as more patterned and congruent than they really are) and elite bias, defined as overweighing data from highly articulate informants while under-representing less-articulate ones (Miles and Huberman, 1994).

The researcher must reasonably assume that the facts and opinions presented to him by the focus group were true. However, if the research had moved forward simply on the basis of that assumption, the final results could be questioned. It would have been easy for the researcher to accept the data at face value or to believe in his own opinions. There are distinctions between actual events, a person's experience, and how those events and experiences are related to the researcher. To deal with this issue, the researcher attempted to find corroborating support for an individual's responses: Did opinions and observations coincide with others' in the group? Did the response make sense, or did it surprise or confuse the researcher? Did the answer's given by an individual make sense when considered in relation to other comments that the same individual made on related topics? Did the respondent's work habits, actions, and lifestyle support his commentary?

By using this type of analytic induction, the researcher probed potential conflicts both during the data collection and through the coding analysis.

### The Researcher's Role

In qualitative research, the researcher was used as the primary instrument for data collection and analysis. To objectively present the findings required that the study include a discussion of the researcher's personal values, assumptions, and biases (Creswell, 1994).

During the researcher's undergraduate studies, he was a member and officer of an engineering fraternity at the Ohio State University. Over the course of his final year of the undergraduate studies in mechanical engineering, the researcher participated in two to three dozen on-campus and off-site interviews and was subsequently offered employment by two consulting firms in central Ohio. Although initially declining these offers, within six months he had taken employment with one of these consulting firms. Since the researcher's first employment in the consulting industry eight years ago, he has interviewed with approximately twenty consulting firms at numerous geographic locations across the United States, many of which resulted in job offers that he eventually declined. When the researcher was twenty-six years old, he was hired as a consulting engineer by a firm in Lynchburg, Virginia, in 1996. Since that time, the researcher has worked with Generation X consulting engineers in Lynchburg, first as a peer, and then later directing their activities as a project manager. As the senior engineer of the mechanical engineering department he has acted as a supervisor and mentor, including having two recently graduated Generation X engineers report directly to him in a student-mentor relationship. The researcher has been responsible for the recruiting, interviewing, and hiring of young engineers. In 2000, the researcher sat on a panel of engineers at a nearby university that spoke to college students studying technical fields, and in the course of events dealt with several of the students directly and listened to their concerns and answered their questions about the possibility of their future employment in the consulting profession.

The researcher believed that his experiences enhanced his understanding of the context of the main research problem. The researcher's knowledge and personal experience from both interviewing and being interviewed have allowed him a unique perspective into the mindset of Generation X engineers that seek employment in the consulting industry. This firsthand knowledge by the researcher brought with it obvious advantages in understanding the problem and the mindset of Generation X engineers, but along with that came certain biases, both known and unknown. Through a carefully designed and executed research study, combined with a thorough explanation of the research activities, the researcher believed that the bias could be effectively mitigated. Of special note regarding the potential for bias stemming from the researcher, he was acutely aware that his own set of experiences as a young engineer seeking employment were in fact unique to him and that they did not necessarily reflect those of any of the individuals involved in the study. Because of the researcher's responsibility to recruit and hire young engineers and to promote the growth of the consulting firm for which he was employed, the researcher firmly believed that understanding the perspective of other engineers was much more important than the justification of his own career decisions.

### **Ethical Considerations**

Prior to beginning the research and throughout the study, the researcher maintained a strict ethical stance about how the research should be performed and any subsequent impact on the participants. In the following sections, the guidelines used to ensure fair treatment to involved parties is discussed.

#### Anonymity of the Participants

The researcher recognized that during the interview and the survey questionnaire the participants in the research were revealing parts of their own experiences, some of which they might consider unpleasant or intimately personal. Prior to all interviews, surveys, and discussions, the researcher explained the nature of the research, how the data would be used and what the final product would be. The researcher let it be known to all



of the participants that their responses, attitudes, and statements would all be kept confidential.

During the interview and subsequent analysis, the researcher was careful to respect the rights and desires of the participants by not extrapolating unnecessary information that would reveal personal or professional weaknesses in their personal character or professional career. A copy of the transcribed interview was given to each participant of the interview for them to review and make any comments concerning accuracy. One copy of the interview was sent to the chairman of the advisory committee. No additional copies of the tape recording or of the transcript were made available.

The tabulated results from the survey questionnaire were accessible only to the researcher and to a professor at Old Dominion University responsible for administering the electronic network where the data was stored. Each of the individual participant's responses was coded by a unique identification number that was kept confidential by the researcher.

#### Informed Consent

Before the data collection, and during and after the analysis, the researcher considered if the participants had the full information to represent the sample population and appreciate the nature of the questions that were posed to them. The researcher felt that the information given by the participants was voluntary and freely given. The researcher attempted to deal directly with the participants when possible, and did not use management or executive influence to force respondents to participate. The researcher was aware that weak consent on the part of the respondents would lead to poor data (Miles and Huberman, 1994). It was for this reason that the researcher kept the responses confidential, and tried to fully explain the purpose and intent of the research so the participants would feel comfortable. In development of the survey questionnaire, the format was specifically developed to be both short and straightforward, thereby showing appreciation for the participants' time and honesty.

### Harm and Risk

The researcher had no motive to harm anyone, be it respondents or otherwise. This was clearly explained to the participants and to the management of their organizations. The practical purpose was to aid consulting firms with recruiting efforts. Because the interview and subsequent survey answers were confidential, there was little to no risk involved for those who participated in the study.

### Honesty and Trust

The researcher was always straightforward about the intent of the research. Everyone involved was made aware that the interview and survey were for a research study, that the answers of individual respondents would remain confidential, and that the final results of the study would be made available to those who participated. The researcher explained to all involved that this was a study to learn more about how to recruit and attract engineers into the consulting profession. The researcher committed to provide to several consulting firms the results of the study, regardless of whether they were competitors of each other or the researcher's employer.

### Ownership of Data and Conclusions

This study was funded solely by the researcher and performed in conjunction with the Engineering Management Department at Old Dominion University. The researcher committed to provide research results as well as the final thesis to the organizations that allowed their employees to participate. Specific interview material and other data that was linked to individual responses shall be retained and secured by the researcher.

### **Organization of the Remainder of the Study**

This report will discuss the review of relevant literature and will explain the role of literature in the research study. The explanation of the deficiency of past literature will help to show the need to research the problem. This section will also review how

literature and existing knowledge was used to provide a framework for the research problem and how existing knowledge was used to supplement the research design. The review of literature will provide some engineering statistics that will help the reader to see the bigger picture of engineering employment.

The chapter on Research Methodology will explain the limitations of using a single-phase methodology for this research study. The chapter then moves on to provide an overview of using a two-phase methodology for the study. The mixed method research approach is explained, including numerous references that support its use for this type of research as well as the methodology that would be used in the study.

The next chapter covers the Research Design. It begins by defining the research sub-problems then describes how the research was carried out through Phase One and Phase Two. This chapter includes discussions on development of the interview, data collection, analysis, and determination of the emerging major themes for Phase One. Discussions on the plan for Phase Two covers the development of the survey questionnaire, administering the survey, and interpreting the data.

The chapter on Results discusses the findings. These discussions are divided into the two main phases. First, they establish how the researcher worked through the stages of data collection and analysis to achieve the final results. Included is a detailed review of the data collected during the interview that led to the development of major themes. In addition, the final development of the survey questionnaire and how it was administered was described. Second, the section on Data Collection and Interpretation makes the comparison between the finding of Phase One and Phase Two, including an explanation of why certain themes were not supported by the quantitative findings of Phase Two.

The Results chapter also shows the findings of the research study. The major themes are shown as either supported or not supported by the quantitative study. After the research results are shown, a discussion the reliability and validity of the findings are included.

The final chapter is the Summary of the study, which shall draw together the different elements of the research and findings and shall include a discussion of how this study may be used for future research.

Additional support material is provided in the Bibliography and the Appendix sections. These will include literary sources, information pertaining to the coding analysis, and miscellaneous data from the survey. An additional appendix is included to discuss the potential usefulness and implications of the study to the engineering management practices of consulting firms.

## **Summary**

In the introductory chapter of the study the main research problem, its background, and some of its characteristics have been identified to put the study into context for the reader. The research problem has both academic and practical significance. The practical side, as discussed, was in creating knowledge that could help the consulting engineering industry understand the reasons why young engineers make employment decisions. The main research question and the significance of the study were clearly expressed.

From the academic perspective, the reader has been notified that a distinct methodology and research design had been created that would be used to approach the research problem, which will be described in the following chapters. The scope of the study has been defined, including the study's limitations and issues concerning objectivity, research bias, and ethical considerations.

The role of the researcher was described to provide an honest view of the researcher's background and experience, as such honesty was important to show how objectivity was maintained even though the researcher's experiences might otherwise add bias to the research. This discussion also showed why the researcher was well suited to perform this type of study, especially (as will later be discussed) the qualitative analysis because of how the researcher could relate to the sample population.

## **REVIEW OF RELATED LITERATURE**

In the research, literature was used inductively to help frame the research problem and to stimulate an inquisitive attitude within the researcher. Books and articles on research methods were studied to help the researcher create the research methodology and design. Review of literature included sources that discussed consulting firms, engineering studies, college graduates, Generation X, and recruiting of engineers. The literature research consisted of scholarly (academic theses) and practical (industry magazines) sources, books on Generation X as a social group, various websites, as well as U.S. government statistics.

Literature was useful in providing a backdrop and theoretical grounding to the main problem and to provide supporting evidence that the research approach was appropriate for investigating the research problem. The research literature from Grounded Theory was used to analyze the data in the qualitative phase and to develop major themes that were grounded in the data. Literature was very important in determining the research methodology that was used in the study, as well as preparing the researcher to develop a workable plan that would withstand the scrutiny of scholarly review. The three main study sub-problems (discussed in the Research Design chapter) were identified and resolved through the use of literature dedicated to research methods. This literature is referenced throughout the paper to show academic support for the design and methodology.

The following sections discuss how literature (and its deficiencies) was used to define the main research problem and showing why the problem should be studied. The scholarly research that was used to determine methodology, design, and the use of analytical tools are discussed throughout the remainder of the study.

### **Deficiencies of Past Literature**

Before beginning the qualitative phase of the research, the researcher began a review of the literature on hiring young engineers into the consulting profession. This

effort confirmed that many managers within the consulting industry were aware of the recruiting problem, but otherwise the researcher found little evidence to support the opinions offered to improve recruiting. The researcher determined that the majority of material was subjective in nature and lacked any definite basis for the recommendations being offered as solutions to the labor problem.

Despite widespread concern and discussion within the consulting industry, no significant research had been attempted to systematically understand why young engineers in the consulting profession made their career choice. Current theories on recruiting and hiring practices by consulting firms were found to be a conglomeration of guesswork with an extreme bias to personal experiences. For example, one widely distributed national engineering publication highlighted the opinion of a senior partner of a leading consulting firm that the best way to recruit for the future was to brainwash pre-high school students into becoming engineers (Sullivan, 1999); meanwhile, the results of this study on consulting engineers in Lynchburg showed that the participants were unlikely to have been influenced as high school students towards any particular profession except by the promise of wealth.

While some research did exist on Generation X employees (Maurer *et al.*, Montana and Lenaghan, Marklein, which will be discussed in the following sections), such research had tended to generalize findings of the group across a large demographic consisting of more than 40 million members (Bova and Kroth, 1999). It did not focus on the consulting industry and its unique challenges and problems. It did not focus on particular geographic areas. The researcher found some of the data to be useful and relevant to framing the main research problem, and to a lesser degree the findings of these other studies do provide findings consistent with those discovered from this research effort. These similarities are discussed in following sections.

In general, the review of related literature was difficult and tedious because of the difficulty in finding relevant information that discussed the recruiting problems, and to a much larger degree, discussions on actual data that would support developing solutions to improve recruiting within the consulting profession. Editorials and opinions on recruiting were difficult to find, but they existed. Fact-based explanations of the problem could not be found, despite an exhaustive search by the researcher.

## Scholarly Literature

Scholarly literature was considered to be that which was produced within the academic realm or other venues where strict research guidelines were used to produce reliable findings subject to scrutiny of the academic community. The researcher's review of scholarly literature follows.

A 1999 survey investigated the work motivators of Generation X and Generation Y individuals and contrasted them to responses given 30 and 40 years ago by Baby Boomers. The study showed how the mindset of young people had changed in the way that they view employment. The survey asked 200 recent graduates and undergraduates of the Hofstra School of Business to rank six of 25 factors as those that were most important in motivating them to do their best work (Montana and Lenaghan, 1999). The top six responses, in order, were:

1. Steady Employment.
2. Respect for me as a person.
3. Good Pay.
4. Chance for Promotion.
5. Opportunity for self development and improvement.
6. Large amount of freedom on the job.

These responses were compared to a similar study that had been from the 1960s in which 6,000 managers were surveyed. The responses from 1960 were, ranked in order:

1. Respect for me as a person.
2. Good pay.
3. Opportunity to do interesting work.
4. Feeling my job is important.
5. Opportunity for self-development and improvement.
6. Large amount of freedom on the job.

The responses from the 1960s compared favorably to the same survey given to 500 executives in the 1970s. Although the results were similar for the 1960s and the 1970s surveys, they were much different than those from the Generation X and Generation Y responses. Steady employment was listed by Generation X but not by earlier generations, which has been linked to young people's experiences of high inflation and massive corporate layoffs stemming back to the 1980s and 1990s (either directly or through their parents). Another response that differed between the two generations was that members

of Generation X also listed a chance for promotion, as compared to Baby Boomers who wanted to feel that their job was important.

Several of major themes that were investigated through this study were found to have similarities to the findings of a study of degreed Generation X employees throughout the United States (Bova and Kroth, 2001). These authors determined that Generation X employees measure job security by the number of skills that they learn. Because of this, Generation Xers are very demanding of their employer to provide meaningful training: not class coursework, but on the job skills that are learned indirectly through accomplishing some task or assignment. The authors performed a study of Generation X employees in 1999 that saw three themes emerge: work and work environment must support continuous learning, mentors must lead by example, and that Generation X employees place major importance upon living multi-dimensional lives.

Bova and Kroth (1999) wrote on the differences between Generation X and previous generations in the manner that they relate to the world. Young people are independent problem solvers who get work done on their own, due in part to having both parents work outside the home or living with a single parent. They are technologically literate and have had their lives shaped by multimedia, Internet, and computer games. As a result, they expect immediate gratification. Generation Xers distrust corporate institutions because they grew up feeling the impact of corporate layoffs and as a result have not embraced the idea of lifetime employment. Young people desire to learn new skills and new ideas in order to be marketable, which has allowed them the ability to focus on multiple ideas at once. The authors state that Generation Xers will develop loyalty to organizations that provide learning opportunities to employees. Bova and Kroth believe that Generation Xers have a strong desire to have mentors, despite how fiercely independent that they may be; these mentors should be specially trained to deal with the unique mindset of Generation X. The authors discuss their study of Generation X and mention three themes that directly relate to hiring and mentoring employees over time:

1. Work and the work environment must support continuing learning.
2. Mentors and organizational leaders must lead by example.
3. Generation X employees place major importance upon living multi-dimensional lives.



The study by Bova and Kroth were relevant to this study because they have attempted to define some of the generational differences in employees that have created the recruiting problems and the three major underlying factors that affect Generation Xers as employees.

Steven Maurer *et al.* (1992) examined the on-campus recruitment of graduating engineers through the idea of job marketing. The research was based on treating the recruiter as a key source of consumer (the job applicant) influence. In particular, salesmanship and interpersonal skills were examined with regards to their impact on recruiting success. The research investigated the theory premise that consumers (job seekers) respond favorably to influence sources (interviewers) having similar attitudes or demographic traits. Maurer pointed out that marketing research suggests that, all other factors being equal, similarity between the buyer and seller is an all important decision factor when the product itself is ill defined. Maurer developed six hypotheses concerning campus recruiters and strategic recruiting that included how recruiting behavior affects the likelihood of job acceptance, applicant response to recruiting process, applicant response to recruiter, and applicant response to quantity and quality of information provided (both before and during interview). The research indicated that the likelihood of job acceptance was significantly related to the recruiter's interpersonal skills and the amount of information that was provided to the student concerning compensation and benefits, job/career, and security/success issues. While students considered it positive if the recruiter shared a similar educational background, recruiter influence was based primarily on recruiter behavior. One theme that was refuted by the data was that the recruiter's job title was important to the student, which as explained by the focus group was that because management/technical interviewers were often indifferent and arrogant. The most basic finding of the research was that the student's perception of the employer recruitment process (overall response to process) was a strong predictor of the intention to accept a job offer.

The results of the research by Maurer coincided with the findings in this study (by Mayfield) on Generation X consulting engineers in a general sense; however, Maurer's research spanned 20 universities throughout the United States and covered student interviewing in a wide spectrum of industries, and therefore the generalizations do not

specifically apply to this research's focus on consulting firms in Lynchburg or the current focus on engineers. Specifically, the research findings had similarities regarding the likelihood of job acceptance being related to the recruiter's interpersonal skills and the amount of information provided to the job seeker concerning financial compensation, job activities, and job security.

The Gallup Organization polled American employed adults in a year 2001 study concerning job satisfaction and found that 65% of respondents felt that enjoying their job was more important than salary or job title (Clifton, 2001). Another Gallup Organization Survey (Tritch, 2002) showed that 40% of 18 to 24 years olds believed that promotion was based on ability, compared to 25% of all employees at least 25 years old. Similarly, 45% of 18 to 24 year olds trust their company to be fair to all employees, compared to 24% of older workers. The second set of data from the Gallup poll showed the differences in perspective across age demographics. These younger employees in certain ways represent the Generation X demographic, and so it is noted that gross generalizations about the workforce are useful only if the employee age demographic and career field can be made insignificant. For the purposes of recruiting young engineers to work in Lynchburg in consulting firms, neither the age demographic nor the engineering profession alignment can be ignored.

The Southern Growth Policies Board prepared a report based on data from a 1997 survey of science and engineering graduates by the National Science Foundation (Marklein, 2001). Respondents had been out of college for one to three years. The report noted that college graduates who attended high school in the same state as their college were ten times more likely to accept employment in that state. Students who moved to another state for college were not likely to return to their home state to work after graduation, as 43% of out of state students remain in their new state when they enter into the workforce. In addition, the Southern Growth Policies Board reported similar findings with this study on young engineers that geographical location was an important factor that young engineers considered during the employment decision.

The review of scholarly literature showed that studies have been conducted on Generation X as a cultural group, but that these studies were limited in how they could be useful to this research effort. Relevant information generally was concerned with

Generation X as a large group, with the exception of Maurer's study on graduating engineers. The scholarly literature showed that Generation X members were concerned about job skills, having capable mentors, and quality of life. Maurer (1992) provided evidence that the perspective of Generation X engineers needs to be considered when considering how these engineers are recruited. Other scholarly literature was concerned about identifying differences between demographic groups, thereby providing evidence that members of Generation X cannot be expected to have the same ideas about employment as previous generations. The study by the Southern Growth Policies Board showed that geographic location plays a significant role in determining where young engineers choose to find employment. The limited amount of information yielded in these literary sources show that the findings of the research done on Generation X engineers (by Mayfield) will significantly contribute the scholarly literature.

### **Practical Literature**

Literature sources pertaining to the research problem that were found in periodical articles published for the engineering profession are discussed in this section. The practical literature was used to define the main research problem from the perspective of members of the consulting profession. The discussions on practical literature are useful for providing context to the recruiting issues as they pertain specifically to consulting firms and Generation X engineers.

A national survey of consulting engineers in the year 2000 found that the biggest challenge facing the consulting profession was the hiring and retaining of good engineers (Sullivan, 2000). Engineering managers listed the difficulty in attracting and keeping high quality employees as their second biggest problem behind retaining their top engineers, with one-third of respondents listing it as their top issue. (Klein, 2000). The study pointed out that many engineering managers were also troubled by the lack of effective recruiting and interviewing techniques used to locate, analyze, and hire talented engineers. The concern expressed by engineering managers in the article was similar to the concerns expressed by engineering managers in Lynchburg that discussed the

recruiting of young engineers with the researcher, and was important because it supports the significance of the study from a practical application viewpoint.

An article from the magazine *Consulting-Specifying Engineer* (Horwitz, 2000) cited a 1999 survey of leading consulting firms nationwide that investigated future challenges in the consulting industry. The article stated "... the perennial difficulty of recruiting qualified and skilled employees tops the list." The use of the word perennial matched other sources identifying recruiting as a constant problem.

Despite the recent downturn in the demand for labor beginning in the middle of 2001, many students remained undeterred. A survey in late 2001 by the online job-listing service Jobtrak.com© found that 30% of all college graduates expect to have four or more job offers by the time they graduate (Armour, 2001). This data reflects, that even in the economic downturn of 2001 that Generation X job seekers remain very optimistic about receiving multiple job offers. Such optimism directly shows the need for the consulting profession to better understand how recruiting works from the perspective of the young engineer because the study reflects how young people intend to make comparisons between companies and to select the best company for them rather than merely accepting the first job offer that they receive.

Corley (1999), a consultant in workforce change management who worked to help employers recruit and retain employees, wrote that a new employment contract has been created whereby young people are willing to lease their knowledge and energy only if they get meaningful work in return. Members of Generation X, being the first generation to grow up with computers, have linked their ability to access information to their demands for autonomy in the workplace. Corley claimed that young people want to work on projects that last for weeks or months, but not years. They want stimulating jobs because they want to continue learning. They feel most comfortable in an atmosphere that blurs the distinction between the workplace and the college campus. He also noted that because of all-night fast food and ATM machines, members of Generation X have come to expect immediate responses to their requests. For businesses, this means answers and feedback from managers. Corley made an interesting note that compares to Montana's and Lenaghan's remarks on the desire for job security: he cited a study where more Generation Xers believed in the existence of UFO's than in the likelihood of having

a Social Security system to retire on. Obviously, the concern that young people have about job security was an important factor regarding their motivations in determining their career path.

An article entitled "How to Recruit Engineers and Architects" (Brown-Alcala, 1999), stated numerous ideas about how to successfully recruit employs. The author was a manager of a recruiting department at a full-service management consulting firm that served the architectural/engineering industry. Although the basis for her observations may have been only her personal experience, she made several suggestions that were subsequently supported by the findings in this research study. The author listed factors that she felt influenced a candidate's decision to accept a position: selling their firm with enthusiasm and make sure that the candidate was explicitly told about projects, travel, quality of life in the area, and working environment. The article, despite any accuracy in the opinions that were stated, was still considered a speculative piece of work because it lacked the substance of scholarly data to support its claims. These types of articles are commonly found throughout the consulting profession: suggestions for improving recruiting contain a combination of good and bad ideas but none of which ever are supported by anything other than the experiences of the authors. Such opinion-based articles are dangerous because the experiences of the authors, without rigorous research standards, will undoubtedly contain bias and errors that undermine the article's credibility in those cases where the author is correct, and secondly, in those areas where the author is incorrect, the author may still be able to pass themselves off as an "expert" merely to experience, regardless of whether such experience is truly applicable to the recruiting of Generation X engineers.

The review of practical literature was important to the study because it provided a context to represent the main research question with regards to the two separate perspectives of the recruiting issue: Engineering consulting firms and Generation X engineers share a common bond concerning employment: firms want young employees and young engineers want jobs. The specifics of the how firms understand recruiting and the Generation X engineers must be better aligned to what young engineers are looking to receive from recruiting efforts by the companies that pursue them. The review of

practical literature also showed that very little information exists within the consulting engineering profession that can be substantiated by data from research.

### **Engineering Statistics**

Statistics on engineering enrollment, graduation, and employment have been provided to create a more universal perspective of the main research problem and to put the main research problem into a greater context.

According to the American Society of Engineering Education, there were 360,000 students enrolled in engineering undergraduate programs in the year 2000, with another 73,000 studying for a master's degree. In the 1999-2000 academic year, 63,700 undergraduate and 29,500 master's engineering degrees were awarded. Twenty-one percent of these undergraduate degrees were awarded to women.

The Department of Labor predicted that the total number of graduates from engineering programs was not expected to increase significantly through 2008. Between 1986 and 1998, the number of students receiving bachelor's degrees in engineering declined by 19.8 percent while the total number of bachelor degrees from American colleges increased by 20 percent (National Society of Professional Engineers). While the 2000 Census showed that the number of elementary and high school students equaled that of the peak in the early 1970s, the historic declining trend of students receiving bachelor's degrees in engineering will likely negate this surge in college graduates that will begin in 2010 (Schmitt, 2001).

The year 2000 census showed that engineers held 1.5 million jobs in the United States, with 401,000 of these jobs in service industries (primarily engineering and architectural services or other work done on a contractual basis). The National Science Foundation predicted there would be a shortage of 675,000 scientists and engineers by the year 2006 (Silvestri, 1997).

Information on engineering statistics has been provided to give a general overview of recruiting issues relating to engineering, particular as recruiting issues are a function of the limitations of the existing labor supply available to engineering recruiters.

## **Summary**

The review of related literature was intended to show how existing literature helped to shape the research study. The deficiency of past research on the specifics of employment decisions of consulting engineers was an important reason why the study has practical significance, because it can provide knowledge-based understanding where only speculation previously existed.

The existing literature was discussed to provide a backdrop for the research study. The scholarly literature provided the reader some idea of what other researchers have attempted to describe and explain in other studies that have some similarities to what was accomplished in this research. The review of practical literature was intended to show how members of the consulting profession have attempted to define the recruiting problem and some of the proposed solutions that had been suggested. The section on engineering statistics provided a broad view of how consulting engineering was impacted by the demographics of engineering enrollment and graduation, which demonstrated that the recruiting problem was not merely an illusion but a real issue that stemmed, in part, from the tightening of the labor market due to the relatively large number of employment possibilities compared to the limited number of young engineers seeking to fill those positions.

## **RESEARCH METHODOLOGY**

After the researcher selected the main problem to be investigated, he turned his attention towards determining the most ideal research methodology to use in the study. There was not an established methodology for the researcher to use because of the lack of previous academic research into this particular problem. The following sections describe the development of the particular research methodology developed for this research study.

### Research Perspective

The research methodology used for this study was determined by the research purpose of identifying the main factors that influence young engineers in their employment decisions to join the consulting profession in Lynchburg. After investigating various research models, it was determined that no single methodology would provide a complete and thorough research effort. The researcher determined that using a hybrid methodology, combining both a qualitative and a quantitative analysis method in a combined effort, would yield the most robust design for the study.

The paradigm model used for the research was a mixed method dominant-less dominant design (Creswell, 1994), with the dominant qualitative phase occurring first. The qualitative portion of the study was intended to be an inquiry process used to build a complex, holistic perspective of the problem to develop major themes. The goal for the quantitative phase of the study was to provide supporting data for the evaluation of these major themes. The reasoning for using the mixed method approach is discussed in the following sections.

### **Limitations of Single Phase Methodology**

Prior to this research study, the concepts, variables, factors, themes, and theories related to the main research problem were largely unknown or else based on speculation. Data and hard facts concerning the research problem had never been uncovered by



previous researchers. As previously discussed, an exhaustive literature search revealed that past literature offered little evidence to explain or identify which factors influenced Generation X engineers in their decisions with respect to selection of an employer. The research problem was focused on understanding the perspective of Generation X engineers; therefore, the research effort would be exploratory in nature as the researcher attempted to build, through data collection and analysis, an understanding of this perspective.

The factors that influenced the employment decisions of Generation X consulting engineers was previously unstudied, so no past research was available to use as a foundation for this research study. A significant part of the research involved discovering the perspective of how this group of young engineers viewed phenomenon of recruiting and the employment selection process. This desire to build a foundation of understanding was the principal driver that caused the researcher to utilize a qualitative study that would allow for the use of inductive logic to discover concepts and themes (Creswell, 1994).

The advantage of using a qualitative study was the strength of qualitative data. A major feature of well-collected qualitative data was that they “focus on naturally occurring, ordinary events so that we have a strong handle on what real life is like” (Miles and Huberman, 1994, p10). Miles and Huberman (1994) also pointed out that another feature of qualitative data was their richness and holism, with a strong potential for revealing complexity. These authors go on to state that qualitative data, because of the data’s emphasis on people’s lived experiences are fundamentally well suited for locating the meanings that people place on events and structures of their lives.

For this research, a quantitative study would have been inappropriate to discover the perspective of young engineers, because there were no existing predictive theories to test through traditional experiment, quasi-experiment, or survey. Without known factors or theories, it would have been impossible to perform a purely quantitative study that relied upon context-stripped cases of employment decision-making by Generation X engineers.

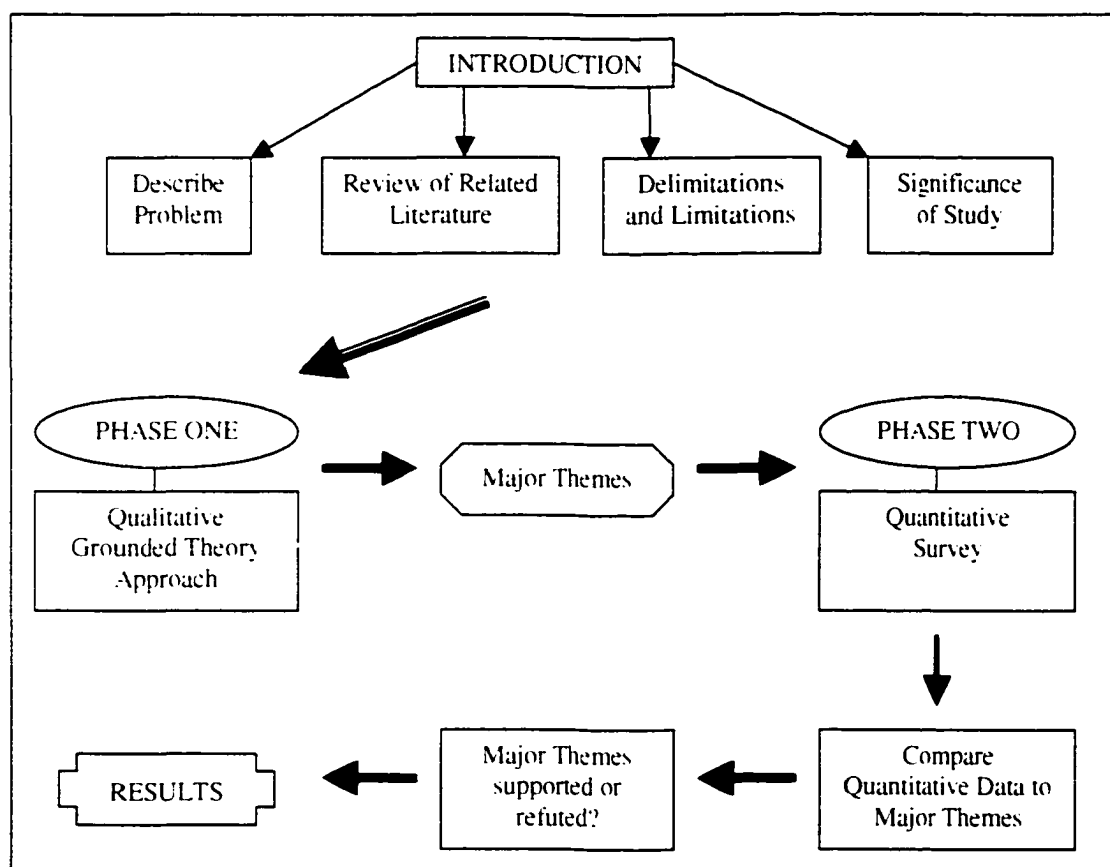
After determining that a qualitative approach was the most appropriate methodology to build an understanding of the perspective of the sample population, the researcher considered three major qualitative methods to use in the study: ethnography,

phenomenology, and Grounded Theory. An ethnographical study would have required the researcher to study the Generation X engineers as a cultural group during a prolonged period of time. This would have focused the research on explaining their behavior in a particular setting, instead of determining what influenced their employment decisions. A phenomenological study would have been based on understanding and describing the experiences of being young engineers (from their language and particular perspective) through a prolonged study, but this again would not have told us what factors influenced them during their job search. Therefore, both ethnographical and phenomenological methods were ruled out. Grounded Theory was determined to be the best qualitative method to study the research problem because this method was well suited to derive patterns and themes from data collection through the interrelationship of categories of information (Creswell, 1994). The researcher hoped to discover major factors that influenced young engineers from information that was grounded in the data that would be collected.

Miles and Huberman (1994) reflected on their previous 1983 statement that qualitative researchers shared no canons, decisions, rules, or even any agreed-upon heuristics to indicate whether findings were valid and procedures robust. The authors stated in 1994 that the situation was changing, but slowly. The limitation of using Grounded Theory was that reality, within the context of the research, would be entirely constructed by the researcher and the participants' responses. The major factors that would be developed would be applicable for representing the sample population, but how could the researcher know if the results could be generalized to the larger population? How would the research study be able to stand up against questions of bias and accuracy? Without some type of test of the results, would problems and limitations of the research be apparent to the researcher?

The potential limitations of the qualitative study could weaken the research study and make the results less credible. To address these potential limitations, the researcher decided to evaluate the qualitative results with a quantitative study. While combining research methods increased the complexity of the study and the effort needed to complete the research, the researcher believed that there were significant advantages to combining the methods to strengthen the findings of the study. The researcher decided to have a

second phase of the research: the quantitative study used in Phase Two would be intended to evaluate the major factors that were discovered in Phase One. The quantitative study would be performed only after the qualitative portion of the research was completed and the data had been analyzed and developed into major themes. Figure 1 provides a general flow diagram for the Two-Phase Mixed Methodology. The detailed specifics of the research design will be discussed later in the study.



**FIGURE 1 General Diagram of Mixed Method Research**

## **Overview of Two-Phase Methodology**

As previously discussed, the limitations of a single-phase methodology would have severely restricted the significance and credibility of this research. In the following sections, the approach to the two-phase methodology is explained in general terms. More detailed descriptions of the two-phase method will follow.

### Grounded Theory Methodology (Phase One)

The research plan was to use Grounded Theory in the qualitative portion of the research to derive patterns from the data. During the research design, the representative sample population would be determined, and then this sample population would be interviewed. Information from the initial interviews with the representative sample population (data collection) would be refined, differentiated, and compared to responses of other interviewees, then collected and gathered into categories until themes began to emerge. The data would be classified and organized according to the data's characteristics using forms of data coding. Coding is the analytic process through which data are fractured, conceptualized, and integrated to form theory (Strauss & Corbin, 1998). From this coded data, the researcher would identify patterns and themes that would reveal the major themes concerning the factors that influenced Generation X engineers to accept employment in consulting firms in Lynchburg, Virginia. According to Strauss and Corbin (1998), coding procedures involve building rather than testing theory; providing researchers with analytic tools for handling masses of raw data; help analysts consider alternative meanings of phenomena; and to identify, develop, and relate the concepts that are the building blocks of theory (or in the case of this study, major themes). After coding is completed the themes will have emerged from the data; this will be the completion of the qualitative phase of the research and the study will transition to the quantitative phase.

### Quantitative Methodology (Phase Two)

The researcher intended to collect the results from the qualitative phase (the major themes) and use them to create a survey questionnaire. The survey would be administered to members of the sample population. The questions in the survey would allow the respondents to agree or disagree, based on their personal experience, that the major factors had influenced their decision to seek employment as consulting engineers in Lynchburg, Virginia. The survey results would be used to support, refute, or modify the findings from the qualitative portion of the study.

The quantitative research was intended to be complimentary to the qualitative research rather than merely a classic triangulation of results (to neutralize bias). According to T.D. Jick (Creswell, 1994), the concept of triangulation was based on the assumption that any bias inherent with the data source, investigator, and method would be neutralized when used in conjunction with other data sources, investigators, and methods. Creswell goes on to cite additional reasons to use combined methods in a single study. These include convergence of results, the opportunity for overlapping and for different facets of a phenomenon to emerge, initiation of a process to allow contradictions and fresh perspectives to emerge, and expansion of the research to add scope and breadth to a study. A fifth and final additional reason to use triangulation, according to Creswell, was the development of the research method to use the first method to help inform the second method.

### **The Mixed Method Research Approach**

By utilizing the qualitative and quantitative methods previously described, the researcher decided to investigate the research problem with a mixed method two-phase study, by using a Grounded Theory analysis first, and after completion, following it with a quantitative survey. The model that the researcher used was a dominant-less dominant design (Creswell, 1994). The dominant part of the research was the Grounded Theory method that would occur in Phase One. The dominant-less, or secondary, method would be the quantitative survey in Phase Two. The mixed method approach used in this study

was based on using Grounded Theory to discover themes and factors, and being the dominant method, the research study would focus primarily on Grounded Theory as the basis for the research effort. The quantitative survey, while enhancing the research study, would require less effort and its results would be used only to evaluate Phase One.

Creswell (1994), in creating the phrase dominant-less dominant, believed that the advantage of this two-phase approach was that it presented a consistent paradigm picture in the study while still allowing the researcher to gather limited information to probe in detail a single aspect of the study. The disadvantage, according to Creswell, was that neither qualitative nor quantitative purists would be satisfied with the use of distinctly separate methods to create major themes and to pursue credible evidence of reliability. However, Tashakkori and Teddlie (1998, p11) supported Creswell's mixed method approach with the defense from E.R. House that "there is no guaranteed methodological path to the promised land." These two authors viewed Creswell's dominant-less dominant approach as an acceptable method of sequential two-phase studies, in part because of triangulation techniques inherently involved in the methodology.

This mixed method approach would allow the researcher to pursue the research in two separate and distinct phases. The results would be presented in two separate sections, according to the method used. This approach would consist of using inductive reasoning and grounded-theory to frame the problem and to seek out and identify major themes concerning factors that influenced Generation X engineers, while the second phase of the research would use quantitative methods to evaluate the major factors of influence that were developed in the first phase.

As previously explained, it was obvious that the initial part of the research had to be qualitative in nature to build a greater sense of understanding to create a base of knowledge. However, qualitative research alone could not attest to the reliability of the results. The dominant dominant-less research approach would be useful in providing both a vehicle for investigative discovery as well as showing evidence of reliability. The quantitative research was intended to aid in demonstrating that the discovery of the major factors were a result of understanding the phenomenon and that the factors were not merely the results of the research process. If the results were based only on the research process, then for the same main research question, a different research process studying

the same problem would yield different results, thereby indicating bias in the study. Quantitative research would also help to neutralize any bias that may have been resident in the qualitative study (from the researcher, the participants, or the methodology itself).

In the mixed method approach, the quantitative research was not intended to test or prove any theory, but instead was intended to evaluate the major themes that were developed in the qualitative research. The data collected in the quantitative phase would be additive, meaning it would build on the qualitative phase by providing data that would indicate support for the existence of the major themes that were discovered. Once the quantitative data supported the major themes, they would be then considered as factors. The quantitative research would strengthen the discovery of major factors through the Grounded Theory analysis.

### **Summary**

The research methodology was created specifically to investigate the main research problem identified in this study. The limitations of single-phase methodologies were identified, which was the impetus that caused the researcher to use a more complex and time-consuming two-phase approach in order to maximize the effectiveness of the research to investigate and answer the main research question. The advantages and disadvantages of using only a qualitative or quantitative study were identified so that it would be clear as to how a mixed method study would maximize the advantages while reducing the disadvantages of either of the single methods. These discussions contained numerous references to literature that described and defined research methods, showing that the researcher used accepted academic understanding of research methodology in applying the mixed method approach to this study. Grounded Theory was shown to be extremely useful as the dominant phase of the mixed method approach, with the quantitative methods being applied to satisfy concerns of reliability and validity.

The design, application, and execution of the two-phase methodology are discussed throughout the remainder of the study.

## RESEARCH DESIGN

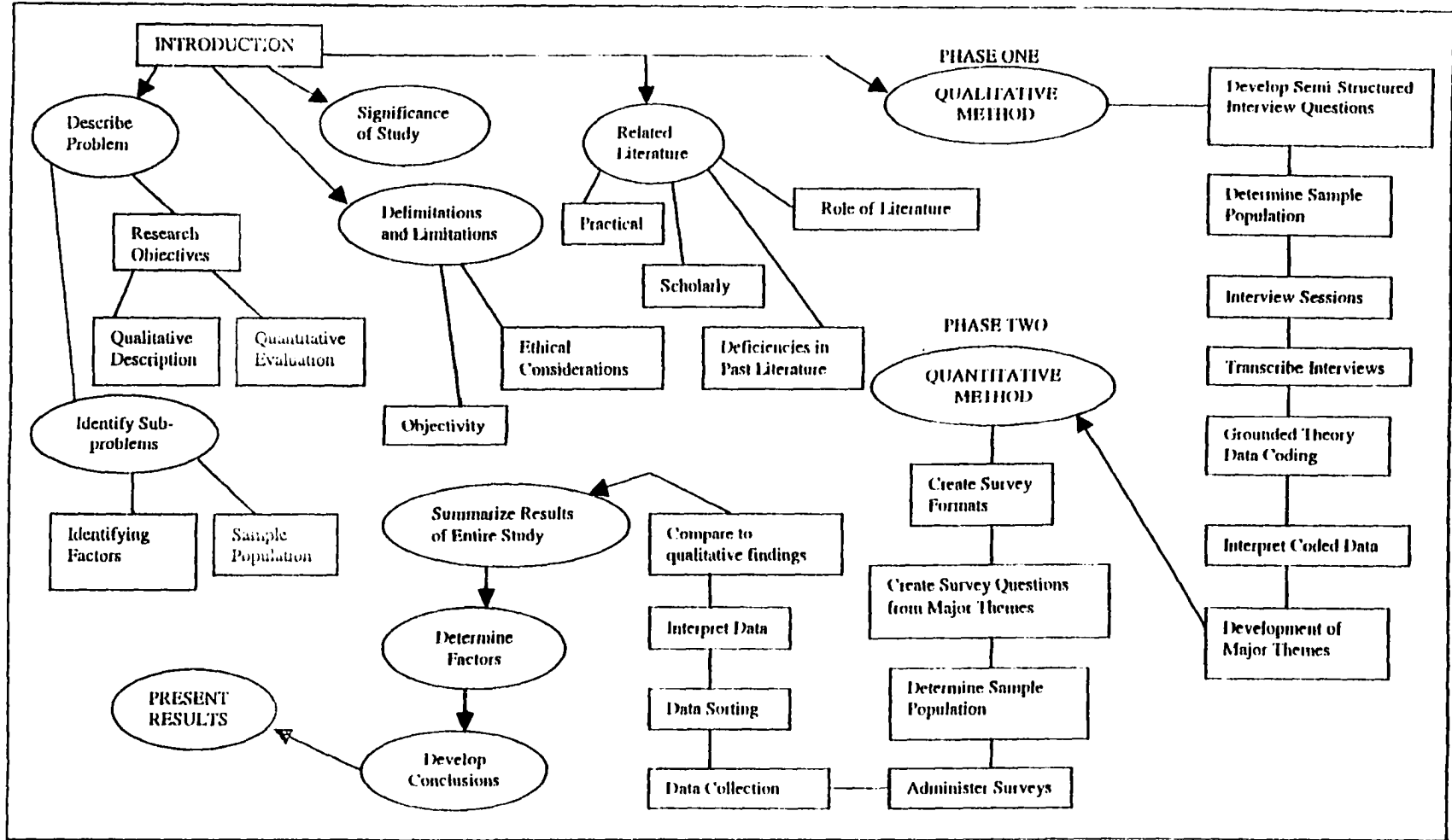
After the main problem was defined and the research methodology was selected, the researcher then set out to create a research design that would incorporate the methodology and investigate the research problem to develop major themes in how Generation X consulting engineers in Lynchburg, Virginia, make employment decisions. Primarily, the research was intended to capture the essence of the problem from the perspective of the young engineer; secondary goals would be to develop a useful research mechanism for future related research and to use inductive reasoning to develop data that would be useful for both future research and for possible practical application in the consulting engineering profession. This chapter on Research Design is discussed to show how translation fidelity (Tashakkori and Teddlie, 1998) was used to translate the conceptual framework of the methodology to the research design.

Figure 2 shows the conceptual map of the research design. In the early stages of the study, the research effort was focused on describing the problem, defining the significance of the study, defining the scope of the research (delimitations and limitations) and reviewing related literature. After these were completed, then Phase One of the research began, which involved developing and hosting interview sessions and analyzing the data from the interviews. The results from Phase One were the major themes that answered the main research problem. In Phase Two, a survey was developed to create additional data to be compared to the major themes. These quantitative findings were compared to the major themes and final results were developed. Those themes supported by the quantitative data were declared as factors.

### The Sub-Problems

In developing the research design, the researcher identified three major areas that needed to be addressed to sufficiently investigate the main research problem and to be assured that bias and errors would be eliminated from the research. These major areas, called sub-problems, were identified as selecting the representative sample population,





**FIGURE 2 Detailed Map of Mixed Method Research**

determining which instruments should be used to gather data, and determining which measurement instruments should be used in the analysis.

### Selection of the Representative Sample Population

This study was limited to engineering consulting firms in the city of Lynchburg, Virginia. The Lynchburg area is situated in central Virginia and has a metropolitan statistical area population of 281,000 (U.S. Census Bureau, 2000; refer to Appendix A). Table 1 shows the criteria that were used to define the research population.

1. Location:	Employed in Lynchburg area.
2. Age:	Born between 1964 and 1980.
3. Education:	College degree in Engineering or Engineering Technology.
4. Occupation:	Employed in a consulting engineering company as an engineer or engineering technician.

**TABLE 1 Criteria for Research Population**

The purpose of limiting the study to the Lynchburg area was to focus the research on a specific population that would reveal factors that impact employment decisions. The researcher lived and worked in the Lynchburg area and was responsible for hiring, training, and managing engineers who fit the criteria for the sample population. The researcher's first hand understanding of the problem and familiarity with young engineers in the area was extremely useful in analyzing the data from the sample population. Potential problems from over-familiarity that could cause bias were discussed in the Delimitations section.

It was important that the sample population would be representative of the larger population that would have generalizations cast upon it by the sample group (Tashakkori and Teddlie, 1998). "Representative" had a single meaning, for the specific intent of the research it meant those individuals defined by the criteria in Table 1.

The researcher was aware that a poorly selected representative sample group for the qualitative research would create sampling and inference difficulties. A well-chosen sample population would reduce research bias such as the sampling of non-representative informants, drawing inferences from non-representative processes, and generalizing from non-representative activities. For these reasons, the researcher carefully selected the participants that were used to represent the sample population by using individuals with whom he was already familiar. This reduced the inference required to fill in missing data and eliminated the guesswork to identify symbolic meanings in the participant's responses. It also reduced the likelihood that the researcher would influence the natural characteristics of the group. The way that the interviewer looks, feels, or acts may have unintentionally affected the results of the study in what was called the experimenter effect (Tashakkori and Teddlie, 1998). However, this was offset because the researcher's familiarity with the participants was less likely to create researcher effects (Miles and Huberman, 1994) that would cause the participants to behave in a manner that would not have normally occurred. The opposite would also be true: the researcher was less likely to be misled or biased by the behavior of the participants, because the normal course of social interaction between each of the participants and with the researcher was already well established prior to the interview session.

For the second phase of the study, the sample population size was increased to include additional individuals that met the population criteria. These additional participants were selected from consulting firms within the Lynchburg area. In order to maximize the number of participants, the researcher inquired about every consulting firm in Lynchburg to contact representative members of the sample population.

The number of Generation X consulting engineers during the research period of January to September 2001 was determined to be eight individuals. Four of these individuals were selected to participate in the Phase One interviews. Eight individuals participated in the Phase Two survey questionnaire. The researcher determined that the total population of Generation X consulting engineers in Lynchburg, Virginia, was nine (which included the eight participants plus the researcher).

### Determining Which Instruments Should be Used to Gather Data

The decision to select data collection instruments was not made until the design of the research study was planned. The data gathering instruments were the researcher (in Phase One) and a survey questionnaire (in Phase Two). The selection and use of the data collection procedures and instruments are discussed later in the Research Plan chapter.

### Determining Which Measurement Instruments Should be Used

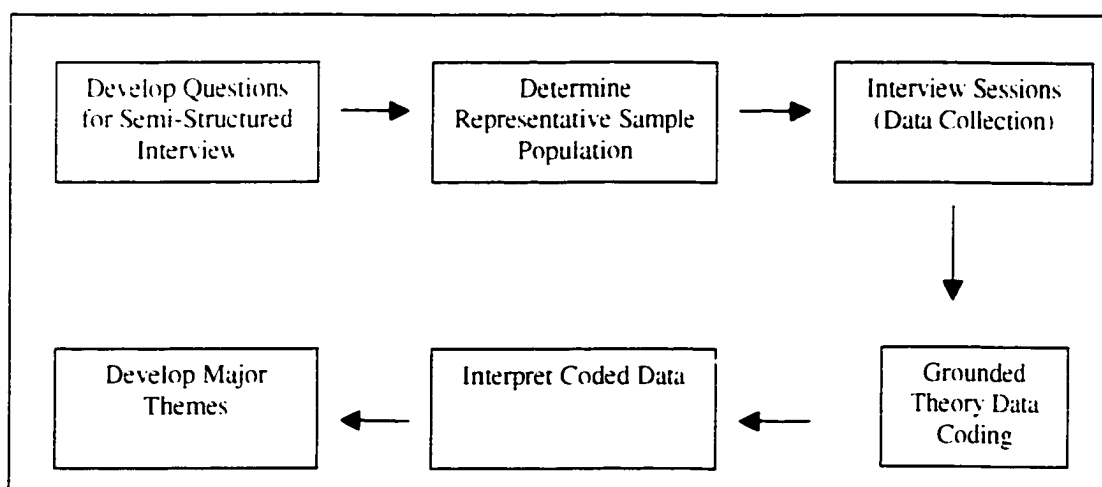
One of the sub-problems was determining which measurement instruments would be suitable to use to analyze the data. This problem could not be solved independently of the research methods to be used or the type of data that would be collected. One purpose of using analytic tools was to increase sensitivity and to decrease bias (Strauss and Corbin, 1998). Sensitivity to the research problem allowed the researcher to develop a more in-depth understanding of the participants and the relevant properties of the data, which in turn opened up more dimensions of the categories used in the Grounded Theory open coding analysis. Other reasons for using measurement instruments include objectivity and reliability.

The purpose of the research was to determine the major factors that influenced the decisions of why young engineers selected employment with consulting firms in central Virginia. Examples of these factors might include starting salary or the candidate's preference for geographical location. The researcher knew that for the research to be robust he would have to be careful about not limiting the quantity or type of potential factors to be explored when analyzing the data.

Ultimately, the researcher allowed the determination of measurement instruments to be a function of the research design. The selection of instruments was determined during the research design and is discussed later in this chapter.

## RESEARCH DESIGN FOR PHASE ONE

The purpose of conducting the qualitative study was to explore the factors that influenced young engineers when they made decisions about pursuing a career in the consulting engineering profession in Lynchburg. By observing and creating dialogue with the sample population, the researcher attempted to build a perspective based on their ideas. Because there was a very limited amount of existing documented knowledge on the subject of attracting engineers into consulting firms, the researcher identified the need to delve into the heart of the subject and seek out meaningful data that could be used to discover emerging themes. By using information and understanding gained from the research, and combining that with his personal experience with hiring and managing young consulting engineers, the researcher set out to understand the wants and needs of young engineers through dialogue, interpretation, inductive logic, and Grounded Theory analysis. Figure 3 shows the general outline for the research design for Phase One.



**FIGURE 3** Research Design for Qualitative Phase of Study

### Development of Semi-Structured Interviews

The open dialogue with the representative sample population was the prime source of data collection for the qualitative phase of the study. As previously discussed in the

Sub-problems section, the researcher wanted to thoroughly investigate as many avenues of potential influence as possible. Rather than rely upon the participants to fully reveal their personal experiences, which would have created a large quantity of unusable information and compromised the quality of the data analysis, the researcher chose to treat the interview session as semi-structured interviews (shown in Appendix B). The researcher would invite open conversation on various topics, but by using a semi-structured format the researcher could keep the dialogue focused on the research topic. The researcher followed the advice of Miles and Huberman (1994) that making a list of general questions helps make the implicit explicit without necessarily limiting the researcher's vision. In this regard, the researcher was careful to ensure that the list of questions was in fact generalized so that it could not be used as the prime instrument to control the interview session, as this could have easily blinded the researcher to underlying ideas that might not have been thought of while creating the list of questions. The prime instrument that chose the direction and flavor of the dialogue was the collected group of participants.

Although the researcher desired not to influence the dialogue of the interviews with the young engineers, he did not want the conversation to wander to non-relevant topics or for the interview to end prematurely because the participants could not remember what they wanted to discuss. To facilitate a meaningful dialogue between the participants, the researcher prepared list of general questions that were used to stimulate conversation. Tashakkori and Teddlie (1998) suggested that this type of "funnel interview" is directly applicable to mixed research approaches.

Initially, the researcher reviewed various articles contained in consulting industry periodicals concerning recruiting in the quest to find general interview questions. Mostly, these articles focused on issues of salary and other financial compensation. A periodical article by Poe (2001) was helpful, which reported on recruiting difficulties outside of metropolitan areas. Poe suggested that companies in rural areas or small cities should emphasize cost of living, regional outdoor activities, job security, and cost of living in their recruiting efforts.

Mostly, the development of the general interview questions came from the researcher's personal experiences and from discussions with managers and executives

from consulting firms in the Lynchburg area. The researcher was familiar with several managers and executives of consulting firms in Lynchburg and spoke to them about the research project. The researcher listened to their view of the recruiting problem and what recruiting methods they had found to be useful. Some of their ideas concerned the importance of geographical location, internships, and the value of diversity of projects within the consulting profession, as well as the opportunities to explore various avenues of marketing, sales, and management. The researcher utilized his personal experiences as a Generation X engineer who came to Lynchburg to work in a consulting firm by framing questions concerning quality of life issues. The researcher also used his observations from interviewing and managing young consulting engineers to include how young engineers strongly identify with their college experiences and how they prioritize short-term and long-term goals. Combining these ideas together, the researcher developed the general interview questions.

Further discussion on the semi-structured interview is contained in the chapter on Results.

#### Determining the Sample Population

The primary goal of the research was to study the problem within the context of the experience and perspective of young engineers in order to identify major factors that influence their employment decisions. Sampling of the population was necessary to create boundaries to keep the data collection and analysis within practical time and energy expenditures. The basis of choosing the size of the sample population and the characteristics of its members was purposely made to limit the qualitative data to a quantity that could be reasonably managed while yet offering enough variety to be robust. According to Creswell (1994), the idea of qualitative research was to purposefully select informants that would best answer the research questions, and that no attempt should be made to randomly select informants. The researcher followed this advice and personally selected the members of the sample population. The researcher chose to work with a small sample population that would respond to the questions and would not be afraid to openly discuss their experiences and observations. This approach would give the best

chance to the researcher for discovering information, developing meaningful themes, and creating knowledge for future research. It was decided that the qualitative research would use homogeneous sampling for the purpose of focusing the research while reducing and simplifying the data collection process and because of its advantage of facilitating group interviewing (Miles and Huberman, 1994). The choice of using homogeneous sampling was not considered to have had a negative impact on the research study because the population being studied (Generation X consulting engineers in Lynchburg) was fairly homogeneous in its makeup (age, employment, location). The potential limitations concerning the male Caucasian aspect of the population was previously discussed in the Limitations section of the Introduction.

The research plan was for the researcher to have four members of the population to assemble together with the researcher, and discuss the research project issue of employment decisions. The researcher contacted the participants and spoke to them in person concerning the purpose of the research study and then asked for their cooperation to participate. Background characteristics of the sample population that participated in the interviews are shown in Table 2.

	<u>Age</u>	<u>Work Experience</u>	<u>University Attended</u>	<u>Occupation</u>
1.	28	5 years	Virginia Tech	Mechanical Engineer
2.	27	5 years	U. of Virginia	Structural Engineer
3.	24	1.5 years	Virginia Tech	Mechanical Engineer
4.	23	2 months	Virginia Military Institute	Mechanical Engineer

**TABLE 2 Characteristics of Sample Population Participating in Interviews**

Interview Session with Generation X Consulting Engineers from Lynchburg, Virginia

The research plan was for the four representative members of the sample population to meet together with the researcher for a period of one to two hours. The session would take place in a private meeting room without outside interruptions, with lunch provided by the researcher. The researcher would open up the meeting with



introductions and briefly repeat the purpose of the interview which each of the participants had heard individually. The interview would be mediated by the researcher and would follow the program established by the semi-structured format, as previously described. The interview would be tape-recorded and the researcher would record handwritten notes.

While the benefits of tape-recording the interview included aiding data collection and data management through the course of the research, it also allowed for increased sensitivity later, during the analysis. In order for descriptions to be faithful to field observation they must conserve the meaning of what took place in the interview (Gephart, 1988). By being able to transcribe the interview and listen to pauses and inflections in speech patterns increased the sensitivity of the observation and allowed for more rigorous detailed analysis by letting the speaker's meaning to remain intact through the analysis rather than being falsely interpreted by the researcher.

Had each of the participants been interviewed separately and their own unique perspectives been taken as a stand alone case, the analysis might have yielded different results than what the research actually achieved. In the group setting, it was easier to move from the specific details of each individual's experience to the more general understanding that tied the individuals together into a more homogeneous population. The interaction between the participants could not have been duplicated with the researcher working one on one with the interviewees. In this group setting, there was a natural contrast/comparison taking place in the conversation and the inquiry methods that were ongoing during the interview.

The researcher was careful to avoid biases created by researcher effects during the interview (Miles and Huberman, 1994). In particular, four items that the researcher used to reduce this bias included:

1. Having the interview session take place in a congenial environment. Lunch was provided by the researcher.
2. Staying on-site as long as possible. The researcher worked with the participants and knew several for many years.
3. The researcher stated his intentions for the purpose of the research, how the information would be collected, and what the information would be used to accomplish.

4. Used unobtrusive measures when possible. This was accomplished by encouraging dialogue between the participants and following the semi-structured list of interview questions.

The researcher attempted to prevent bias stemming from the effects of the participants on the researcher (Miles and Huberman, 1994) by:

1. Avoided elite bias by providing equal weighting to each of the participants' responses, regardless of their status or job title. The researcher tried to keep all of the participants equally involved and not to allow one or two individuals to dominate the interview.
2. The researcher tried to conceptually translate sentimental and interpersonal thoughts into more theoretical ones and expand these concepts into general questions during the interview.
3. The researcher kept the main research question in mind during the interview and prevented the interview from wandering into territory that was not relevant to the main research purpose.

### Data Collection from Interviews

The interview session was tape-recorded. All participants were aware of and consented to the use of the recording device. The tape recording of the interview was transcribed by the researcher, verbatim, into a typed transcript of the interview. Also, the researcher took notes during the interview to coincide with the recording. The notes were used as reference during the interview session for clarity purposes and again later during the coding process.

### **Data Coding and Grounded Theory**

The analysis of the coded data was the most important element of the research. This discussion describes how the Grounded Theory was utilized to investigate the data to determine major themes that answered the main research question.

Prior to any analysis or data sorting, the researcher read the interview transcript several times to get a feel for the context and the communication between the participants. All of the handling and organization of the data was conducted by the

researcher. After the researcher felt comfortable with the raw, uncoded information, then Grounded Theory analysis began.

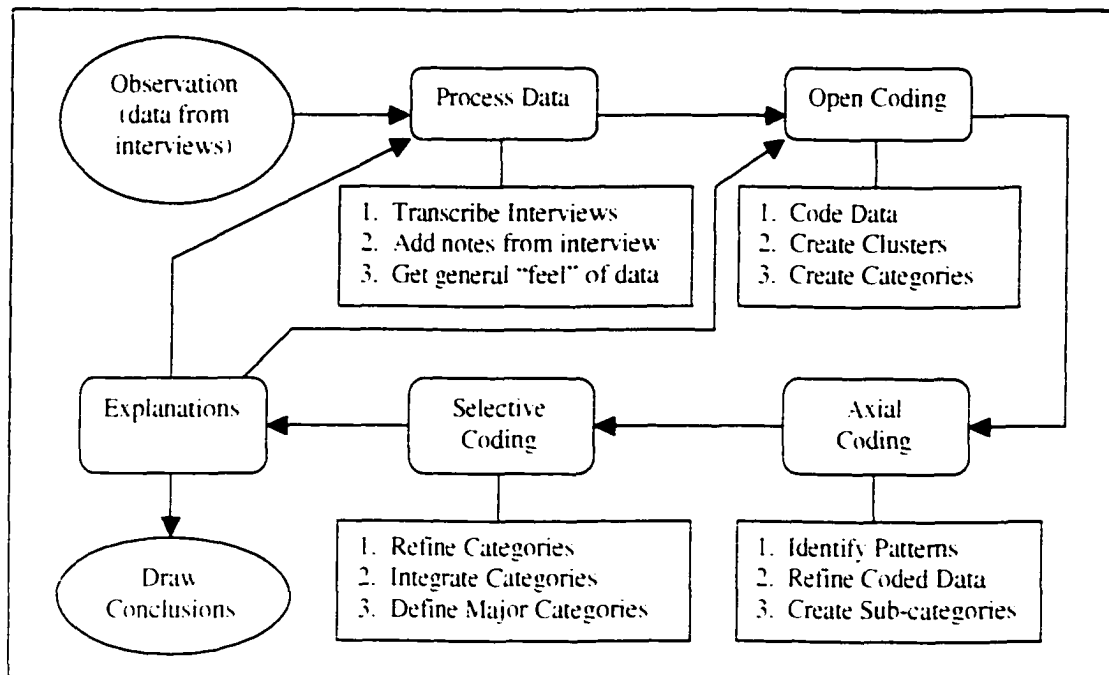
All coding occurred during the analysis. No segments or categories were created prior to the actual analysis of the data (a priori). This would be essentially the grounded approach originally advocated by Glaser and Strauss, and it would allow for a more open-minded and more context-sensitive approach than a pre-structured coding effort (Miles and Huberman, 1994). Coding was based on a line-by-line analysis of the transcript, with codes being identified per paragraph of text. Coding groups were developed as they were observed in the data by the researcher. Codes were given descriptive names that semantically matched the data, instead of using numbers or acronyms. Codes and notes associated with the data were written directly into an electronic version of the interview transcript, and then later organized into a separate document. The purpose of this was to keep the codes linked closely to the data during the coding analysis. Because all of the coding would be focused on a single interview transcript, the researcher would rely upon tabulated groups of text-based codes rather than a graphical representation to link codes into larger categories.

The coding occurred in two phases. The first phase was an open coding based on the general thoughts and ideas in each paragraph of conversation. Multiple codes were allowed for the same paragraph. After going through the transcript looking for general thoughts, then the researcher again performed coding on a line by line analysis, this time searching for "in vivo" codes, that is phrases used repeatedly by informants. This second coding attempt searched for particular words and phrases that fit into the codes developed from the first pass. The second coding effort was repeated multiple times through the entire text until the researcher was confident that sufficient "saturation" had been achieved and additional codes would not be forthcoming unless unreasonably forced. Through this coding process, the codes and categories were revised as relationships in the data became transparent to the researcher. Also, this repeated review of the interview and the coded data allowed for inferential codes to be developed, that is, codes that are not obviously clear in the data but which either imply or are intrinsically linked to subtle meanings. The coding effort continued until all of the codes were linked and related to each other as well as to the central concept.

## **Developing Major Themes**

After the information was thoroughly analyzed and assembled into separate categories, the researcher began to search for themes and trends in the coded data. After the coding process created major categories, these groups were analyzed as a whole, with general patterns and themes emerging to represent the entire group. By combining these patterns with the individual notes attached to the data, the major groups were further reduced into sub-groups by identifying key factors that were important to the job seeker. The researcher then considered if and how the potential factors in each group might be relevant to the decisions made by the engineer during the job search. In a mental test of repeatability, the researcher developed a set of questions for each group, that when posed to the focus group, should have invoked responses that were similar to coded data. The group of questions was then examined by the researcher to see if they were appropriate to the larger context of the study problem. The researcher considered the different types of answers that could be a response to the researcher's theoretical questions and still be consistent with the data and the coding. If there was only one likely response, then he determined that a key factor had been identified. If multiple responses were likely, then it was determined the data cluster had not been reduced to a common denominator and further partitioning and analysis was necessary. When the researcher considered the data analysis to be complete (after saturating potential questions and answers), the final set of factors was developed.

A general map of the Grounded Theory coding analysis is provided in Figure 4. A more detailed map is provided in Figure 6 in the Results chapter.



**FIGURE 4 General Design of Grounded Theory Coding Analysis**

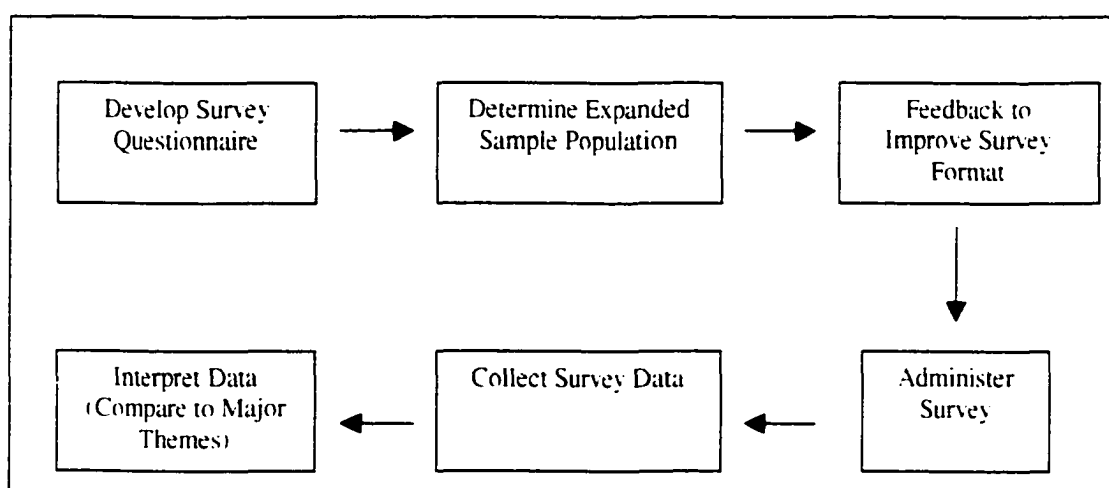
## RESEARCH DESIGN FOR PHASE TWO

In the qualitative portion of the study, the major themes were developed from the Grounded Theory analysis. These themes were specifically designed to present factors that young engineers used in the decision-making process to enter into employment into the consulting industry. To further explain this phenomenon, the researcher chose to use a quantitative study to add credibility to the findings. Survey questions were developed from the major themes to provide additional information about the themes that were identified through Grounded Theory. The quantitative data was compared to the themes from Phase One, and those themes that were supported in Phase Two were identified as important factors that influenced employment decisions. Using quantitative investigations to add merit to the identification of major themes increased the possibility that the factors could be developed into workable theories, and subsequently tested through hypotheses by future researchers.

The primary limitation of the qualitative research was the difficulty in meeting traditional notions of validity and reliability. The quantitative portion of the research

focused on adding credibility to the major themes developed from the qualitative study. This was accomplished by stating the major themes, then creating the survey questionnaire with the intent of showing support or refutation of themes discovered during the qualitative phase of the study. The use of the Likert-scale format allowed for the participants to discriminate in the level or degree of response to each question. Without the ability for the participants to demonstrate such discrimination, then the data would be limited in the credibility that they would provide to the research.

Figure 5 outlines the Phase Two research design.



**FIGURE 5 Research Design for Quantitative Phase of Study**

### **Development of Survey Questionnaire**

The researcher created a single stage, univariate, Likert-scale cross-sectional survey. The instrument used was a self-administered, nineteen-item, Likert-format questionnaire with five response options (strong agree, somewhat agree, no preference, somewhat disagree, strongly disagree). For a few questions, the Likert-format was not well suited to provide meaningful data from the responses, and instead a multiple-choice question was asked. This occurred for questions for Theme 13 (When did you first begin to consider consulting as a career?), Theme 18 (What do you consider is a reasonable

amount of overtime for salaried employees to work without compensation?). and Theme 19 (Which type of management system would you prefer to work in?). For these questions, a list of responses was provided that would make sense to the respondent and allow them leeway to provide one of a range of answers. The survey questions are included in Appendix D.

The survey was designed so that an answer was required prior to the next question being administered. This was done to eliminate response bias that would be created if the respondent skipped questions or gave answers that could not be adequately interpreted. The respondents took the survey via the Internet to a secure website maintained by Old Dominion University. A password supplied by the researcher was required to gain access to the survey. The survey results were collected and sorted into an electronic database.

The researcher treated the questionnaire construction and its purpose as an instrument to interface between the participant and the researcher. Unlike the interview environment, the researcher would not be able to make direct observations of the participants and be able to react and/or modify statements or provide additional clarification. The survey format had to be able to clearly and concisely ask direct questions and allow for the respondents to provide honest and accurate answers without any outside help.

The researcher considered the assumptions underlying the questions (Leedy, 1997) and made sure that the language was clear for those who would be responding to the questions, even for those who were not familiar with the qualitative interview. After developing the questions and the format, the survey was tested on a small group of non-representative individuals to test for clarity. Later, for the purposes of using feedback to improve the questionnaire, the survey was provided to the original respondents for their review with regards to clarity and usability of the survey. This is further discussed in the chapter on Results.

The survey was designed to be completed by the respondents in less than ten minutes. It used a graphical interface so that a keyboard and mouse were required to answer questions. The questions were simple and straightforward, displayed in large fonts, and used common terms of the English language. Personal information such as name, age, occupation, etc. was to be typed by the participants. For almost all questions,

the respondent merely had to click on a response using a mouse and then click on a second button to move to the next question. The respondent was able to change his answer before moving to the next question. A single question was shown at a time, one question per screen. The choice of answer selections was shown immediately below the question on the screen.

The survey was intended to be accessed by the respondents through the Internet. The survey format was designed specifically to be user-friendly as viewed and administered from a computer monitor. The color of the background screen and the color of the written text were contrasted to allow for clear understanding of the questions without causing eyestrain. The format tried to follow common forms of Internet-user interface pertaining to how questions appeared on the screen and to how the questions could be answered.

### Create Survey Questions

The questions used in the survey questionnaire were developed directly from the major themes, as each question was intended to allow the respondent to indicate various degrees of agreeing or disagreeing with the major theme. These questions were developed by re-wording the major themes into the form of a question and then providing a set of applicable responses. An example of this is provided in Table 3.

Theme 3:	Geographic location is an important factor in a candidate's decision of accepting a job.
Question 3:	Was geographic location an important factor in your decision to accept a job offer with your first employer?

**TABLE 3** Example of Transition from Major Theme to Survey Question

Use of a Likert-format allowed the respondents leeway in their responses and prevented the respondents from being forced to provide an answer that they did not want to give. For most questions, agreement by strongly or somewhat agreeing to a question meant that



the respondent supported the statement. Likewise, disagreement was to be represented by strongly or somewhat disagreeing, which indicated that the theme was rejected by the respondent's perspective.

### External Feedback

The researcher improved the design of the format by having the questionnaire reviewed by an individual not affiliated with the research project. This review took place prior to submitting the survey to the original four interviewees in the feedback stage of development. The survey was reviewed for grammatical and general formatting issues. Minor spelling errors were found and corrected during the external review.

### Feedback from Original Participants

The survey questionnaire was administered to the original four participants to determine if the major themes were in agreement with the qualitative data. This feedback, also called member checks (Creswell, 1994) allowed the researcher to determine if the survey asked clear questions and if the survey format was easy to use. The researcher spoke to the original participants after they completed the survey to determine if any improvements in the format or the measuring instrument were necessary.

It was found that the original format allowed the respondents to skip questions without providing answers, which would have introduced selective bias into the results had it not been corrected. The survey was corrected to require the respondents to provide answers to all questions. There were also some issues regarding using the password to access the survey via the Internet, but was later determined to be a temporary computer network problem. After correcting the questionnaire, the survey was re-administered to the original four participants and the results were recorded as part of the research's data.

After the format was improved based on feedback suggestions, the survey was officially administered and the feedback results were tabulated and compared to the themes. For the purpose of providing external validity (Creswell, 1994), the researcher

desired to know if there were significant differences between the major themes discovered by the qualitative research and the major themes that were actually supported by the quantitative data.

### **Administering the Survey and Data Collection**

The researcher made inquiries within the Lynchburg area to determine the actual number of individuals that met the population criteria. This involved personal phone calls to managers at engineering firms and conferring with sales representatives that served local firms. Four additional young engineers were identified to be included along with the four initial respondents (from the original sample population) for a total of eight. After the researcher determined which firms had young engineers, the researcher contacted the lead managers at those firms by telephone and explained the purpose and intent of the research. The researcher offered to share the results of the research with those firms who would pass the survey questionnaire onto their young engineer employees. The response was very positive and all four local consulting firms with young engineers agreed to participate.

After the telephone calls and explanations were made, the researcher contacted the managers by email. The email contained a link to the questionnaire website and the password required to access the questionnaire. The email message also briefly explained the purpose and intent of the survey questionnaire and promised that the participant's responses would remain confidential. The managers forwarded the email to young engineers within their organization.

The survey was administered through the Internet using computer software specifically developed for quantitative research. The software automatically saved the data into an electronic database. When the researcher wanted to review the survey results, he would contact a professor at Old Dominion University. The results were then sent to the researcher electronically.

## **Interpreting the Survey Data**

The format to display the results was selected by the researcher to reveal data in a fashion that was useful for interpretation. This included ensuring that the displays included the unique identification attached to each respondent as well as the date and time that the survey questionnaire was taken.

Further manipulation of the data display allowed the researcher to view each question along with the answers given by each respondent. This allowed for a quick and easy evaluation of the results on a question-by-question basis.

The results from the survey questionnaire were collected and tabulated in a researcher-created table that clearly indicated the how many respondents chose each of the possible answers for the questions. The tabulated results of the study are shown and discussed in the Results section.

## **Reliability of Findings**

In order for the findings of the research to be credible, the research design had to be first defined. Validity and reliability of the research would not just occur by coincidence, but had to be factored into the research design. This section discusses how the research was designed to avoid error and bias that would weaken the findings of the study.

### Validity

In the context of this research study, validity of the major themes meant determining if the major themes were plausible, fit the data, and could be duplicated by another researcher performing an independent study (Miles and Huberman, 1994). Strauss and Corbin (1998) explained validation by stating that by the time of integration, the theory that emerges from data becomes an abstract rendition of that raw data; therefore, it is important to determine how well that abstraction fits the raw data.

The researcher performed an internal validity test by comparing the major themes to the original data to determine if and where there were any discrepancies. Internal

validity was the freedom from bias in forming conclusions in view of the data (Leedy, 1997). This involved working directly from the grounded data and following a research guideline to prevent response and researcher bias from clouding the analysis. The researcher consistently reviewed the interview transcript and the coded data to make constant comparisons. When the major factors were identified and stated as themes, the researcher read through them and mentally compared them to his understanding of the data.

Second, the themes were posed as questions in a survey and presented to the original participants. This external validity was based on how well the conclusions can be generalized to other cases of a larger population (Leedy, 1997). External validity was used in the feedback from the participants by allowing them to review and critique the interview transcript and when the quantitative data from the original four interviewees was compared to the themes in a visual inspection to see if the theme and survey data agreed.

In another external validity test, the results from the eight respondents in the quantitative study were collected and tabulated. As previously mentioned, if the majority of the answers were in agreement with a theme, then it was considered to be supported by the data and was then determined to be an important factor that influenced employment decisions. If the majority of the data did not support a theme, then that theme was considered to be refuted. External validity was also used when the researcher had the survey questions and format reviewed by an individual otherwise not associated with the study.

Content validity was also involved in the creation of the quantitative study. This type of validity was concerned with the accuracy with which an instrument measured the themes under study (Leedy, 1997). The criteria for content validity were subjective in nature, that is, based upon the judgment of the researcher. The researcher's interest in content validity concerned making sure that the survey questions would elicit the data being sought. This involved in examining the survey questionnaire to ensure that the questions could be clearly understood and the associated list of responses was appropriately matched to the question.

The researcher used face validity (Leedy, 1997) to ask two questions about the research study: (1) Are the instruments measuring what they are supposed to be? and (2) Was the sample being measured representative of the behavior or trait being measured? Face validity was similar to content validity in that it relied on the judgment of the researcher. The researcher, being the prime measurement instrument in the qualitative phase of the study, followed the guidelines of the methodology and research design. By describing the method and design used in the study, the researcher was able to reference his data collection and analysis techniques with those that were described in the research plan. For the quantitative phase, the researcher made sure that the questions were closely related to the themes and the survey questionnaire format was appropriate for gathering quantitative data associated with the main research problem.

The second face validity question from the previous paragraph was concerned with the selection of the sample population. The researcher selected the original interview group specifically to aid in the collection of data and the ease with which it would allow him to perform feedback tests. The original interview group definitely matched the criteria set forth in the research problem, as these participants were hand selected by the researcher. For the second phase of the study, when the survey was administered to additional members of the population, the researcher met personally with two of the participants and also reviewed the characteristics of the sample population during data collection from the survey to make sure that all of the participants met the population criteria.

The final test of the research was one of internal validity. The writing of this study required the researcher to review all of the decisions that had been made over the course of the research. Continuous questioning of assumptions and results were encountered during the creation of this descriptive record of the research. Several times the researcher re-visited data and reviewed texts on qualitative research to remove his doubt and convince him that the research was objective and the results justified by proper research techniques.

### Reliability

Reliability was addressed by the development of the research plan and the clear descriptions given for the data collection tools used in the research. Reliability was considered to be the consistency with which a measuring instrument performs (Leedy, 1997). By giving detailed descriptions of the instruments used and the manner that they were utilized, the researcher made it more likely that the outside observer will be able to understand how data were studied. These descriptions also deal with reliability because it allowed others to evaluate the research tools and methods so that, if other researchers should desire, they could re-create these instruments and reliably obtain similar results from a similar sample population.

### **Summary**

The design of the research was based around the mixed method approach. The particulars of the design were developed to deal with the three major sub-problems: selecting a representative sample population, determining the instruments to gather data, and determining the instruments to measure/analyze the data. By clearly documenting the research plan, the execution of the research would yield useful results that could withstand the scrutiny of an academic review.

The research plan was devised to investigate the research problem within the context of scope, promote objectivity, and eliminate bias (within reason) while still allowing the research to be creative, robust, and reliable. The research design first identified the sub-problems and explained how they would be resolved.

The research plan was developed into two separate phases, one qualitative and the other quantitative. The Phase One qualitative research plan revolved around obtaining quantitative data from a representative sample population for analysis using Grounded Theory; this would create the major themes. This included creating semi-structured interviews with the sample population and collecting data, then analyzing that data using defined analytical tools and methods. Phase Two was devised to create a quantitative tool that would provide additionally data to indicate if these major themes would be

supported by the large population of Generation X consulting engineers in Lynchburg, which in turn would lead determining what are the important factors that influence employment decisions of Generation X consulting engineers. The development of the survey questionnaire and the creation of the survey questions were described, including how feedback was incorporated to improve the quality of the Phase Two research.

## **RESEARCH RESULTS**

This chapter focuses on the research results. Certain elements of the research study have been explained in the discussion on the research methodology and design. These discussions continue in the following sections and are intended to bring full disclosure to how the research investigations and analysis occurred and how the results were obtained.

### **RESEARCH EXECUTION – PHASE ONE**

The first phase of the research focused on developing semi-structured interviews for the sample population, then collecting the data from the interviews for analysis through Grounded Theory. The process, as it occurred during the research, is explained in the following discussion.

#### **Questions for Semi-Structured Interviews**

After the research design was completed, the initial thrust of the qualitative portion of the research execution was to interview a sample population that would be representative of young engineers in the consulting field within the geographical confines of central Virginia. The interview would be exploratory in nature, as the intent was to recognize emerging themes from the sample population that would allow the researcher to recognize factors that influenced the employment decisions of the sample population.

The researcher intended to begin the interview phase of the research with a list of general questions that would be used to guide the interview (called guiding questions). These guiding questions were open-ended and kept the dialogue open by involving all participants. These open-ended questions led to more specific inquiries, depending on the responses given by the participants. While the interview was intended to be based upon open and unrestricted dialogue between members of the sample group, the researcher wanted to be prepared in the case that the conversation began to wander or the interviewees were not taking advantage of the open format to freely discuss their



attitudes, opinions, and experiences. The original list contained 26 questions. However, as the researcher continued the study of how to conduct objective research, he realized that these questions were too specific and could have possibly led the participants into giving biased responses. The researcher modified the list of general questions and narrowed them down to eight broad topics. This list of questions covered why students choose engineering, short- and long-term goals, the importance of tangible and non-tangible rewards, non-work issues, recruiting, etc. The inquiry process was intended to proceed from broad general questions to provide freedom and flexibility to explore the topic in depth, then to move onto more specific questions that were dependent on the flow of the conversation.

The list of general questions were concerned with:

- Why and when students choose to study engineering
- Short- and long-term employment goals
- Tangible and intangible rewards
- Work issues regarding vacation, flextime, overtime
- Non-work issues regarding leisure activities.

The list of general questions that were used to guide the interview is included in Appendix B.

#### Additional Use of Questioning

The researcher knew that other types of questions would have to be asked once the dialogue moved beyond the probing of the guiding questions. Although these additional questions were not explicitly developed prior to the interview (which could have caused bias), the researcher prepared himself by investigating types of questions that could be used during the interview. Strauss and Corbin (1998) discussed three suggestions that were used in this study for qualitative data gathering. Guiding questions were discussed previously. The others were sensitizing questions and theoretical questions.

Some inquiries were intended to be sensitizing questions that allowed the researcher to gain perspective into how the participants rationalized during the career selection process. Sensitizing questions were meant to determine if the meanings and

experiences expressed by the interviewees were the same or different from the other interviewees. Other questions were theoretical in nature and were designed to reveal comparisons and contrasts between data and to provide insight into relationships between potential influencing factors and outcome (the decision to work for a consulting firm). The relationship between factors and outcome was important because the researcher was concerned that the respondents might disclose personal opinions that did not actually influence their employment decisions; if the researcher was not careful this would negatively impact the research.

### **Overview of the Interviews**

The interviews provided the source of data for the qualitative analysis. Before discussing the raw data obtained in the interview, the following section provides an overview of the participants and interview process.

The interview group consisted of four young engineers and the researcher. Each of the four engineers was born after 1971 and employed in the consulting field. All of them were employed at Versar Global Solutions, Inc. (Versar) in Lynchburg, Virginia. Each had come to work at Versar without any previous, full-time, permanent employment. These individuals were chosen because they had all worked with the researcher on engineering projects and therefore each of them had an ongoing relationship with the researcher. This was considered advantageous because it would allow the researcher a better perspective of the discussions, and would enhance the researcher's ability to decipher and interpret the dialogue. The researcher also intended to ensure that the discussion provided opportunity for generalized data collection and that the dialogue did not become so specific that it could not be generalized to represent that larger population.

The interview session lasted approximately one and one-half hours and was tape-recorded. The researcher provided lunch and the dialogue took place in a private meeting room. The interview format was explained to the interviewees prior to the interview. They were told that the purpose of the meeting was to openly discuss the reasons that influenced their decision to pursue employment in the consulting field, and that they were allowed to speak on whatever ideas that they thought were relevant. It was also

explained that their discussions would be considered privileged and that the researcher was present only to mediate the conversation and keep it focused on the relevant topics.

### Transcription of the Interview

The researcher transcribed the tape-recorded interview verbatim and read the transcript multiple times to check for typing errors. Then copies of the transcript were provided to the interview participants so that they could make comments and indicate any mistakes in the transcription. Afterward, the researcher added commentary and notes throughout the transcript. This was done so that the researcher could attain a comprehensive appreciation for the interviews and the context of certain parts of the conversations. The researcher felt it was important to understand the information that came from the interview prior to coding the data. This approach created an opportunity for the researcher to better relate data to different parts of the interview and to place unique thoughts or comments into the greater context of the entire dialogue. Later, during the coding analysis, the researcher used the transcript to identify phrases (called in vivo codes) and sentences that related to the recruiting and hiring of engineers as well as to the personal attitudes and opinions of the engineers themselves.

### **Interview with Generation X Consulting Engineers from Lynchburg, Virginia**

The following sections describe the interview and raw data collected from the investigation of the sample population. The raw data was later refined and analyzed to determine the major themes.

### Discussion of the Interview

The researcher chose to represent the data from the interview session in a descriptive, narrative form. Narrative text has been the most frequent form of display for qualitative data (Creswell, 1994). The written description has been used to communicate a holistic picture of the data that used in the Grounded Theory analysis to discover the

factors that influenced how young consulting engineers in Lynchburg made employment decisions.

The following is a description of the data that was collected during the interview. It has been summarized and organized for the benefit of the reader's understanding. Statements made by the interview participants and taken directly from the interview transcript are shown in italics with quotation marks.

The researcher has occasionally added commentary notes to the following descriptions of the data based on his observations and experiences. These notes and statements have been added during the writing of this study (after the major themes had been developed) for the purpose of helping the reader to understand the data. The researcher has treated these auxiliary comments as merely a technique to help communicate a clear picture of the data to the reader. The researcher stresses that the coding analysis of the data was focused specifically and directly on the interview transcript and that the notes added to the descriptions below were not included in the Grounded Theory analysis.

### Young Engineers' Sense of Identity

The interview revealed that the participants had a strong sense of identity that resulted from being graduates of engineering programs. They were very willing to identify themselves according to the stereotypes that society had created for them, and did not seem eager to re-define normal definitions of what being an engineer means. Unlike the standard cultural stereotype that young Americans demand individuality, the participants exhibited a comfort level with being associated with a larger set of the population. The research was not able to reveal if this was because of the ease which participants could quickly assume a professional identity, or if this was a psychological feature stemming from a lack of experience and confidence in handling "real world" situations.

The desire to seek out existing stereotypical definitions for themselves was further exemplified by the participants strongly identifying themselves according to the university where they received their undergraduate engineering degree. In particular, this

phenomenon included the idea that being an engineer made it acceptable, perhaps even preferable, for being skilled at analytical thinking such as mathematics and science while struggling with writing and literature. (*"Your strength as an engineer is math and science and your weakness is in English. Engineering just matches your strength and weaknesses."*) The researcher noted that if students desired to become engineers because of their math and science skills, then it would be natural that they would later expect an engineering job to entail those same math and science skills. (*"I was always good at math and science. Someone told me to try engineering."*) When the researcher asked if there were other reasons that the participants decided to study engineering, one of them stated, *"When you are in high school, no."*

The interviewees extended their stereotyping by grouping together individuals who were employed in non-technical professions. The participants demonstrated a belief of arrogance that engineers were intellectually superior to those with liberal arts or business backgrounds, and they made disparaging remarks about non-engineers to intentionally stress the differences in individuals along stereotypical guidelines.

### High School and College Experiences

The participants expressed that their decision to enter into a technical field was generally made between their sophomore and senior years of high school. This did not necessarily mean engineering was their favorite technical choice. At least one member of the interview group switched into engineering from a science field after college enrollment, and another two changed disciplines within the engineering field.

The participants did not choose a prospective discipline of study (such as electrical engineering) or make career choices until after they selected a university to attend. (*"You decide to be an engineer before you decide to work for a consulting firm."*) The participants examined most or all of the state-funded schools that offered technical courses, then made their final selection based on the reputation of the university's technical programs weighted against educational costs.

The participants' expectations as teen-agers (and reinforced by later comments) appeared that high school impressions of engineering have little impetus in creating an

understanding of consulting firms or other types of engineering jobs. (*"When you are in high school all you think about is money."*) At this age, these high school students had not enough exposure to engineering in a broad sense to relate to the specifics of consulting and were unable to differentiate the complexity of engineering disciplines and how they related to the job market. (*"High school is just about picking something, you know, to do. What can you support yourself on."*) Based on the researcher's observations, it seemed that their maturity level during high school and subsequent comprehension of the real world was too limited to understand the difference in different employment situations. (*"You really don't know anything about working anywhere."*) They could have related to material rewards offered by a profession, but otherwise the participants explained that it would not be possible to convince them to enter into a particular profession based on the details of what that profession entailed. (*"We'd first consider that [an engineer] made pretty good money and then we'd consider the career choice and then we'd try to evaluate it."*) Another participant said, *"You don't know what reality is like when you are in high school."* Only one of the participants, prior to entering college, had considered the kind of work that he wanted to do, and even he did not understand what his choice would entail. (*"I didn't have a clue what a structural or a civil engineer did. I knew, well, civil handles roads and bridges, that's what I always thought about civil. But then you get in [college] and there are others you learn and you like. But I don't think you know that until you get to school."*)

Every member of the interview group was enrolled in college engineering courses for at least two or more years prior to having any concrete ideas concerning what kind of employment they wanted for a career. For the most part, participants entered into their college curriculum without any knowledge that the consulting profession even existed, much less what kind of work that consulting engineers performed. (*"I didn't find out (about consulting) until I started looking for a job...."*) None of them learned much about consulting until they began to search for a job (*"I didn't know what consulting was before they [a consulting firm] came to interview me. I knew I wanted to do something with thermo[dynamics], heat transfer, fluids, that kind of thing versus kinematics or vibrations."*) Each of them had mistakenly believed that their college coursework had given them insight into the majority of possible profession selections, and since

consulting engineering work was not included in the typical theoretical and manufacturing based curriculums, consulting engineering was not considered to be an available option for engineering students. (*"You take electives in college to determine if that's what you want to go into."*) Those engineering students in disciplines with strong ties to the manufacturing industry (such as mechanical or electrical engineering) knew less about consulting engineering than did those in disciplines without strong industry ties (such as civil and structural engineering). All of the participants learned about the consulting profession primarily during the job interview from descriptions explained to them by the job interviewer.

**Researcher's Comment:** The researcher took note of the obvious disadvantage of learning about consulting during the job interview, because such an explanation was likely to create an unrealistic perspective due to the inference of personal bias of the interviewer, the limits of the interviewer's communication skills, the psychological mindset of the interviewee, and the willingness of the interviewer to portray an extremely positive view of the consulting profession.

The participants viewed internship employment as an important experience-builder. Those who had been employed as interns felt that it gave them an opportunity to deal with other people in a professional environment. They also believed that it enabled them to form opinions about what a permanent engineering job would be like. (*"It gives you an opportunity, if nothing else, to interact with other people in a professional environment. You don't get that in school. I mean, you go to class and people have hair down past their shoulders."*) However, none of the participants had any strong inclination to return to their internship employer after graduation, and there was no evidence provided to support the idea that the internship employer was at any advantage when it came to recruiting those engineers for full-time employment.

When the students began to look for permanent employment, the principal guiding tool was their college curriculum. The participants looked for jobs that required skills similar to those that were taught in courses for which the student had a positive memory (probably either because the students received high grades or felt comfortable with the course material). One of the participants declared that he used elective courses to help him determine which specific fields of engineering would interest him as a career.

**Researcher's Comment:** For the consulting industry, the use of elective courses as a tool for selecting a particular career negatively impacts recruiting efforts, because none of the participants took any elective courses that focused on skills exclusively used in the consulting engineering field. Consequently, none of them knew much about the consulting profession until they learned about it during the interview.

However, because the students acknowledged that they had little knowledge about particular jobs, the students' correlation between college courses and full-time employment was likely mere speculation regarding which technical skills would be required to meet particular employment opportunities. The students were looking for jobs in areas in which they had hoped that they had already learned the sufficient technical skills necessary to sustain a comfort level with the employer's expectations.

### The Job Interview and Recruiting Tools

The participants spoke about the importance of the job interview experience. They felt that it was important to be respected as an individual and not just a number. When the interviewer was familiar with their resume and background and took the time to get to know the interviewee, the participants expressed a strong positive reaction. This made them feel that if the company was taking the time and effort to be good hosts and to make a sincere effort to find the right person for the job, then the job seekers were more inclined to have a desire to work for that company. (*"When I came here I was overwhelmed by how much attention they paid to the interviewee, which I hadn't seen anywhere else. I had interviewed at three or four other consulting firms and it was kind of quick. 'Your in the way, let's get you out of here so I can get back to work.'"*) The job seekers were turned off by interviewers who were unfamiliar with the seeker's resume and by those who treated the interview as a nuisance. (*"If they interview you and treat you like a number, then that is pretty discouraging."*)

The participants also evaluated how well the interviewer "sold" the company. They felt that if the interviewer was not excited about his job, that the participants themselves would not be excited to work there. (*"If there were a lot of cool projects going on then you should have told us about them during the interview."*) They expected



the interviewer to be knowledgeable about the company as a whole, as well as the detailed nature of the job for which the participants were interviewing. The participants seemed to be able to create a comfort level by understanding the overall types of the work that the company did in addition to the specific job description itself.

Another element of the recruiting process that influenced job seekers was the physical nature of the on-site interview at the company's location. It was considered a positive influence if the setting looked like a place where professionals would work, and this included the behavior and interaction of the company's employees. This was related to the young engineers' desire to work in a "clean" office environment rather than in a factory setting. (*"That is another side of consulting that I liked: coming to a clean environment and working and I felt like industry was dirty."*)

The participants indicated that their job search was influenced strongly towards those companies that held on-campus interviews, as well as the availability for the participants to take part in those interviews. (*"On campus interviews are a very good thing. That is probably the best thing."*) Companies that perform on-campus interviews received considerable more attention than those companies that posted job openings only in newspapers or on the Internet. The students focused their job search towards on-campus interviewing, and the majority of efforts to learn about jobs or companies revolved around university-provided career planning and on-campus recruiting. Students relied on the university's on-campus recruiting program to help them find jobs, and only after that process was unsuccessful did they turn to other sources. When the students did look for job advertisements in newspapers, they read the want ads from major metropolitan areas in the state of Virginia (Washington D.C., Richmond, and Roanoke). The participants said that they might be interested in direct mailing of information, although none of them had any experience with such a recruiting effort. When asked for ideas that would help them to better understand the company with which they were interviewing, the participants mentioned videotapes of projects and photographs with explanations.

The participants felt that using the Internet or newspapers for recruiting purposes was of limited use to them. While it allowed them to learn about a company and the geographical locations of its operations, these ads could not sell the company (that is,

convince a potential recruit to be seriously interested). The researcher noted that due to young engineers' lack of understanding about engineering jobs, any kind of advertising would have to convey information in a special format to help them understand the profession.

**Researcher's Comment:** The use of the Internet is continuing to expand. Many companies have only very recently begun to use the Internet as a significant part of their recruiting program. Web sites dedicated to matching prospective employees with employers (i.e., Monster.com©, HVACjobs.com©) were not prevalent during the job search for most of the participants. The fact that the Internet has become a more common tool for engineers to use when looking for work places additional emphasis on the participants concerns that a website cannot sell a company, because Internet ads cannot address many of the concerns and factors that influence employment decisions.

### The Job Search – What Young Engineers Were Looking For In a Job

This section of the discussion could not begin without first referencing the reader to earlier paragraphs concerning the young engineer's perceived relationship between college curriculum and what the young engineer desires in a job.

Prior to graduation, each of the participants had preconceived notions of what an engineering job would be like. These included options such as engineering sales, manufacturing, and product design. Their images of employment were based on a combination of college curriculum, Dilbert© cartoons, internship employment experience, and photographs from brochures, among other things. While the participants had a unique set of wants, needs, and perspectives that led them to the consulting industry, they also, like everyone else, wanted to have a job that they looked forward to going to everyday.

**Researcher's Comment:** One of the primary reasons the participants decided to interview with consulting firms was the availability of jobs in the profession at the time of graduation. Many of them graduated at a time when the manufacturing industry was not hiring due to economic conditions. This economic fact alone could very easily be the most important reason why any of the participants are not currently working in other industries. What this indicated is that perhaps there is an advantage for consulting firms to recruit young engineers when other industries are not hiring

because this reduces competition, therefore, an understanding of larger economic factors affecting the labor market could be significantly advantageous.

The participants expressed a strong desire to work with and to work for individuals who had common technical backgrounds (i.e., electrical engineers wanted to work with and work for other electrical engineers). This desire seemed to be related to the strong identification that the participants had with being engineers. (*"I don't want somebody who has no idea what I do telling me how to do my work."*) They also felt that it was highly desirable to work for a manager that could relate to them on a technical level (*"They've got your same major. They've got your same degree, things like that. That makes a big difference."*) Also, working closely with a mentor who had a similar technical background was considered to be very positive. The participants expressed a negative reaction to the idea of working for or closely with individuals who had a business, finance, or liberal arts backgrounds. This related strongly to the interviewees' negative comments about non-engineers. The participants' strong preference to work with individuals of similar technical background applied equally to both peers as it did to supervisors.

All of the participants mentioned geography as a factor in their job search. This did not mean that they would not work in a location outside of a set of geographic limitations, only that they did not actively seek work outside of those limitations. None of them expressed concern that a smaller community would have fewer competing consulting firms. The reason for applying geographical limitations seemed to be primarily based on being close to family and friends. (*"I wanted to be in Virginia. I wanted to be near family."*)

In terms of everyday work, the interviewees expected companies to provide competent managers, a pleasant work environment and challenging work, as well as to treat them with respect. The young engineers desired long-term employment and job security, in a place where they could settle in for a few years and try to live like "normal adults." (*"I wanted to go somewhere and know I was going to be there and settle down. I didn't want to be job hopping or moving."* and *"[Recent graduates] like to go somewhere where you can get your stuff out and throw your boxes away."*) One participant mentioned the benefits that an employee receives for long-term employment.

*(“It’s an investment of your life and your time. You work here five years you accrue vacation. So, you want to go somewhere where you can meet those milestones, you know. If you leave then you’ve lost that four and a half years and you’re starting over now on the seniority level.”)*

Researcher’s Comment: Generation X engineers viewed long-term employment as a period of time extending between two and five years.

They wanted variety of assignments so that they could learn new skills. The participants were concerned about being constrained to a very specific range of activities that would hinder their learning and advancement. Additionally, they were concerned about becoming bored with doing the same thing everyday. *(“But I think that I am very much attracted to the variety (offered by consulting firms) because nothing is ever the same. It’s always different. It’s a challenge. I think it’s better than sitting behind the desk designing the same thing for thirty years.”)* The desire for variety of assignments seemed was a significant reason why the participants were excited to learn about opportunities in the consulting profession. *(“That was kind of my conception about what engineering was and then I interviewed with [engineers from a consulting firm] and I realized that there was a whole different world out there as far as engineering was concerned.”)* Prior to learning about the work that consulting engineers did, the participants assumed that engineering work was focused on a small and narrow set of assignments.

Although the participants were concerned about becoming bored with performing simple tasks, they were at the same time worried that their employer’s expectations would be too high. *(“It helps if the people you work for are realistic about your abilities. You come out of school and you are in consulting, let’s face it, you can’t do anything. Basically, you need to be spoon fed.”)* The interviewees expected some type of on-the-job training (whether it be formal or informal) and time to learn about the workplace prior to becoming fully engaged in the work of the company. *(“We assume that you are going to ease us into things. I knew that coming out of college that I wasn’t going to be able to specialize in what I did, not coming right out until I had some exposure to it.”)* The interviewees wanted to be mentored and be given projects with very high chances of

success so that they could gradually learn engineering skills. The participants did not want to be placed immediately in a situation where they would be forced to deal with others face to face in business relationships, whether it be a traditional sales job or on a project basis. Young engineers expected to be given realistic challenges that were well suited to their skill level, in particular those that help them to develop fundamental skills used in the profession. Some of the participants indicated that, during the interview process, they came to believe that consulting was a profession in which they could hone their technical skills before being forced to interact directly with clients.

The participants were concerned about teamwork issues in the workplace. None of them expressed a positive reaction to the idea of working closely to others in a team environment, excluding working closely with a mentor. They indicated that team-driven projects in college often meant that the workload was distributed unevenly, so they assumed the team concept in the workplace would be similar. (*"Some people can slack off..."*) The participants liked the idea of the potential support offered by other team members, but this was not strong enough to overcome feelings generated from their previous college experiences. (*"You might want to be included on a team if you are not confident enough in yourself and your ability."*)

The participants expressed concern about how their first job would impact their future occupations. Despite their youth, they considered the potential availability of future opportunities in particular specialized fields, meaning that they did not want to be limited when it came time to move on to other employers. They wanted to choose a distinct career path, rather than having an employer choose it for them. They also wanted to be in a position where they would someday be given opportunities at advancement into management as a line manager or a project manager. The participants had very strong desires to gain meaningful experience so that they could be marketable in the future. (*"If you aren't learning anything then you have to go where you can be taught, if you didn't learn at all before you got here."*) While none of the participants accepted their first job with the idea that it would be short-term, at the same time they also knew that it was very likely that they would have multiple employers throughout their careers.

The young engineers thought it was a great advantage for the company to be able to offer them opportunities to travel and see new things, especially to sites that would help

the young engineers better understand their jobs. (*"It's good to get out. When you get out of college you don't know what an air handling unit looks like."*) All of the participants were eager to see how engineered systems actually functioned. While travel opportunities were considered a positive influencing factor, none of them of the indicated that travel was considered a requirement for accepting a job offer.

### Personal Freedom and Privacy

The participants expressed concern about the amount of personal freedom and individuality that they would be able to maintain once they become employees. They expressed a general distrust of management personnel and the policies that they might inflict upon the employees. This distrust seemed to stem from various sources of the media and popular myth, but no specific sources were cited. The concerns that were mentioned included monitoring of email and phone calls. They thought that time clocks were used primarily to keep track of employees. (*"Time clocks are there to work against you."*) and were viewed as a tool for the benefit of management's control over the workforce (*"If you are not professional enough to keep track of your time, you shouldn't be working, period."*)

The participants were very interested in making sure that they did not work too many hours. Part of this was because they did not want to be cheated by the company and because they had interests and hobbies that they wanted to pursue outside of work. (*"You want to have time to do your own thing."* and *"After their senior year (of college) they don't want to work sixty hours a week."*) They wanted to limit their time at work to 40-45 hours a week, with exceptions given for certain projects that would provide them with meaningful experience. (*"It depends on your definition of overtime. An hour or two extra isn't really..."*) The young engineers especially disliked the idea of working overtime because the company would not hire more employees or because it would make more money for the company's management. The participants were interested in having the free time to pursue their own interests and activities. However, they did indicate that they would willingly work overtime on two conditions: one, if they were compensated for overtime through additional income or comp time, or two, if it would enhance their

learning opportunities. (*"I don't expect you to watch me to make sure I'm here for exactly forty, and I'm not going to watch the clock to make sure I don't run over forty exactly. It might be a situation where we expect you to work some overtime and its not going to be compensated, but if it gets atrocious, like you're working seventy hours a week, then we might look at some sort of comp-time plan."*)

Researcher's Comment: Although the young engineers may desire to limit the amount of overtime that they work, the business trend is to force employees to work more overtime to compensate for a tight labor market. "The 40-hour week has all but disappeared: Americans now log 260 more hours a year than they did a decade ago" (Conlin and Coy, 1999). The researcher believed that the participants were aware that working overtime is commonly expected in the workplace.

### Management Issues

Discussions on management systems were not very revealing. None of the participants knew about different types of management philosophies outside of the stereotypical traditional pyramid hierarchy where the higher ranks make more money than those on near the bottom. (*"I think everybody in school wants to be in management, but they don't know what it means...."* *"They make the money."* and *"It makes it sound like they make the decisions and they're the last ones to have to worry about job security."*) However, after they were employed and began to understand how companies operate, then all of them agreed that a matrix style management system, such as that commonly used in project-driven consulting engineering firms, was preferable. (*"I think that I was looking at management in terms of not project management, I don't think I understood what project management was exactly when I came out (of college), but I think that I was looking at management in terms of managing people or managing an office or something like that, but then you discover that there is whole other realm of management within the company."*)

## Financial Issues

A surprising theme that was discussed concerned the willingness of the interviewees to seek out positions where they could learn skills that would help them long-term in lieu of pursuing short-term financial gratification. In fact, the participants viewed professional growth as being more important than salary, at least early in their careers. (*“Well, of course you have to have enough [money] to support yourself, to live the way you want. After that, it's pretty much. “Where do I get the experience? Where do I get a variety of things to do? How can I grow?”*) Very few of the responses given during the interview were focused on achieving short-term wealth, promotions, or high-visibility positions. Discussions on salary indicated that starting salaries were important, but that the starting figures were tempered with expectations for future earnings. (*“Salary is really a short-term thing. You look at potential for future salary.”*) The participants did not believe that there would be a strong correlation between starting salary and future salary, because they believed that companies would pay them substantially better as their experience and skills increased. (*“I would rather go somewhere where I can get the experience to make myself marketable and worry later about the dollars.”*)

A potential bonus incentive plan was not considered to be an important reason to accept a job. The participants expected to be paid fairly for their effort, and thought that a bonus should be something extra. (*“I think that a company should come out and pay their employees good money, I mean not outrageous, just good money so they can take their mind off of salary and actually doing the work and advancing.”*) The participants were only interested in considering an initial starting bonus if the starting salary was considered fair and appropriate. (*“Salary would probably be prominent unless you were looking at different firms and the bonus was the make it or break it between them”* and *“I don't think you look at anywhere just for the signing bonus.”*) The participants were unwilling to consider accepting a smaller starting salary in order to get money up front as a bonus. In regard to the idea of starting salary and bonuses, the young engineers did have an understanding about the cost of living as it differed based on geography.



population density, and urban versus rural living. Cost of living was considered to be a very important factor in how young engineers evaluated job offers.

The interviewees were more financially astute than the researcher had anticipated. Before entering the work force, each of them had some awareness of retirement, 401(k) plans, medical benefits, and vacation, and all of these were considered important types of compensation. While the young engineers did not fully comprehend the full meaning of these benefits, they knew that such benefits were considered to be normal parts of compensation packages.

### Specific Interests Satisfied By the Consulting Engineering Profession

The availability of jobs in the marketplace at the time of the student's graduation was a prime factor for participants to seek work as consulting engineers: consulting firms had job openings and were actively recruiting. Despite the fact that they knew little about the consulting industry, the students were willing to investigate potential job openings in the field. However, the interviewees did not give any indication that they had considered how national and regional economic conditions affected their job search, or that they were aware of the larger macroeconomic picture where the consulting profession was linked to the economic cycles of the construction industry. Therefore, job availability, in the minds of the participants, was based on how many companies were recruiting within the immediate perspective of the participants.

The participants found it favorable that there were a large number of consulting firms in various locations across the country. (*"If you work in consulting you can go work anywhere that you want."*) Even though the participants used geographical parameters during the search for their first job, their belief that they could find future employment in many diverse locations was important. Some of the interviewees noted that initial jobs that they were interested in seemed less appealing after the interviewees considered how the limited number of opportunities might negatively impact their ability to find future employment. The actual number of firms located in the Lynchburg area did not seem to be at item of importance.

What seemed to generate the most interest in graduating students towards consulting engineering was the diversity and variety of projects that they would be able to be involved with. They liked the idea of working on multiple projects that have relatively short life spans because it increased the number of opportunities for them to learn new skills. The opportunity to be challenged in different areas was considered a good way for them to learn a large set of job skills while preventing them from getting bored with their jobs. (*"That is what appealed to me, too. Diversity mainly."*)

The participants were intrigued by consulting (after they learned about it during the interview) because the profession gave young engineers the opportunity to work for a few years before making decisions to specialize in design, sales, or management. The participants did not feel that other job opportunities offered the same type of future choices for career specialization. They made this determination either during the interview (as they learned about the consulting profession) or came upon this realization after they were employed as consulting engineers. The young engineers knew that without experience they lacked the knowledge to make career decisions concerning specialization. They felt that a generalized learning experience on their first job would allow them to make better decisions on their career as they pertained to their own unique set of job skills and interests.

### **Analysis of Data Collected From Interview**

Grounded Theory data coding was carried out in two steps because the researcher considered the first step unsuccessful. In the first phase, the researcher analyzed the data based on a limited understanding of how to differentiate between pieces of data. This led to a lack of robustness in the analysis. The researcher realized that the analysis was not uncovering new and meaningful themes. Realizing this shortcoming needed to be overcome in order to proceed with the research, the researcher further investigated Grounded Theory analysis methods through literature review and Internet research. After developing a further understanding of qualitative research execution, the researcher determined that the problem with the initial analysis effort was because the data coding was too vague. The researcher had only made summary data analysis, and had not really

dug into the interview data. After investigating improved research methods using Grounded Theory analysis, the researcher started the coding analysis over again. The existing coded data was reviewed, but was not used.

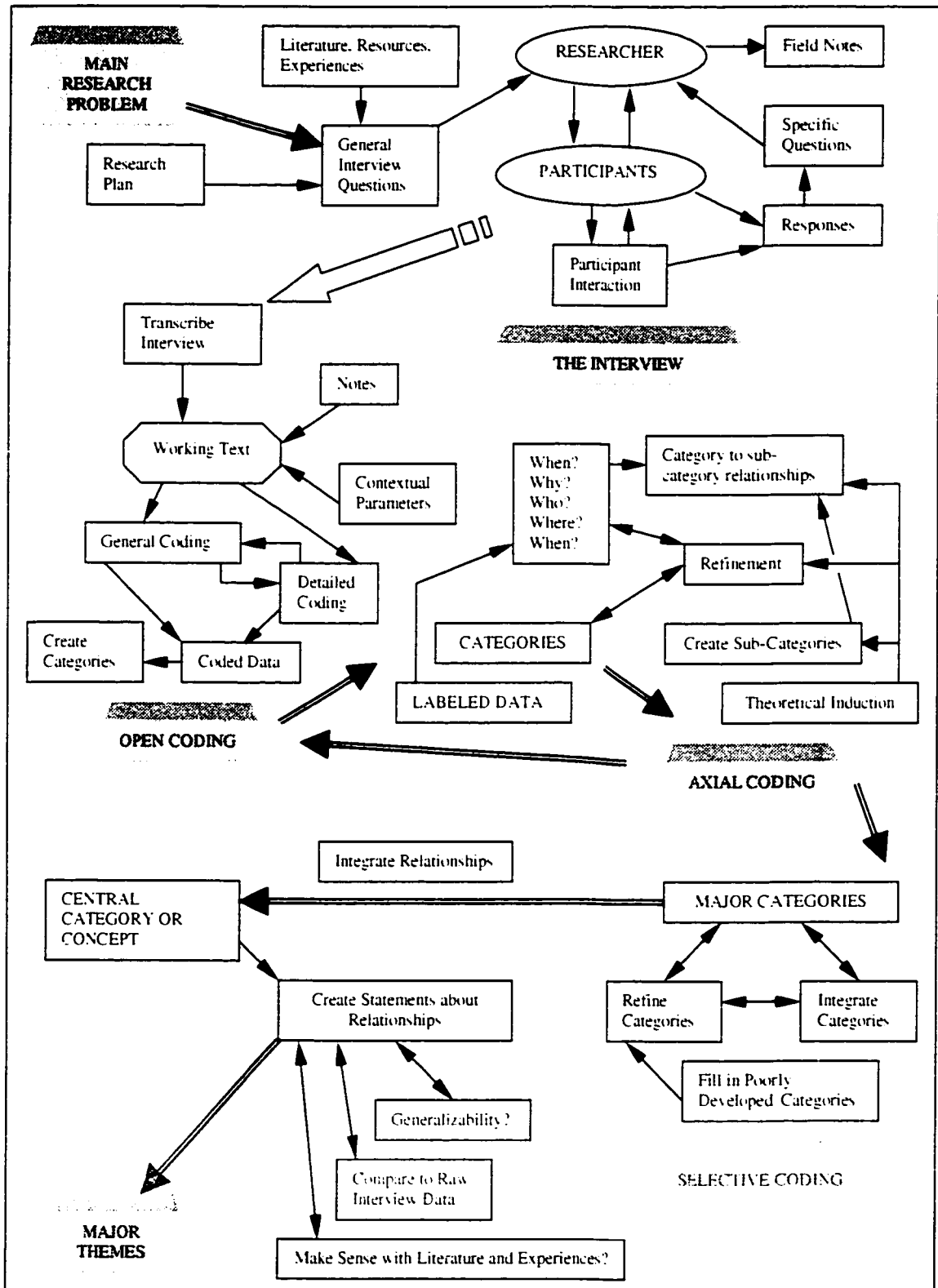
The researcher did not use a pre-determined coding list to identify data; instead he allowed the contextual nature of the interview to determine which coding tags would be most suitable to describe the data. This allowed the coding system to develop its own characteristics and direction according to the qualitative data that was collected. Notes and researcher comments were added to most of the individually coded data. In this research project the analysis of each individual piece of data was considered necessary for the researcher to fully understand the analysis process. The advantage of individually analyzing each data component was that it made it easier to identify patterns and to cluster the data into major groups and sub-groups. Even after repeated coding analysis, the researcher would often re-visit the data to confirm the qualitative interpretation of the data. This continuing process of analysis and coding enhancement was used to ensure robust data recognition and to uncover the most thoroughly examined themes possible.

The data analysis process was carried out by manual coding and sorting the information. The data was identified and coded based on key words, phrases, topic matter, contextual meaning, and inferred meaning. Open coding was performed first on a general overall sense of the interview and key components of discussion, and then the process became more specific and detailed. After the detailed coding, the researcher again performed more general coding looking to compare/contrast the general and detailed codes. Coded data was reviewed, compared/contrasted to other data, and when appropriate, was re-coded. After initial and repeated coding, the coded data was sorted and categorized. During open coding, the data was broken down, examined, and compared for similarities and differences (Strauss and Corbin, 1998). The researcher searched through the coded data for patterns and groupings. When plausible similarities were discovered, the coded data was grouped into categories. The researcher developed more than 100 pieces of unique coded data that were loosely categorized into a dozen subcategories. Through axial coding categories were created, and these categories provided a more holistic view of the data. The number of categories was reduced as the relationships between data became apparent and relationships became obvious.

Through close examination of the data at a detailed level (per paragraph, sentence by sentence, and occasionally word by word), microanalysis allowed for a broad range of categories to be developed (Strauss and Corbin, 1998). This technique occurred at a detailed level for the purpose of coding the participant's textual quotes and the interpretation of the participants' events and actions. The purpose of microanalysis was to create as many pieces of coded data as possible for analysis. This approach helped to prevent the researcher from pursuing any particular focus on developing themes because the effort was solely to examine the data and not to look at the larger frame of reference. As Strauss and Corbin explained (65), microanalysis prevents the researcher from jumping into theoretical conclusions. Microanalysis was also used to develop "in vivo" concepts.

Axial coding was performed to create and relate subcategories within larger categories (Leedy, 1997) and to refine and enhance the subcategories. The purpose of axial coding was to reassemble the data (previously broken down through open coding) to form more complete explanations about the phenomena by making connections between categories and sub-categories and making better links between coded data and sub-categories. It was during this phase of the study that the groupings from open coding began to be refined and linked with other groups according to properties of the data. Properties were characteristics of a category that gave it meaning (Strauss and Corbin, 1998). Axial coding was also used to reveal indications that denoted how major categories might relate to each other. Selective coding was used to integrate and refine the categories (Strauss and Corbin, 1998). This included ensuring that the data was grouped to give insight to the general sense of the phenomena and not deal with a specific or unique case. The research intended to discover major factors that influenced the employment decisions of the sample population that also could suggest the behavior of a larger population. Any data that might be too specific or unique could become unusable or create bias in the analysis that would weaken the validity of the major themes.

Figure 6 shows a detailed diagram explaining how Grounded Theory was used in the research effort, and shows how the raw data was processed through a rigorous execution to develop major themes.



**FIGURE 6** How Major Themes Were Developed Through Grounded Theory Approach

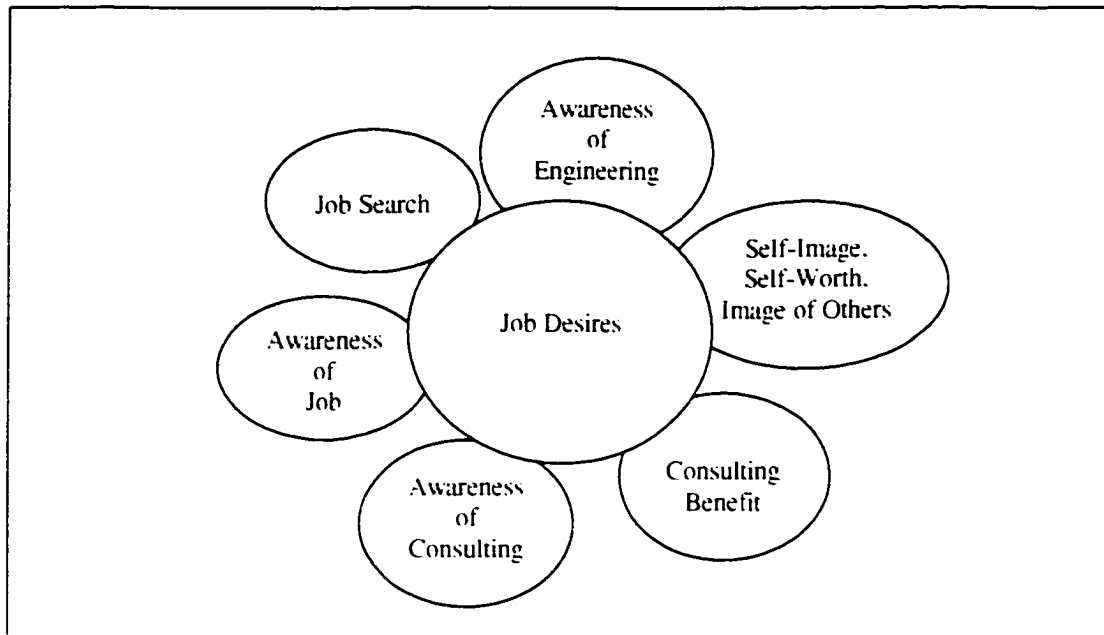
## **Definition of Major Coding Groups**

The seven major coding groups are described in the following discussion. Although the categories are numbered one through seven, the order of categories was not relevant to the analysis. Figure 7 shows the Major Coding groups, with the central group being Job Desires.

In the research, selective coding allowed the researcher to develop Job Desires as the central and dominant category that contained the most useful and most relevant data. All of the other categories could be linked back to this central category. Data in the Job Desires category appeared consistently throughout the data and was the largest set of data that was collected. During selective coding, the categories and coded were related back to the central category of Job Desires very naturally; all of the other categories were small collections of data that lacked a strong reference point except when they were linked to Job Desires. The Job Desires category was made up of those items and experiences that the participants desired or expected in their employment. The other categories contained data that was dependent upon a fairly fixed time period that reflected how the participants viewed the world. (The time period was fixed because the experiences and understanding of the participants would drastically change as they became more familiar with what is meant to be employed.)

### *1. Self-Image, Self-Worth, Image of Others*

The major group is a collection of subcategories that by themselves are very small and would have been under-represented by the clustering of coded data. This group was defined by data that was concerned with how the participants tried to identify themselves. The initial part of the interview was focused on how the participants were different than other groups, and it was not until later that they started to talk about their specific job desires. Part of their act of defining themselves included identifying others, and then showing how the two groups were different. The coded data in this group included how the participants identified with the college that they attended and how they compared themselves to non-engineers. The researcher felt that developing this category was



**FIGURE 7 Major Coding Groups**

important because it reveals how young engineers attempted to define themselves as being different than others and therefore could be useful for recruiting efforts.

## *2. Awareness of Engineering*

This category was created based on the coded data that represented how the participants viewed the general field of the engineering studies and the engineering profession prior to entering the workforce. This included how they used math and science skills to be persuaded to become engineering students as well as how they viewed potential engineering jobs, career paths, and what duties engineers performed on a daily basis. Other data in this category included expectations of what it would be like to be an engineer, how the participants compared their technical skills learned in college to what would be required in an engineering job, and perception of engineering teams.

### *3. Awareness of Consulting*

This group contained coded data that represented how the participants viewed the consulting profession prior to entering the consulting profession. This category was created to collect the data that was directly related to the consulting profession rather than the engineering profession as a whole. Because the participants chose to become engineers prior to choosing consulting as a profession, it might be possible to consider this category as a subcategory of Awareness of Engineering, but the coded data was strong enough to stand on its own. This group contained data that demonstrated how the consulting profession differed from the participants' typical views of engineering jobs. (*"I realized that there was a whole different world out there...."*) One of the differentiators that caused this group to be created was that the participants had opinions and perspectives about engineering prior to entering college, but they did not (for the most part) know that consulting engineers even existed.

### *4. Awareness of Job*

This category was developed based on data showing how the participants viewed the concept of employment as an engineer. This category contained information relating to the participant's perceptions about employment as they began their job search (as they neared the time of graduation). This included experiences relating to internship employment, how they attempted to define their career direction prior to having a job, and how they came to understand engineering jobs through their academic and recruiting experiences.

### *5. Job Search*

The Job Search category included coded data relating to how the participants searched for employment. Examples of data in this category were availability of jobs, newspaper and Internet advertisements, and the experience of on-campus recruiting. This category was rather small because data much of the information relating to the Job Search



category was better suited to other categories: as a result, this category was considered important only as it related to the tools that participants used to locate opportunities in the job market.

#### *6. Consulting Benefit*

This category was created to represent those data that were uniquely identified by the participants as part of the consulting engineering profession. The key element of the category was about perception relating to consulting. This was the smallest category, but it was particularly relevant to methods that might allow the consulting industry to differentiate itself from engineering employment as a whole. This group contained data concerned with perceptions relating to future salary (as opposed to starting salary) and future employment opportunities.

#### *7. Job Desires*

This was determined to be the central category that related the other major groups. It was also the category that contained the most coded data. The majority of the major themes were developed from this group. The collection of data included job desire issues relating to geographic location, diversity of assignments, company size, work environment, career advancement, salary, learning opportunities, mentoring, travel, limited overtime, vacation, interesting work, bonuses, and dress code. The data assembled in this main category was directly related to answering the main research question.

### **Development and Presentation of Major Themes**

After the data were thoroughly analyzed and broken into coding segments and categories, and then integrated into a holistic collection of patterns, the pattern segments were developed into major themes represented in the data. The major themes revealed which key factors were the most important to Generation X consulting engineers in

Lynchburg. In the following discussion, each major theme is discussed. Direct phrases taken from the participant's quotes during the interview have been shown in italics with quotation marks.

### Presentation of Major Themes

<p>Theme 1: Engineers prefer to work for a supervisor who is an engineer rather than someone with a business or liberal arts background.</p>
--

*" I don't want somebody who has no idea what I do telling me how to do my work."*

The initial major theme was based on how the sample population related to others within the engineering world. The coded data revealed that young engineers strongly identified with those of similar technical backgrounds, and were distrusting of those individuals who lacked strong technical skills. The sample population seemed to exhibit uncertainties about proper social interaction outside of dealing with other technical-minded people. During the interview, it was explicitly stated that engineers preferred to work with and work for individuals who could relate to and appreciate the participant's unique technical skills. The data implied that young engineers would desire to seek out personal and professional relationships with others of similar technical backgrounds.

<p>Theme 2: Candidates do not have strong opinions about working with or for someone with whom they can relate a college experience.</p>
--

The sample population indicated that they strongly identified themselves according to their college experiences. They also exhibited a desire to find a comfort level within an employer's organization. However, the data showed that the strongest means of self-identification was through engineering studies, and that non-technical graduates of the same university were viewed with disdain. Overall, the engineers were looking forward to moving past the college experience and wanted to create a new lifestyle.

**Theme 3:** Geographic location is an important factor in a candidate's decision of accepting a job.

*"I wanted to be in Virginia. I wanted to be near family."*

Geographic location and being near family was explicitly mentioned several times as being a prime factor that influenced the job seeker.

**Theme 4:** Candidates who accept work in the consulting industry have a strong desire to work in an office environment.

*"That is another side of consulting that I liked: coming to a clean environment and working and I felt like industry was dirty."*

The sample population expressed a desire to work in an office environment rather than a manufacturing or factory environment. Some of this desire seemed to be connected to young engineers preferring the status that came with working in a white collar setting rather than one considered to be blue collar.

**Theme 5:** When considering a career choice, candidates take into consideration the large number of consulting firms that are in business across the country and world because of the options that it grants to them for future employment decisions.

*"If you work in consulting you can go work anywhere that you want."*

The interviewees mentioned job availability and job security as key factors in seeking employment. Consulting firms operate in nearly every mid- and large-sized city in the United States. The ability to find work in different locations with different employers was considered an advantage of being a consulting engineer. The participants indicated that certain job opportunities in other fields were considered to be less appealing because of the potential limitations that could exist should they ever decide to find a new employer.

This theme may seem to conflict with Theme 3 (geographic location), but the difference between the two themes resides in how the participants viewed the relationship between time and various stages of their career employment. The participants used geographic location as an employment decision factor early in their career because they desired to maintain ongoing relationships with family and friends. Theme 5, concerning the number of consulting firms in business across the country, was important to the participants because they were taking into consideration potential future employment options. This indicated that the participants considered employment, even at an early stage of their career, in terms of total career development.

Theme 6: Candidates look for job prospects in areas relating to college courses in which they excelled.
---

*"I didn't know what consulting was before they came to interview me. I knew I wanted to do something with thermodynamics, heat transfer, fluids, that kind of thing..."*

The sample population indicated that they preferred employment where they would use knowledge and skills similar to those learned in those college courses that they enjoyed. Certain parts of the discussion revealed that young engineers had an uncertainty about how they would fare in the workplace. Familiarity with subject material increased the comfort level that they would have on the job because it created a relationship between the student's known worldview (as a college student) and the new worldview (as a full time employee).

Theme 7: Having knowledge about a company before interviewing makes the interview more comfortable for the interviewee and makes it more likely for a candidate to accept a job offer.
--

Recent college graduates seemed to exhibit little to no awareness of what full-time employment would be like working as an engineer. Combining this with uncertainty about paying bills, getting started with post-college life, and the stress of searching and interviewing for jobs, the candidates would appreciate any sense of comfort that a company could provide. During the interview, it was explicitly stated that a comfortable

and friendly interview setting was a contributing factor for young engineers to accept a job offer. This particular theme is related to the study Maurer (1992) that was discussed in the review of related literature.

Theme 8: Candidates willing to work in smaller communities prefer to work for small-sized companies more than for mid-size companies and large/very large companies.

The sample population had insecurities relating to lack of social skills. Working in a smaller environment might make it easier to develop relationships because of the lack of social competition. Working in a smaller company required employees to learn more skills than in a large company that could afford to have specialized employees. The researcher based this theme on the analysis of the implied logic stemming from the interview dialogue, including desire to pursue recreational activities and dealing with cost of living.

Theme 9: Candidates have no strong preference for a company that works on large projects versus small projects.

*“That is what appealed to me, too. Diversity mainly.”*

The interviewees were especially focused on finding employment that would provide long-term growth and personal challenges. They did not seem to find large projects any different from small projects. This could be because they could not relate to the attention and priority often given to large projects, but is most likely because these young engineers felt limited in their ability to contribute on a project of any size and instead were primarily concerned about growth opportunities. (They think that they would learn more skills from many small projects than a few large ones) In general, the researcher interpreted the interview responses to mean that young engineers are much more concerned about their personal happiness and career growth versus identifying with the company or with certain projects.

Theme 10: Candidates fear beginning their career in a “sink or swim” environment and would prefer an extended training period prior to being given work assignments immediately.

*“We assume that you are going to ease us into things.”*

Engineers graduating from college lack “real-world” experience and are often naïve about the expectations that companies have for their performance. They are unfamiliar with management systems, with corporate missions, and profit goals. They also have a poor concept of engineering teams. Many of the interviewees expressed disdain towards a team approach on problem solving because their college experiences were based on disproportionate sharing of the workload between team members. Taking on a new job involves potentially traumatic transitions of changing location, living arrangements, lifestyle, financial means, and peer groups. Although the interview revealed differences in the confidence level of engineers at the time of graduation, there was a consensus that they would likely fail in their job if the company did not provide them some type of support.

The interviewees expressed a number of things that they desired from the job that would lend credibility to the theme. Two of these included opportunities to obtain meaningful experience and the opportunity to grow professionally. Because young engineers had previously based learning and experience in a teacher-student type of relationship, they naturally expect some kind of training process to be in place in the professional environment. The researcher observed that the underlying data showed that the reason why the interviewees wanted to have a mentor was because of their uncertainty about their ability to meet performance expectations.

Theme 11: A candidate’s comfort level during the interview plays a significant role in whether or not that individual will consider a job offer.

*“If they interview you and treat you like a number, then that is pretty discouraging.”*

Recent college graduates were unaware of the expectations of the professional world. Because of age and experience, most young engineers were unfamiliar with the

interviewing process. These factors could make the interview process stressful for them. If the young engineer can have a positive and comfortable interview experience, then it is easy to theorize that the engineer will project that positive experience into his perception of the entire company. The sample population displayed traits of social insecurity through their negative opinions of individuals outside of the engineering profession. One of the job desires identified in the coding analysis was socialization into the workplace. A young engineer who had a high comfort level during the job interview could view the company as an environment where she could be shielded from having to deal with her feeling of social insecurity. This theme shares similarities to the research study by Maurer (1992) that was discussed in the review of related literature.

Three of the four members of the sample population explicitly stated that one of the reasons why they chose employment with an employer was because the interviewing company made them feel important during the job interview.

Theme 12: Candidates have only a slight preference to work for a company that has a low-turnover rate and a high percentage of long-term employees.

The sample population expressed a desire for their employer to provide job security. There is an obvious correlation between job security and a company that has many long-term employees. The employee turnover rate is important as it is a trademark of the consulting industry because it is commonly used as a means for career advancement while allowing individuals to quietly leave behind their failures. However, although job security was desirable, when asked to discuss the key factors that were important to young engineers, the sample population did not rank job security among the most important of factors.

Because of their youth, the sample population was interested in breaking into the engineering profession and not finding their lifelong job. One member of the sample population stated, *"I would rather go somewhere where I can get the experience to make myself marketable and worry later about the dollars."* Others expressed desire to have meaningful professional learning experiences and to grow professionally. Some wanted future opportunities at management, and therefore might have been willing to trade

starting salary for a learning experience in management. These are all examples that young people might view their first job primarily as a stepping-stone for their career.

Theme 13: Candidates know little about the consulting industry prior to interviewing with a consulting firm.

*"I didn't know what consulting was before [a consulting firm] came to interview me.*

Most of the sample population first learned about consulting during their job search, and specifically, during the job interview itself. One young engineer, upon learning about consulting, said, *"I realized that there was a whole different world out there."* Other members of the sample population expected to learn about different types of jobs through their regular college coursework. While some discussions about employment might take place in academia, these would of course be limited to the professors' own personal experiences, which may or may not be in the consulting profession.

The sample population agreed by consensus that they did not have an accurate perception of the consulting industry prior to actually sitting down with a consulting engineer or before actually beginning employment in the consulting field.

Theme 14: Financial compensation is not as important as having a job where an individual can gain meaningful experience.

*"I would rather go somewhere where I can get the experience to make myself marketable and worry later about the dollars."*

One member of the sample population listed his top four job desires in this order: location, interesting work, diversity, and salary. Another said that money was not the highest priority, so long as there were other things about the job that made it worthwhile. While salary and financial benefits are important to young engineers, the data suggests that they place significant value on other issues. As long as there was not a significant difference between the salary that was offered and what was considered to be competitive from other prospective employers, then the engineer seemed interested in looking deeper



into the job offer. This type of philosophy might be expected of older employees who are more adequately prepared to differentiate quality of life issues, but the researcher discovered that salary was not considered the most important criteria in any member of the sample population.

The engineers interviewed considered starting salary as secondary to gaining meaningful experience and the skills to demand higher salaries later in their careers. The sample population indicated that the potential for a high future salary was a stronger driving force than the actual starting salary. At the beginning of their careers, they considered salary in a temporary context because they believed that salary would rise comparatively to growth in their abilities. One young engineer thought that he could have made more money in another industry, but felt that a few years into the future it would cause him to have a limited number of career options. Members of the sample group spoke of future marketability of skills as being extremely important.

During the interview, the engineers spoke about other issues that competed with starting salary in importance. Consistently, gaining experience, growing professionally, and the opportunity to do a variety of assignments were mentioned as possible rivals to salary.

**Theme 15: Job assignment diversity is at least as important as starting salary.**

*"I think that I am very much attracted to the variety because nothing is ever the same. It's always different. It's a challenge. I think it's better than sitting behind the desk designing the same thing for thirty years."*

The participants indicated a strong desire to have employment that would offer them opportunities to do and see multiple things that would enhance their experience. In their early careers, the participants seemed to support the idea that learning skills and making themselves valuable as employees was more important, in the long run, than starting salary.

Theme 16: Having knowledge about the consulting industry prior to beginning the job search would have increased their interest in pursuing a consulting career.

*“That was kind of my conception about what engineering was and then I interviewed with [engineers from a consulting firm] and I realized that there was a whole different world out there as far as engineering was concerned.”*

The participants did not begin their job search with a specific focus on the consulting profession, and in fact they pursued employment in various engineering fields. Through the process of seeking employment, they discovered that consulting engineering could provide them with the type of interesting and challenging work they wanted, in the type of environment that appealed to them, and with professional growth opportunities. Based on this data, it would seem that, if the applicants knew that such employment opportunities existed, they would focus more time and effort into acquiring jobs in the consulting engineering profession.

Theme 17: Candidates consider working in a location with recreational activities more important than starting salary.

*“I wanted to go somewhere and know I was going to be there and settle down. I didn’t want to be job hopping or moving.”*

The participants’ desires to limit overtime and the importance of geographic location, combined with their youth and starting a new life, indicated that they knew that they had many years to acquire wealth, but during the beginning of their career they were more interested in seeking quality of life. These quality of life issues were dependent upon the college experience that the participants had gone through. They wanted more free time, more leisure activities, and more stability in their lives.

Theme 18: Candidates are willing to work a small amount of overtime without expecting compensation.

*"You want to have time to do your own thing."*

The participants wanted to treat their job as a new life, one that was far removed from long nights cramming for exams and working on lab reports. Instead, they wanted to get used to a normal schedule. (*"...Most college students are burnt out by the time...After their senior year they don't want to work sixty hours a week. I mean, they've spent four years in engineering school so they don't have to work sixty hours a week."*) After the end of eight hours the young engineer was ready to go home. The participants also felt that most overtime was a result of an employee not being able to meet his goals or else because the company's management was trying to make money for themselves at the expense of employee.

However, the participants felt that if their employer was flexible in employee work hours and did not make an issue of them coming in late or leaving early from time to time, then they would be willing to work some overtime without additional compensation, as long the employer was not greedy. The key word is "some." The participants made it clear that there was definitely a limit to the amount of overtime that they would be willing to work without expecting compensation with either money or comp time.

Theme 19: Candidates would prefer to work in a project management environment rather than a traditional top-down rigid organizational structure.

The participants were generally oblivious to how management systems within businesses operate. Their limited knowledge was based on traditional management hierarchies. They did not know that project-driven management philosophies existed, or that matrix-based networks of personnel were prevalent within the consulting engineering profession. The participants' views of management personnel were negative. The data indicated that young engineers would recognize that their desires to have diversity in

their job assignments and a variety of projects would be best served in an organization that is based on project management.

### External Feedback

After the Grounded Theory data coding was completed and the major themes were developed, the researcher discussed the qualitative results with several managers and executives at consulting firms in Lynchburg. This "sounding board" approach was used to further strengthen the researcher's belief that the qualitative results were founded on sound principles. This external feedback could not verify that the procedures were sound or the methods robust, but it did serve to provide confidence that the Phase One findings "made sense."

### **Summary for Phase One**

In the qualitative portion of the study, the research utilized a semi-structured interview format to obtain data, through direct dialogue and observation, from the sample population. The use of questioning techniques and the interview process was included to show that the observations and collection of data was part of the design of the study and did not occur by coincidence. Through a well-thought out design and careful execution, errors and bias were avoided.

A significant amount of refined data and explanations concerning the interviews was provided in the study, and such information and discussion was useful to provide a opportunity to reveal, in part, the perspective of Generation X engineers on employment in a general sense as well as that specifically related to the consulting industry in Lynchburg, Virginia. The interview data was presented to make it easy for the reader to understand how the researcher was able to create major themes and also to provide a sense of what the coded data would looked like.

This data was broken down, refined, and analyzed through Grounded Theory techniques. The process was explained in the study, especially in regard to those difficulties that occurred and how they were corrected. The major coding groups were

identified, and it was shown why the Job Desires category was selected as the central unifying category.

The major themes were developed and presented in the study. Explanations were provided for each major theme so the reader could relate each explanation back to the discussion on the data collected during the interviews. In this way, the reader could draw a complete and unbroken line from the beginning of the qualitative study all the way to the Phase One results.

## **RESEARCH EXECUTION - PHASE TWO**

After the major themes were developed and explained in Phase One, the study moved into Phase Two. This transition focused on taking only the major themes from Phase One and creating a quantitative analysis built around the major themes. The purpose of the analysis was to produce data that would be shown to support or refute the major themes. The quantitative study was designed to reinforce the discovery of relationships that had appeared to “make sense” when discovered and analyzed through the qualitative research. The questionnaire was created to determine if the major themes could be supported with quantitative data. Themes supported by quantitative data were then classified as important factors that influence the employment decisions of Generation X consulting engineers.

### **Administering the Survey**

After the survey format was corrected during the feedback check (as was discussed in the Research Design), the survey was administered to the original four participants. These results were tabulated and compared to the themes. Of the nineteen major themes, eighteen of them were supported by the survey data. The researcher believed that this was sufficient evidence that the themes were sufficiently supported to allow the survey questionnaire to be submitted to additional members of the sample population (discussed in the next section).

The only major theme that was not supported by the original participants was Theme Eight, which stated that candidates willing to work in smaller communities prefer to work for small-sized companies (less than 25 employees) more than mid-size companies, large, and very large companies. All four of the initial respondents indicated that they had no preference concerning company size when looking for a job. Although the theme was not supported by the original interviewees, the researcher decided not to modify this theme, but to proceed with the survey questionnaire and analyze the results after the survey was administered to the larger population.

After the feedback from the original four participants was examined and subsequent formatting issues were resolved, the survey was submitted to the larger survey population: that is, other engineers in the Lynchburg area that met the research criteria.

The researcher made inquiries within the Lynchburg area to determine the actual number of individuals in the Lynchburg area that met the population criteria. This involved personal phone calls to managers at engineering firms and conferring with sales representatives that served local firms. Four additional young engineers were found to be included along with the four initial respondents (from the original sample population). After the researcher determined which consulting firms had young engineers as employees, the researcher contacted the lead managers at those firms by telephone and explained the purpose and intent of the research. The researcher offered to share the results of the research with those firms who would pass the survey questionnaire onto their young engineer employees. The response was very positive and all four local consulting firms with young engineers agreed to participate.

After the telephone calls and explanations were made, the researcher contacted the managers by email. The email contained a link to the questionnaire website and the password required to access the questionnaire. The managers then forwarded the email to young engineers within their organization. The respondents took the survey via the Internet to a secure website maintained by Old Dominion University; a password was supplied by the researcher that was required to gain access to the questionnaire.

The researcher made the effort to locate every young consulting engineer in the City of Lynchburg; after his effort he was reasonably confident that the eight members of

the sample population were likely the entire representative population that met the study's criteria during the time of the quantitative research. The time frame used for the questionnaire lasted several months: the survey remained accessible via the Internet until all eight members of the sample population had responded to the survey.

Each survey response contained a unique identification number. The respondent's name, address, occupation, age, etc. were also included in the survey response. This was done to ensure that the data used for the quantitative analysis was collected only from those survey responses that came from individuals who met the criteria of the sample population. The characteristics of the sample population that participated in the survey questionnaire are shown in Table 4. All members of this sample group were employed in consulting firms in Lynchburg, Virginia. The first four participants are those who were members of the original sample population used in Phase One.

	<u>Age</u>	<u>Occupation</u>
1.	28	Mechanical Engineer
2.	27	Structural Engineer
3.	25	Mechanical Engineer
4.	23	Mechanical Engineer
5.	24	Electrical Engineer
6.	24	Mechanical Engineer
7.	32	Engineer
8.	23	Civil Engineer

**TABLE 4 Characteristics of Sample Population  
For Survey Questionnaire**

### **Data Interpretation**

The main purpose of the quantitative study was to increase confidence in the findings from the qualitative study so to be able to classify supported themes as important factors. It was not the intent of the quantitative research to definitively verify or refute major themes. However, the quantitative research used in this study was useful to indicate whether findings were valid and the procedures robust. Definitions concerning

the themes such as proven, validated, and rejected were avoided by the researcher. Instead, the researcher used the terms “supported” and “not supported/refuted” when making comparisons between the quantitative data and the themes. In a single case, the data was split evenly between supporting and not supporting the major theme: for this theme the term “inconclusive” was used to describe how the quantitative data reflected the theme.

The researcher determined if each theme was supported or not supported through visual inspection. As previously stated, the nineteen themes were represented by nineteen questions. For most questions, if the majority of the respondents strongly agreed or somewhat agreed with the theme, then that theme was considered to be supported; likewise, if the majority strongly disagreed or somewhat disagreed, then that theme was considered not to be supported. When the theme was based on young engineers having no preference, then a majority selection of no preference was necessary for the researcher to declare the theme as supported.

#### Major Themes Supported by Quantitative Data

Sixteen of the nineteen major themes were directly supported by the findings from the survey questionnaire. Theme Eight is discussed in the proceeding section, and after being re-stated, has been added to the other sixteen themes that were supported, for a total of seventeen. These are shown in following sections.

#### Major Themes Not Supported by Quantitative Data

Three themes were not supported by the responses from the sample population. One of these themes (Theme Eight) has been re-stated and will be shown as supported in the Results chapter. Of the remaining two (Theme 10 and Theme 12), one theme had data that was split evenly between support and not support and so was determined to be inconclusive. The other was simply not supported. These are discussed in the following paragraphs and shown in Table 5.



Theme 8:	Candidates willing to work in smaller communities prefer to work for small-sized companies more than for mid-size companies and large/very large companies.
Theme 10:	Candidates fear beginning their career in a “sink or swim” environment and would prefer an extended training period prior to being given work assignments immediately.
Theme 12:	Candidates have only a slight preference to work for a company that has a low turnover rate and a high percentage of long-term employees.

**TABLE 5 Themes Not Supported by Quantitative Data**

### Theme Eight

Theme Eight was not supported by the quantitative data. The researcher re-visited the coded data and the interview transcript to search for reasons to explain this. This review of the data showed that the development of this theme was based on the researcher trying to connect underlying pieces of data: there were no direct statements from the interviewees that directly dealt with size of a company. The researcher had inductively developed this theme based on a combination of the participant’s insecurities with social skills and fears of the engineers in becoming a specialized cog in a company. Upon review of the data the researcher determined that this theme was more speculative than inductive because the qualitative data did not provide much support for the theme. The researcher also acknowledged that bias stemming from personal experience was involved in allowing speculation to play a role in the development of this thesis. While it was disappointing to find that personal bias had affected the research (and demonstrating that bias can never be completely eliminated), the soundness of the research methodology and research design was demonstrated by preventing this bias from impacting the final results of the study.

The theme has been restated as follows:

Theme 8:	Candidates willing to work in smaller communities have no preference regarding company size.
----------	--

### Theme Ten

The quantitative data for Theme Ten was split evenly between supporting and not supporting the qualitative findings, so the researcher determined that the quantitative data was inconclusive. Three of four original interviewees thought that receiving at least some training was preferred to having immediate assignments. The coded data supported the theme on the grounds that the interviewees desired a mentor and wanted to be given assignments that were matched to their skill level. Review of the interview transcript showed explicit statements that were in support of the theme.

Noting the difference between reality as experienced and reality as remembered, the theme could very well be true but that not all of the respondents remembered the insecurities they felt when facing the unknowns of a professional career without the benefit of experience. The researcher also acknowledged the possibility that the original four interviewees were not representative of the larger population with regards to this particular issue, perhaps as a result of their unique set of experiences with their first employer (all four members of the original population were employed at the same location). After reviewing the quantitative data, the researcher decided the data suggested that the desire for training or for immediate assignments was independent of whether or not a candidate decides to work as a consulting engineer.

### Theme Twelve

Based on the qualitative analysis, it was expected that the participants would “slightly agree” with the theme stated as “Candidates have only a slight preference to work for a company that has a low turnover rate and a high percentage of long-term employees.” The feedback test from the original interviewees showed that two of the four had a strong preference to work for a company that has a historically low turnover rate. Two of the original participants had some preference for a low turnover rate. The theme would have been supported had it excluded the use of the word “slight.” The researcher reviewed the coded data to re-visit the reason why the theme was worded as such.

The coded data showed evidence for job security being a factor. However, during the interview, the participants did not show strong emotion or desire to use job security as a primary reason to choose an employer. In comparison, the interviewees held very strong opinions about many of the issues that were discussed, such as the importance of gaining meaningful experience and geographic location. The review of the qualitative data and the interview transcript did not give the researcher any reason to modify the theme.

The theme had used the term "slight preference" to try to be as specific as possible. If a more general theme had been used and made the statement to be that the young engineers would choose job security over not having job security, then the theme would have obviously been supported. However, an exhaustive research study would not have been required to make the statement that employees prefer job stability. The reason the data showed such strong support for job security is that the concept was presented to the participants in a single, unique, mutually exclusive statement. The fact that job security might be lower on the priority list of factors that influence employment decision-making could not be taken into account in a question that dealt with only one factor.

The theme that Generation X consulting engineers have a preference (with "slight" deleted) for companies with low turnover rates and a high percentage of long-term employees will be considered an important factor.

### **Summary of Phase Two**

In the quantitative phase of the study, the major themes were presented to the second sample group in a survey questionnaire. The second sample group consisted of eight individuals, four of which were the original participants and four who were added during the Phase Two research. Prior to the survey questionnaire being administered, the survey was examined by the original participants (called external feedback) to ensure that the format of the questionnaire was easily understood by users.

After the format was corrected, the survey was administered to the original four participants. Their responses were examined to evaluate if they were consistent with the major themes from Phase One. Eighteen of the nineteen major themes were supported by

the quantitative data. The survey was then administered to four additional individuals who met the sample population criteria (Generation X consulting engineers in Lynchburg, Virginia). The data from all eight individuals was collected and compared to the major themes. Sixteen of the nineteen themes were supported by raw data. The three themes that showed discrepancies between the qualitative analysis and the quantitative analysis were discussed to explain potential reasons why the differences occurred. One of the themes (Theme 8) was modified to conform to the data. The ability to modify and improve themes during the quantitative phase was one of the reasons why the two-phase mixed method research approach was selected for the study.

## **Findings**

The qualitative research identified nineteen major themes that were determined influence Generation X engineers when making employment decisions to work as consulting engineers in Lynchburg, Virginia. The themes are shown in two separate tables according to whether they were supported or not supported by the quantitative study. Seventeen major themes were supported by the quantitative data were subsequently classified as important factors that influence employment decisions.

### Important Factors - Major Themes Supported by the Quantitative Data

Seventeen of the nineteen major themes were supported by the quantitative study. (Note that Theme Eight was re-stated so as to be considered supported.) The important factors shown in Table 6 are those major themes discovered in the Grounded Theory study in Phase One that were also supported by the findings from the Phase Two survey questionnaire. No additional discussion of these themes will be provided beyond that which was covered in the previous sections.

Factor 1:	Candidates prefer to work for a supervisor who is an engineer rather than someone with a business or liberal arts background.
Factor 2:	Candidates do not have strong opinions about working with or for someone with whom they can relate a college experience.
Factor 3:	Geographic location is an important factor in a candidate's decision of accepting a job.
Factor 4:	Candidates who accept work in the consulting industry have a strong desire to work in an office environment.
Factor 5:	When considering a career choice, candidates take into consideration the large number of consulting firms that are in business across the country and world because of the options that it grants to them for future employments decisions.
Factor 6:	Candidates look for job prospects in areas relating to college courses in which they excelled.
Factor 7:	Having knowledge about a company before interviewing makes the interview more comfortable for the interviewee and makes it more likely for a candidate to accept a job offer.
Factor 8:	Candidates willing to work in smaller communities have no preference regarding company size.
Factor 9:	Candidates have no strong preference for a company that works on large projects versus small projects.
Factor 10:	A candidate's comfort level during the interview plays a significant role in whether or not that individual will consider a job offer.
Factor 11:	Candidates know little about the consulting industry prior to interviewing with a consulting firm.
Factor 12:	Financial compensation is not as important as having a job with variety or a job where an individual can gain meaningful experience.
Factor 13:	Job diversity is at least as important as starting salary.

**Table 6 Major Factors that Influence the Employment Decisions of Generation X Consulting Engineers**

Continued	
Factor 14:	Having knowledge about the consulting industry prior to beginning the job search would have increased their interest in pursuing a consulting career
Factor 15:	Candidates consider working in a location with recreational activities more important than starting salary.
Factor 16:	Candidates are willing to work a small amount of overtime without expecting compensation.
Factor 17:	Candidates would prefer to work in a project management environment rather than a traditional top-down rigid organizational structure.

#### Major Themes Not Supported by Quantitative Data

The results shown in Table 7 are those major themes that were discovered in the Grounded Theory study in Phase One but were not supported by the findings in the Phase Two survey questionnaire. These have been discussed in the previous sections.

Theme 10:	Candidates fear beginning their career in a "sink or swim" environment and would prefer an extended training period prior to being given work assignments immediately.
Theme 12:	Candidates have only a slight preference to work for a company that has a low-turnover rate and a high percentage of long-term employees.

**TABLE 7 Major Themes Not Supported by Quantitative Data**

#### **Summary of Results from Survey Questionnaire**

The summarized results from the Phase Two survey are shown in Table 8. The themes and associated questions are shown grouped together in the Appendix. The table also indicates whether the major theme was supported or refuted by the survey data.

Several of the themes are also discussed to reveal data that appeared to be controversial or surprising. The researcher examined the data for any obvious differences in the responses of the four original Phase One participants versus the additional four participants added during Phase Two, and these differences are also discussed in the following paragraphs.

Theme Number	Supported/ Not supported	Responses					Total
		Strongly agree	Somewhat agree	No preference	Somewhat disagree	Strongly disagree	
1	Supported	6	2				8
2	Supported		2	5	1		8
3	Supported	4	3	1			8
4	Supported	3	4	1			8
5	Supported	2	3		3		8
6	Supported	6	1	1			8
7	Supported	5	2	1			8
8	Not supported		1	6	1		8
9	Supported		1	5	2		8
10	Inconclusive	2	2		2	2	8
11	Supported	5	2	1			8
12	Inconclusive	4	4				8
13	Supported	1	5		1	1	8
14	Supported	5	2		1		8
15	Supported	2	5		1		8
16	Supported	1	5	2			8
17	Supported	1	5		1	1	8
18	Supported	3	3		2		8
19	Supported	7				1	8

Key: Supported: Indicates the majority of respondents agreed with theme.  
 No Supported: Indicates the majority of respondents disagreed with theme.  
 Inconclusive: Indicates responses equally split between agreement and disagreement.

**TABLE 8 Results From Survey Questionnaire**

### Understanding Table 8

Table 8 shows the data from the quantitative survey used in Phase Two. Each of the nineteen questions represents a single major theme from Phase One. If the majority of responses to a question were “strongly agree” or “somewhat agree” the theme was considered supported. The exceptions to this rule are for Themes 2, 9, and 12. For questions 2 and 9, a majority of “no preference” indicated support for the theme. For question 12, a majority of “somewhat agree” was necessary for Theme 12 to be considered supported. Theme 12 and the issues regarding the phrasing of the associated survey question were previously discussed.

### Discussion of Findings Shown in Table 8

The following paragraphs discuss those results which revealed interesting information that may not be obvious from reviewing Table 8 or from previous discussions.

Theme Eight, concerning preference for company size, showed some disparity between the two groups of the larger sample population. All four members of the original group selected no preference with regards to company size. Of the newer group, two members also selected company size, but one participant selected very large and another selected a medium sized company. The researcher did not further investigate why the two members of the newer group had different perspectives than the other participants.

Theme Ten dealt with the preference for the participants to be given assignments immediately or having an extended training period upon starting a new job, and was previously discussed because the survey data was inconclusive. Three of the four members of the newer group either strongly or somewhat preferred to start on immediate assignments. Likewise, three of the four original participants strongly or somewhat preferred having training. There was no significant difference in age between the two groups. The researcher speculated that one potential explanation for the different responses is in the difference between the work environments with which each of the



members had become familiar. If a participant was given immediate assignments and enjoyed them, he might have answered that those were his preference: on the other hand, if the participant had not been successful at handling immediate assignments then he would have responded that his preference would have been to have received training. Also, each work environment deals with its employees differently regarding how success and failure are measured in terms of acquiring skills or producing usable work: these contrasts in work environments may exist between the consulting firms located in Lynchburg. Another, more simple, explanation may be that it is a preference developed through each individual's unique set of experiences.

Theme 13 stated that Generation X consulting engineers in Lynchburg knew little about the consulting profession prior to interviewing with a consulting firm. One member of the original group learned about consulting immediately before or during the interview with a consulting firm, and the other three members learned about consulting during the job search. For the newer group, two of them also learned about consulting during the job search. However, one of them knew about consulting prior to college and another during college prior to a job search. This data makes more sense when it was determined that the respondent who knew about consulting prior to college was employed at a consulting firm owned by his family.

Theme 17 stated that the sample population preferred being in a location that had recreational activities available to them was more important than starting salary. This was strongly or somewhat supported by all members of the original group and two members of the newer group. In the new group, one participant somewhat preferred a higher salary and one strongly preferred a higher salary. The differences between the responses are likely based on individual preferences that depend on what recreational activities are desired (e.g. Lynchburg is well-suited for camping and hiking enthusiasts, but not for dancing at night clubs) and economic wants and needs that a person has relating to lifestyle, college debts, taking care of family members, etc.

Theme 18 dealt with how much overtime was considered by the sample population to be reasonable before additional compensation should be paid. Both the median and average response was three to five hours per week. The original participants had two responses for one to two hours per week, one response for three to five hours per week,

and one for six to eight hours per week. The new group had one response for one to two hours per week, two responses for three to five hours per week, and one response for six to eight hours per week. There was no obvious difference between the responses of the two groups. There were no responses for working overtime without compensation for more than six to eight hours per week.

### Other Findings

In an additional question (question #20) on the survey questionnaire, the participants were asked to rank, in order of importance, the criteria that they used when considering a job. The responses are displayed in Table 9.

Factor	Rank	Ave Value	Number of Responses												
			1	2	3	4	5	6	7	8	9	10			
Interesting Work	1	2.9	3		1	3	1								
Salary	2	3.3	4	1	1	1	1	1							
Location	3	3.8	4	1				1			1	1			
Having a mentor	4	4.5	2	1	1	2				1	1				
Work Diversity	5	5.0	1		2	2	2				1				
Retirement and health benefits	6	5.4	1	2					1	3	1				
Training prior to work assignments	7	5.8			2	1		2	1	1	1				
Supervisor w/ similar academic background	8	6.4	1				2		2	1	2				
Company Size	9	8.1								1	1	2	4		
Other	10	10.0													8

Key: Factors are ranked in order according to the ranking of importance by respondents, with 1 being most important and 10 being least important.

**TABLE 9 Ranking of Important Factors That Influenced Generation X Consulting Engineers in Lynchburg, Virginia**

The findings shown in Table 9 cannot be used to evaluate or support the qualitative findings because the respondents were given the ten options to rank without regard to other factors. Also, these findings are beyond the explicit goal of discovering key factors that influence employment decisions of Generation X consulting engineers. However, the findings are meaningful in representing the research problem in a new and different

light. The researcher felt that it was important to present this data to help create a more holistic understanding of the study and its findings.

For example, Theme 15 was stated as “Job diversity is at least as important as starting salary.” The responses to the survey question related to that theme were five (5) strongly agree, two (2) somewhat agree, and one (1) somewhat disagree. These findings allowed the researcher to declare the theme as being supported. In Table 9 it can be seen that the collected results of multiple respondents show that work diversity is ranked fifth on the list of priorities while salary is ranked second.

Did the results from the survey and the data from Table 9 conflict with each another? Perhaps. A better explanation was that the findings showed there was a difficulty in separating individual factors when dealing with Generation X engineers. The participants did not select their job based on only one factor, and each factor has many different facets. The data explicitly showed that job diversity was as important as salary. However, when a job candidate makes decisions based on multiple factors, then the importance of one or several of the factors changes in relationship to all of the others.

In this confusion of data interpretation lays the significance of the study. It has been very difficult for consulting firm managers and recruiters to corroborate their own personal experiences and apply them to understanding how and why Generation X engineers view recruiting and employment.

## **Summary**

The Results chapter followed the execution of the research from the conclusion of the research plan to the development of the final results. The tools and methods used to obtain data, perform analysis, and determine findings were described.

This chapter began by discussing how the semi-structured interview was developed and carried out, including how the questions were developed. The interviews were discussed, and a significant amount of data was presented from the interviews with Generation X consulting engineers in Lynchburg, Virginia. The presentation of data provided insight into the perspectives that the participants had on engineering, recruiting, and job desires. The analysis of the data through various coding procedures of Grounded

Theory was outlined. The data analysis was described and the major categories were identified.

Nineteen major themes were developed in Phase One. The major themes were shown along with supporting descriptions showing how the major themes were developed and relating the major themes to the information from the interview transcripts.

After the major themes were identified, the study transitioned to Phase Two. A Likert-scale questionnaire was created and administered to eight participants, four of which had previously been involved in the Phase One interviews. The survey data was collected and then interpreted by the researcher.

The survey data showed that seventeen of the nineteen major themes were supported by the quantitative data. The two unsupported themes were discussed at length to provide possible explanations for why the analysis in the two phases did not agree.

The results of the study were presented. The seventeen major themes supported by the questionnaire results were shown as findings of the study. The two themes not supported by the questionnaire data were also presented. The actual data from the Phase Two research was presented, which indicated specific details of the participants' responses. Additional discussion was provided to additional explanation about the quantitative data, which explained variances in the data.

In the Other Findings section an additional survey question was discussed to help create a more holistic understanding of the main research problem and the research results. This question had allowed the respondents to rank, in order, nine of the major themes. Neither this question nor the data collected helped to develop major themes or to provide supporting data, but this question has relevance in terms of helping to show the possible relationships between the major themes.

## CONCLUSIONS

This chapter provides the researcher's concluding views of the research effort and additional explanations of how the research findings are relevant to understanding Generation X employees.

### Contributions of Research

This research made several contributions to the academic realm and to the consulting engineering industry. The major contributions are shown in Table 10.

<ol style="list-style-type: none"> <li>1. The research developed a rigorous methodology and design for approaching the problem of understanding the perspectives of potential employees with regards to how members of Generation X make employment decisions. The methodology and design are well suited to be adapted to other fields of study regarding recruiting and employment.</li> <li>2. The research used Grounded Theory to analyze data to put together the building blocks to build theory concerning how Generation X employees make employment decisions. The findings of the research can be utilized as a springboard for a variety of research efforts that are concerned with the recruiting and employment of Generation X employees.</li> <li>3. The research findings have provided data and knowledge from a rigorous research approach that will be useful for comparison to other studies done on Generation X employees. This will allow for a greater understanding of Generation X engineers as well as those individuals who become employed by the consulting engineering industry.</li> <li>4. The findings of this study have a strong practical application for use by consulting engineering firms to improve their recruiting efforts.</li> </ol>
--

**TABLE 10 Contributions of Research**

Generation X employees will dominate the change in how business is performed in the next twenty years. This research begins to explain how the mindset of the Generation

X employees differs from previous generations and how organizations must re-think their recruiting and management strategies to encompass the wants and the needs of the individuals that they so dearly desire to employ.

The research methodology and design utilized in this research was developed to deal with the particular issues regarding Generation X employees. This methodology and design can be easily adapted to other research efforts that are concerned with recruiting and employment. There is no doubt that the wants and needs of Generation X employees are significantly different (and more demanding) than those of the Baby Boomers who will soon be retiring from the workforce. As was demonstrated in the review of past literature, there is a tremendous amount of work that must be done before organizations will fully understand and appreciate the unique set of skills, ambitions, and interests of Generation X.

Future researchers will be able to borrow from and improve upon the research ideas that came from this study. The methodology, design, and execution of the study were well documented, which will allow for future researchers to build upon the foundation of this work. The analysis and theme developed during the research effort will be useful to both academic and practical based research that tries to better understand the engineer as a candidate for employment. This research was focused on a narrow area of geography, age, and academic background in order to sufficiently ensure in-depth study; however, the methodology and design are well suited to be applied to broader regions of research, especially those concerned with recruiting of Generation X employees.

The findings of this research is part of the foundation that needs to be developed before more specific and detailed research studies can be performed. The findings are part of a larger effort to create theories that explain the behavior of Generation X employees. Without theory building, the understanding of Generation X will remain stereotypical, biased, and not founded on real evidence.

This research was developed with the primary goal of providing data to the consulting engineering industry that would benefit its recruiting efforts. It has been well established that the recruiting (and retaining) of skilled employees is the single greatest challenge facing the consulting industry. Until the consulting industry is shown actual evidence that will help to modify recruiting and management processes, bias and

misunderstanding will dominate the thinking that goes into how consulting firms recruit, hire, and manage their young engineers.

### Researcher's Comments

The seventeen important factors determined by this research are just a small part of the puzzle concerning Generation X employees. This research and its findings should be extremely useful to better understand the wants and needs of Generation X employees, even those not employed by the consulting engineering profession.

The seventeen factors cover a wide range: geography, salary, mentoring, diversity and variety of projects, recreational activities, and workplace environment. There is no simple equation that can be developed that will reduce the findings into a neat, easily understandable explanation. Members of Generation X have a unique set of wants and needs that have to be addressed by employers if recruiting issues are to be resolved. This study helped to provide information to allow for that to happen.

One of the most important pieces of knowledge that came from the study was that salary was not the most important factor that influences members of Generation X. They have a high degree of understanding of quality of life that differs significantly from previous generations. They have no desire to climb on the corporate ladder and to wait their turn in line; instead, they demand constant learning experiences that will develop their skills sets. Where previous generations measured job security by longevity, members of Generation X measure it by the quantity and quality of skills that they possess. Not only do they believe that employers should provide fair financial compensation, they also expect mentoring, training, and career growth opportunities.

Consulting engineering firms have already realized that they are a buyer in a seller's market. Consulting firms must compete against one another as well as other industries when it comes to attracting engineering talent. Consulting firms have a lot to offer potential employees, and by using the findings in this study, they will be able to capitalize on the advantages that consulting engineering firms have to offer to Generation X engineers.

### Recommendations for Future Research

The researcher suggests that future research in the area of the recruiting of young engineers be expanded so as to test the factors determined in this study. The factors could be tested as hypotheses in a quantitative study by using a large sample population that could utilize statistical analysis to provide statistical definitions of validation. Such data would provide more definitive proof that the factors discovered in this study are accurate and would also allow the factors to be further studied in a manner that would allow them to be improved upon.

Another consideration for future research also would include an in-depth study of each of the seventeen factors developed in this study. Such investigations might reveal if these factors are dependent or independent, and by understanding why these factors are important to Generation X engineers, recruiters might be able to predict how young engineers respond to different elements of the recruiting process. This type of research might also be able to discern whether the important factors should be considered as independent or dependent variables.

This research dealt exclusively with Generation X employees (born 1964 to 1980). As the members of the NET Generation (1981-?) enter the workforce, it would be beneficial to discover if they are influenced by different factors than that of Generation X. The research methodology and design is already in place to perform such an investigation.

This research was focused on determining the important factors that influence employment decisions. A very similar research effort could be done without significant modifications that would study what factors influence the decisions of Generation X employees to either remain with their current employer or to leave for other employment.

Currently, most consulting engineers are Caucasian males. Research into the recruiting of minorities could prove to be extremely beneficial to improving the talent base required in the consulting engineering profession.



## SUMMARY

This study determined seventeen important factors that influenced the employment decisions of Generation X consulting engineers in Lynchburg, Virginia. Knowledge and data was created on the subject of Generation X consulting engineers which served to fill in the deficiencies of past literature. A specific mixed method research methodology and design was developed and executed in a sequential mixed method approach and was used to examine the employment decisions of the study group.

Prior to beginning the data collection, the researcher determined the main problem to be that engineering consulting firms have struggled to attract young engineers into their organizations. This led to the development of the main research question:

**What characteristics, attributes, and experiences were the influencing factors for Generation X engineers in their decision to choose employment in the consulting engineering profession in Lynchburg, Virginia?**

The initial parts of the study had two main focuses: investigate past literature and determine the scope of the research. After these were completed, the researcher then determined the research methodology best suited for the study. It was determined that a mixed method approach would yield the most robust results. A two-phase dominant-less dominant mixed methodology was developed by borrowing from and modifying existing accepted research methods.

During Phase One of the study, nineteen major themes were developed from analysis of the grounded data to represent the factors that influenced employment decisions of Generation X consulting engineers in Lynchburg, Virginia. These major themes were evaluated during Phase Two through a survey questionnaire. Seventeen of the themes were supported by the data, and these were identified as the important factors. Additional discussion was provided for the two themes that were not supported by the survey findings. The final results included the seventeen major themes supported by both phases of the study; additionally, the study provided significant information, discussion, and analysis from the qualitative portion of the research.

In identifying the major factors that influenced Generation X consulting engineers' employment decisions, the study also partially revealed the desires and expectations of the study group. Although this study did not solve the recruiting problem facing consulting firms, it did provide evidence that young engineers are influenced by a particular set of factors that should be addressed if recruiting efforts are to be improved. This seventeen major factors identified by this study will help to fill the gap that existed between the need to hire young engineers and what consulting firms must do to make successful job offers to these individuals.

## BIBLIOGRAPHY

- Armour, S. (2001). "Job Market Gets Tougher for College Grads." *USA Today*, 20 June.
- American Society of Engineering Education, <http://www.asee.org/colleges>.
- Atkinson, R. (1990). "Supply and Demand for Scientists and Engineers: A National Crisis in the Making." *Science Magazine* v248, April 27, 1990, 425-432.
- Bova, B. and Kroth, M. (2001). "Workplace learning and Generation X." *Journal of Workplace Learning*, v13, Number 2 2001, 57-65. MCB University Press.
- Bova, B. and Kroth, M. (1999). "Closing the Gap: The Mentoring of Generation X." *Journal of Adult Education*, v27, Summer, 7-17.
- Brown-Alcala, S. (1999). "Modern Recruiting 101: How to Recruit Architects and Engineers." *Graduating Engineer Online*, [www.graduatingengineer.com/articles/feature/9-15-99.html](http://www.graduatingengineer.com/articles/feature/9-15-99.html).
- Canon, David (1991). "Generation X: The Way They Do Things They Do." *Journal of Career Planning and Employment*, v51 p34-38, January.
- Clifton, D., "Don't Promote Your Stars." *Gallup Management Journal*, Fall.
- Conlin, M. and Coy, P. (1999). "The Wild New Workforce." *Business Week*, 6 December, 39-44.
- Corley, T. (1999). "Becoming an Employer of Choice for Generation X: The Elements of the Deal." *Journal of Career Planning and Employment*, v59, Summer, 21-26.
- Creswell, J. (1994). Research Design: Qualitative and Quantitative Approaches. Thousand Oaks, California: Sage Publications.
- Horwitz, B. (2000). "Trends for 2000." *Consulting-Specifying Engineer*, January, 24-30.
- Horwitz, B. (2001). "Recruiting 101." *Consulting-Specifying Engineer*, April, 26-28.
- Gephart, R. Jr. (1988). Ethnostatistics: Qualitative Foundations for Quantitative Research. Newbury Park, California: Sage Publications.
- Klein, J. (2000) "Hiring Top Engineers Requires Fine-Tuning Interview Techniques" *Managing Design Engineering*, March, 3-5.

- Leedy, P. (1997). Practical Research: Planning and Design 6<sup>th</sup> ed. Columbus, Ohio: Prentice-Hall.
- Maurer, S.; Howe, Vince; and Lee, Thomas W. (1992): "Organizational Recruiting as Marketing Management: An Interdisciplinary Study of Engineering Graduates" *Personnel Psychology* v45, Winter, 807-833.
- Marklein, M. (2001). "Brain Drain Strategies Can Retain Workers" *USA Today*, 08 August.
- Miles, M. and Huberman, M. (1994). Qualitative Data Analysis: An Expanded Sourcebook, 2<sup>nd</sup> ed. Thousand Oaks, California: Sage Publications.
- Montana, P. and Lenaghan, J. (1999). "What Motivates and Matters Most to Generation X and Y." *Journal of Career Planning and Employment*, v59, Summer, 27-30.
- National Society of Professional Engineers (NSPE). <http://www.nspe.org/media/mel-aec.asp>.
- Poe, A. (2001). "Hiring in the Hinterlands" *HR Magazine*, April, 81-88.
- Ruch, W. (2000). "How to Keep Gen X Employees from Becoming X-Employees." *Training and Development*, v54 n4, April, 40-43.
- Schmitt, E. (2001) "Tally of Students Equals Number at Boomer Peak." *New York Times*, 23 March.
- Silvestri, G. (1997): "Occupational Employment Projections to 2006." *Monthly Labor Review*, November, 59.
- Strauss, A. L. and Corbin, J. (1998). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, 2<sup>nd</sup> ed. Thousand Oaks, California: Sage Publications.
- Strauss, W. and Howe, N. (1992). Generations: The History of America's Future: Morrow, William, & Company.
- Sullivan, C.C. (1999). "Issues of Substance." *Consulting-Specifying Engineer*, August.
- Sullivan, C.C., (2000). "Consulting-Specifying Engineer's National Survey of Engineering Trends" *Consulting-Specifying Engineer*, September, 16.
- Tashakkori, A. and Teddlie, C. (1998). Mixed Methodology: Combining Qualitative and Quantitative Approaches. Thousand Oaks, California: Sage Publications.
- Tritch, T. (2001). "Talk of Ages." *Gallup Management Journal*, Winter.

## **GLOSSARY OF TERMS**

**Axial Coding:** The process of relating categories to their subcategories by linking categories at the level of categories and dimensions (Strauss and Corbin, 1998).

**Coding:** The analytic processes through which data are fractured, conceptualized, and integrated to form theory (Strauss and Corbin, 1998).

**Conceptual coding:** The organization of data into discrete categories according to their properties and dimensions.

**Ethnography:** Qualitative inquiry focused on discovering cultural patterns in human behavior by studying the perspective members of the culture in their natural settings.

**Generation X (Gen X):** Population group for individuals born in America between 1964 and 1980. The group was original labeled by social theorists as those Americans born in the 1960s and 1970s (Strauss and Howe, 1992). Combines elements of the Baby Bust (1965 to 1976, reference [www.iversonsoftware.com/sociology/baby\\_bust.htm](http://www.iversonsoftware.com/sociology/baby_bust.htm)) and precedes the NET Generation (1977 to 1997, reference <http://www.tc.cc.va.us/faculty/tcshawp>), also called Generation Y.

**Grounded Theory Research:** Qualitative research studies aimed at deriving theory through the use of multiple stages of data collection and interpretation (Leedy). Theory is generated by systematically obtaining and analyzing through constant comparison of the interrelationship of data.

**Hypothesis:** "A conjectural supposition that is posited in order to facilitate the search for facts but that is held in abeyance until the data are available and have been interpreted" (Leedy, 1997, p8).

**In Vivo Codes:** Phrases that are used repeatedly by informants (Mile and Huberman, 1994).

**Methodology:** A way of thinking about and studying social reality (Strauss and Corbin, 1998).

**Microanalysis:** Detailed line-by-line analysis used to generate initial categories and to suggest relationships among categories; a combination of axial and open coding (Strauss and Corbin, 1998).

**Open Coding:** The analytic process through which concepts are identified and their properties and dimensions are discovered in data (Strauss and Corbin, 1998).

Phenomenology: Qualitative research method that attempts to understand participants' perspectives and views of social reality, especially focused on increasing awareness to the participant's experience to certain phenomena (Creswell, 1994).

Qualitative Study: Inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting (Creswell, 1994).

Quantitative Study: Inquiry into a social or human problem, based on testing a theory composed of variables, measured with numbers, and analyzed with statistical procedures, in order to determine whether the predictive generalizations of the theory hold true (Creswell, 1994).

Theory: Framework that describes a social phenomenon.

Univariate analysis: Involves the examination across cases of one variable at a time.

## APPENDIX A

### Lynchburg and Surrounding Area Statistical Information

Source: Lynchburg Chamber of Commerce (<http://www.lynchburgchamber.com>)

#### Population 2000 U.S. Census Bureau

Lynchburg:	65,296
Bedford City:	6,299
Amherst County:	31,894
Appomattox County:	13,705
Bedford County:	60,371
Campbell County:	51,078
Total:	281,421

#### Median Age

Lynchburg:	33.1
Bedford City:	39.9
Amherst County:	35.0
Appomattox County:	35.8
Bedford County:	35.7
Campbell County:	34.0

#### Demographic Breakdown

White:	181,553
Black:	41,553
Other:	5,565
Male:	109,964
Female:	118,651

#### Median Household Income

Lynchburg:	\$29,105
Bedford City:	\$29,777
Amherst County:	\$34,745
Appomattox County:	\$32,582
Bedford County:	\$42,540
Campbell County:	\$34,895

### Lynchburg Statistical Information

The following background information pertaining to the Lynchburg, Virginia area was obtained from the CNNMoney© website ([http://money.cnn.com/best/bplive/bplive\\_allcities.html](http://money.cnn.com/best/bplive/bplive_allcities.html)) based on data current to December 2001 (# rankings are based 294 cities across the United States, with #1 being considered the best value):

Population: 215,000	Unemployment Rate: #180	
Personal crime: #96	Property crime: #21	Home price: #261
Cost of Living: #241	Air Quality: #1	Water Quality: #10
Leisure Index: #210	Arts Index: #184.	

Average salary for Engineer I (0-3 years experience): \$47,300 in Lynchburg compared to national average of \$49,950. Note that most engineers in Lynchburg do not work in the consulting profession, but in the wireless technology or nuclear engineering industries, so average salaries across professions may not be useful for consulting firms in Lynchburg.

The Forbes/Milken Institute reported in Forbes Magazine in March 2001 ([http://money.cnn.com/best/bplive/bplive\\_allcities.html](http://money.cnn.com/best/bplive/bplive_allcities.html)) on the best metropolitan places in the United States. Based on a study of 328 cities, Lynchburg ranked #202 in salary growth from 1994 to 1999 and #89 in year 2000 salary growth. How did other cities in Virginia rank from 1994 to 1999? Washington D.C was #24, Richmond was #94, Norfolk was #238, and Roanoke was #185. These rankings were based on sustained gains in earning power.



## **APPENDIX B**

### **List of General Questions for Semi-Structured Interview with Generation X Consulting Engineers from Lynchburg, Virginia**

1. Why do students choose engineering and does this impact the later decision to enter consulting field?
  - a. When did you first begin hearing/learning about consulting engineering?
  - b. Did you choose consulting engineering before choosing engineering at large?
  - c. When did you choose consulting engineering as a career?
  - d. How did you choose the college that you attended?
  - e. When did you first consider your career choices?
  - f. Where do you look for jobs? Newspaper, Internet, campus recruiting?
  
2. Do candidates have short- or long-term employment goals with their first employer?
  - Do you think that young people have honest expectations about the workplace, wages, and advancement, and does this impact how they deal with management?
  
3. What issues make candidates comfortable and/or uncomfortable?
  - What does your company do successful in regards to training new employees? What would you like them to do?
  
4. What tangible rewards do candidates seek? Which are unimportant?
  - What about consulting engineering appeals to job seekers? (Diversity, field work, seeing different plants, sales, project management, etc.)
  
5. What intangible rewards do candidates seek? Which are unimportant?
  - a. What role do you believe geography plays in recruiting?
  - b. Is there any effort to increase work at-home scenarios? Are there strong management feelings for or against this type of setup? How would you like this setup?
  
6. What non-work issues are tied to employment?
  - a. With modern societal concerns about trading leisure time for work time, how do employees react to company needs?
  - b. What is influence on student of having an internship during college?
  
7. How do young engineers view employment? How do high-tech companies and the associated perceived lifestyle/salary impact this view?
  
8. How do candidates view recruiting, interviewing, and the job search?

## APPENDIX C

### EXAMPLE OF RANDOMLY COLLECTED CODING NOTES

Code: Opinions about why students drop out of Engineering (image of others), comparison of self to liberal arts majors (self-image, self-worth, social worth)

Code2:

Self-image: (identification with college "our school," special identity of engineers).

Self-worth: (comparison of self to liberal arts majors in an intellectual fashion with engineers being superior)

Image of others: (negative connotation to liberal arts majors "cookbook chemistry," "switch majors so they can handle the subjects" deals with generalization of others who study different subjects)

Code2:

Consulting Awareness: (aware of difference between engineering as a whole and consulting as a specific)

Code: Engineering decision

Code2:

Consulting Awareness: (must choose engineering before consulting, so in a new employee's eyes consulting is a subset of engineering)

Code2:

Engineering Awareness: per next comment, the idea of preconceptions is based on college curriculum rather than job market. Preconceptions are about what the individual would like to do, and this probably means that the interviewing process for the student is about aligning what they want a job to be like to what it is that companies produce.

Interviewing rarely provides the level of detail required to really understand a job (if you are still a student), so to the student this process revolves around the idea of finding a company that could have the ideal job.

Code2:

Engineering Awareness: Preconceptions come from what the student would like a job to be based on college curriculum. This further enforces the above theory that the interviewing process is about the student dealing with finding a fantasy job.

Code: Uncertainty about career choices

Code2:

Engineering Awareness: Based on the interviewer's previous comment on thinking about working for a state agency, he first claimed to have some understanding of the job market but then gives a conflicting statement about not having a good grasp. This seems to tie in to the idea of the student's expectations of the ideal job and dealing with the reality of what the job market offers. One reason why the interviewee gives conflicting answers is that the first statement is concerned with the creation of the fantasy, and the second is about looking to fulfill that fantasy.

**APPENDIX D**  
**MAJOR THEMES**  
**AND RELATED SURVEY QUESTIONS**

- Theme 1: Engineers prefer to work for a supervisor who is an engineer rather than someone with a business or liberal arts background.
- Question: With all other things being equal, would you prefer to work for a supervisor who is an engineer rather than a supervisor with a business or liberal arts background?  
 (Scale of 1-5, with 1 being strongly prefer engineering background and 5 being strongly prefer liberal arts background.)*
- Theme 2: Candidates do not have strong opinions about working with or for someone with whom they can relate a similar high school or college experience.
- Question: Was it a strong factor in your decision that you might work with someone who attended the same college or was raised in the same geographic area as you did?  
 (Scale of 1-5, with 1 being strongly agree and 5 being strongly disagree.)*
- Theme 3: Geographic location is an important factor in a candidate's decision of accepting a job.
- Question: Was geographic location an important factor in your decision to accept a job offer with your first employer?  
 (Scale of 1-5, with 1 being strongly agree and 5 strongly disagree.)*
- Theme 4: Candidates who accept work in the consulting industry have a strong desire to work in an office environment.
- Question: When you were seeking a job, did you consider it important to work in an office versus a factory environment?  
 (Scale of 1-5, with 1 indicating a strong preference for office and 5 indicating a strong preference for working in a factory environment.)*

**Theme 5:** When considering a career choice, candidates take into consideration the large number of consulting firms that are in business across the country and world because of the options that it grants to them for future employments decisions.

*Question:* When you considered a job in consulting, were you aware that there are a large number of consulting firms across the country? Was it a factor in your decision to accept a job?

- I was aware and it was a significant factor.*
- I was aware and it was a moderate factor.*
- I was aware but it was not a significant factor.*
- I was not aware of the number of consulting firms.*

**Theme 6:** Candidates look for job prospects in areas relating to college courses where they excelled.

*Question:* Did you look for a job in areas relating to college courses that you liked and/or where you excelled?  
(Scale of 1-5, with 1 being strongly agree and 5 being strongly disagree.)

**Theme 7:** Having knowledge about a company before interviewing makes the interview more comfortable for the interviewee and makes it more likely for a candidate to accept a job offer.

*Question:* Would you be more comfortable in a job interview if the company had, a few days before, provided you with company brochures, sales plans, and a detailed description of the type of work that the job would entail?  
(Scale of 1-5, with 1 being strongly agree and 5 being strongly disagree.)

**Theme 8:** Candidates willing to work in smaller communities prefer to work for small-sized companies more than mid-size companies and large/very large companies.

*Question:* When seeking your first job, did you consider company size?

- Small company (less than 25 employees)*
- Medium sized company (26 to 100 employees)*
- Large company (101 to 500 employees)*
- Very large company (greater than 500 employees)*
- Did not consider company size.*

**Theme 9:** Candidates have no strong preference for a company that works on large projects versus small projects.

*Question: Would you prefer to work for a company that works on many small projects or fewer large projects?  
(Scale of 1-5, with 1 indicating strong preference for small projects and 5 indicating strong preference for large projects.)*

**Theme 10:** Candidates fear beginning their career in a “sink or swim” environment and would prefer an extended training period.

*Question: When you began your first job, would you have preferred being given assignments immediately or would you have preferred an extended training period?  
(scale of 1-5, with 1 indicating a strong preference for being given assignments immediately and 5 indicating a strong preference for an extended training period.)*

**Theme 11:** A candidate’s comfort level during the interview plays a significant role in whether or not that individual will consider a job offer?

*Question: Do you think that having a high comfort level during the job interview makes you more inclined to accept a job offer from that company?  
(Scale of 1-5, with 1 being strongly agree and 5 being strongly disagree.)*

**Theme 12:** Candidates have only a slight preference to work for a company that has a low turnover rate and a high percentage of long-term employees.

*Question: When considering the prospects of working for a company, did it make a significant difference if the company had a history of low employee turnover and a high percentage of long-term employees?  
(Scale of 1-5, with 1 indicating a strong preference for working with a company with a history of a low employee turnover rate and 5 indicating it was not a factor)*

**Theme 13:** Candidates know little about the consulting industry prior to interviewing with a consulting firm.

*Question: When did you first begin to consider consulting as a career?*

- a. Before college*
- b. First two years of college*
- c. After first two years of college but prior to job search*
- d. During job search*
- e. Immediately before or during interview with consulting firm*

- Theme 14:** Financial compensation is not as important as having a job where an individual can gain meaningful experience.
- Question:* *When considering your first job, did you consider getting meaningful work experience to be more important than having a mundane job that paid well?  
(Scale of 1-5, with 1 being strongly agree and 5 being strongly disagree.)*
- Theme 15:** Job assignment diversity is at least as important as starting salary.
- Question:* *When considering your first job, did you consider job diversity and variety to be more important than having a mundane job that paid well?  
(Scale of 1-5, with 1 being strongly preferring diversity and variety and 5 being strongly desiring salary.)*
- Theme 16:** Having knowledge about the consulting industry prior to beginning the job search would have increased their interest in pursuing a consulting career.
- Question:* *Would having knowledge about the consulting industry prior to beginning your job would have increased your interest in pursuing a consulting career?  
(Scale of 1-5, with 1 being strongly agree and 5 being strongly disagree.)*
- Theme 17:** Candidates consider working in a location with activities more important than starting salary.
- Question:* *Which do you consider more important, working in a location with many recreational activities available to you in your free time or a marginally higher starting salary?  
(scale of 1-5, with 1 indicating strong preference for recreational activities and 5 indicating a strong preference for starting salary.)*

**Theme 18:** Candidates are willing to work a small amount of overtime without expecting compensation.

**Question:** *What do you consider is a reasonable amount of overtime for salaried employed to work without compensation? Choose the one of following that is the most correct:*

- a. No overtime*
- b. 1 to 2 hours a week*
- c. 3 to 5 hours a week*
- d. 6 to 8 hours a week*
- e. 9 to 12 hours a week.*

**Theme 19:** Candidates would prefer to work in a project management environment rather than a traditional top-down rigid organizational structure.

**Question:** *Which type of management system would you prefer to work in?*

- a. Project management.*
- b. Traditional organizational hierarchy.*
- c. Other.*

## APPENDIX E

### Question 20 from Survey Questionnaire

The survey questionnaire contained an additional question, which was used as a multi-variate tool to help differentiate between the factors that had been identified in Phase One of the study. The findings are included in the Appendix for the benefit of future research efforts.

Based upon the criteria that you used in considering a job, rank the following in order of importance from 1 to 10.

- a. Location.
- b. Salary.
- c. Company Size.
- d. Interesting Work.
- e. Diversity of Assignments
- f. Environment where you are trained before there are high expectations in your performance.
- g. Having a good mentor.
- h. Working for a supervisor with similar academic background.
- i. Benefits of retirement and health insurance.
- j. Other.

**TABLE 10 Question 20 from Survey Questionnaire**



## **APPENDIX F**

### **POTENTIAL IMPACT OF STUDY ON ENGINEERING MANAGEMENT PRACTICE IN CONSULTING FIRMS**

It might be assumed that management systems within many consulting firms are being driven towards achieving external client satisfaction while maximizing profits (this is, after all, the mainstay of service companies); instead, they often deal with how to handle workloads with a labor pool that in many ways lacks the skill set required to meet industry standards, building codes, and client demands for modern building systems. These problems have come about by the difficulty that engineering firms have had in attracting talented young engineers.

By developing a deeper understanding of the perceptions of young people, the industry can begin to modify itself to become more attractive to young talent: talent that can use of computer and technical skills in work processes that will provide for more elegant and technically superior solutions to design problems. Additionally, by differentiating the ability of young people to casually deal with rapid technological changes and their ability to analyze large amounts of information, new management systems can alter the work processes themselves to better suit Generation X employees to ultimately provide increased client satisfaction and greater profitability. Business leaders and executives commonly cite attracting and retaining talented employees as their top priority. The depletion of talent in consulting firms puts the industry at risk in terms of providing services in the larger construction industry. This has forced management systems within consulting firms to streamline work processes by overly simplifying problem solving techniques, reducing technical solutions, and relaxing quality standards in order to meet the demands of construction boom of the past decade.

Research data and personal experiences provide supporting evidence for the difficulty that consulting firms are facing in recruiting young engineers; however, most of the emphasis on improving recruiting efforts have been inward-looking ideas that fail to consider the reasons why young engineers do or do not choose to enter into the consulting profession. Many suggestions found in industry trade publications appear to

be based on intuition, opinion, or guesswork, and real evidence is rarely presented as proof that authors have successfully figured out how to attract and hire young talent into the consulting engineering profession.

The most practical intended of the study was to create a published document for circulation within the consulting profession. The intent of such a report would be to provide consulting firms with a tool to improve their existing recruiting and hiring practices. It is the researcher's hope that such a publication would help to shift the consulting industry's dialogue towards creating new solutions based on research-based theories derived from actual data.

The literature references cited in the study showed that recruiting is the biggest problem in the profession. Let us ask, does the biggest problem get the most attention and the best resources to solve? Or, do managers view it as somebody else's challenge to overcome? If there was only one practical significance of the study, it was to cause managers and executives to sit up and take notice that the problem may be nothing more than a lack of understanding on the part of recruiters to pay attention to what young engineers want in a job. Recruiters who want to make actual improvements will consider not just the findings but also the importance of asking the main research question:

**What characteristics, attributes, and experiences were the influencing factors for Generation X engineers in their decision to choose employment in the consulting engineering profession in Lynchburg, Virginia?**

The study showed that young engineers have a multitude of desires and expectations that they bring along with them to the job search. Whoever presents the best match of opportunities to meet these desires and expectations obviously has the best chance of hiring these individuals. If the candidate is unaware of the consulting profession's opportunities, then the likelihood of hiring the candidate is remote.

The study showed that having interesting work, learning experiences, diversity of assignments, career growth, and having a mentor were important factors in addition to salary and geographic location. Salary and geographic locations are not easy to change, but the other factors could be controlled variables if management systems were modified

to make a priority in their recruiting efforts, the processes of work flow in the organization, and as part of the performance review of employees (especially younger engineers as well as the mentors). Making these kinds of changes would allow consulting firms to make reasonable promises to candidates and then actually follow up on them.

Consulting firms must first consider what is important to candidates before modifying their sales pitch. When seeking a new client, doesn't a firm consider what a client is looking for? Shouldn't the same hold true to for recruiting candidates? After firms understand the marketplace (hiring young engineers) then they should consider what they have to offer that will meet the desires and expectations of candidates.

Resources the consulting firms can communicate that they understand what young engineers want:

1. **Marketing Material:** Brochures, on-campus advertisements, Internet, newspapers.
2. **Intern Engineers:** Ask what they desire and expect.
3. **On-campus Interview:** Literature, opening and closing interview dialogue.
4. **On-site Interview:**

### Marketing Material

Assume that the Generation X engineering audience knows nothing about what consulting firms do for clients. Firms must consider how the reader is going to respond to how an organization presents itself. Marketing is not simply bragging or creating a perception of what a company wishes it could be, and Generation Xers will know the difference. Companies should try to communicate a meaningful message to candidates that relates to their wants and needs, not those of the company. Firms must show that they are a place where candidates should want to work. Marketing is not as simple as making the information available; it is about communicating a message to a particular audience. Generation Xers are consumer savvy and despise over-hyped ad campaigns that use modern clichés with "opportunity," "creative companies," and "dynamic work environments." They've already heard it. They want specific information about jobs and projects, salary, and perks (Cannon, 1991). These are definitively difficult to provide

with a marketing effort, but giving at least some of these details will help to catch the eye of marketing targets. Also, members of Generation X strongly desire a place where they can maintain their own unique identity and not be part of a big machine, and would likely take notice of marketing efforts that sold companies on how their employees remained unique individuals.

As was discovered during the research for the thesis, those students enrolled in engineering disciplines with strong ties to the manufacturing industries (such as mechanical and electrical engineering) were less likely than civil or structural engineers to have knowledge about the consulting industry. If you are trying to recruit engineers from these backgrounds, be prepared to explain what consulting engineering entails.

### Internship

If a consulting firm hires intern engineers, then it should listen to them about what they want as full-time employees. They should consider if the intern anticipates that his full-time employment would fulfill some or all of his desires and needs. They should ask what the intern is looking for in a full-time job and work with her to put a program in place that will make the candidate look forward to working at the firm as a full-time engineer. If the organization is hoping to make the intern an offer for full-time employment, it should be already be dealing with what the candidate expects as a full-time employee. Training, diverse assignments, and mentoring cannot be postponed until the intern is hired; the company must put forth the effort prior to the interview if it expects to have the candidate be interested. Organizations cannot operate with the expectation that interns will consider their part-time employers as the top choice for full-time employment. That is not how Generation Xers think. They will use internship as a training ground to move on to another company that will treat them better unless they are given a reason not to leave.

The research for the thesis revealed that intern employees do not have a strong sense of loyalty about returning as a full-time employee. You can almost guarantee that graduating students will explore the job market, regardless of whether or not they believe that their intern employer will make them an offer for full-time employment. Members

of Generation X consider long-term employment to be in the range of two to five years: your intern may have already worked a substantial part of the time he wants to dedicate to your company. Talk to your interns about this long before graduation, or else you may find that they may have already accepted a job offer elsewhere before you can even make an offer. Treat interns like regular employees: find out what motivates them and what must the company to retain as employees.

### On-campus Interviews

When a firm has a chance to get a face-to-face meeting with a candidate, the firm should remember that they are selling as much as they are buying. While a company is evaluating the candidate, he is evaluating the company. This is the perfect time to find out what he wants and expects. Ask questions. Listen. Take notes for future interviews. Find out what his interests are and what classes he liked. Then talk about them and see how they relate to what your company offers. When his desires become clear to you, begin to advertise what you have to offer that meets those desires. Mention interesting projects that you have done, or better, talk about the ones you are currently working on and the ones that they might get to work on if they are hired. Generation Xers want a variety of interesting projects that are exciting as well as entertaining. Many (if not all) of your interviewees will interview with multiple companies. Are you trying to be like everyone else, or are you trying to be different. Knowing the factors that influence employment decisions of young engineers should allow you to prepare discussions for what they will want and expect in an employer.

### On-site Interviews

Before the candidate shows up, send him as much information about your company as possible. Make her feel that she knows what your organization is about. When candidates come to visit, have your notes ready. Have multiple individuals talk about the benefits of your company that will interest the young engineer. This includes paying attention to the candidate, putting forth a professional appearance, and being

prepared to discuss the candidate's experiences (be familiar with her resume). Show to them potential peers and managers who have similar backgrounds and experiences. Let them meet their future boss and so the recruit can begin to build a relationship. Let the future supervisor talk about his expertise so the recruit can anticipate how much he could learn. Generation Xers want to work in modern, flexible environments. They will not want to use eight-year-old computers or drafting tables. Put those away. Show them your most up-to-date equipment and how you incorporate technology into your design efforts, especially computer hardware and software.

### **Summary**

Generation X engineers have a set of desires and expectations that differ from your older employees. If you do not make an effort to create an environment that satisfies those desires and expectations, you will not be able to hire them. They are very adamant about enjoying their work, making money, and having a high quality of life. While it may seem unfair that Baby Boomers have been more accepting of less than ideal circumstances while Generation Xers will not, that is simply a fact that companies will have to deal with if they hope to hire younger engineers. Organizations must change if they want to attract young people and retain them as employees.

There is no single path to recruiting and hiring. What is important is that companies make the effort to relate the Generation Xers as individuals. They will not care what other employees want or how you treat other employees; they will only care about how you treat them. Listen to their desires. Expect them to have high expectations.

**CURRICULUM VITA**

for

Robert William Mayfield

**DEGREES**

Bachelor of Science (Mechanical Engineering). The Ohio State University,  
Columbus, Ohio, March 1994.

**STATES WITHIN WHICH REGISTERED:**

Virginia, South Carolina.

**PROFESSIONAL CHRONOLOGY:**

Versar, Inc., Lynchburg, Virginia  
Senior Project Manager, July 1996 - present

Korda Nemeth Engineering, Columbus, Ohio  
Mechanical Engineer, January 1995 - July 1996

Stirling Technology, Athens, Ohio  
Mechanical Engineer, July 1994 - January 1995

The Ohio State University, Columbus, Ohio  
Heat Transfer Laboratory, Research Assistant  
March 1993 - February 1994

National Aeronautics and Space Administration (NASA)  
Kennedy Space Center, Cape Canaveral, Florida  
Special Projects Branch, Mechanical Engineer Intern  
April 1990 - December 1990

**SCIENTIFIC AND PROFESSIONAL SOCIETIES MEMBERSHIP:**

American Society of Heating, Refrigeration, and Air-Conditioning Engineers

**HONORS AND AWARDS:**

NASA - Group Achievement Award, NASA HQ, Washington, D.C., 1991