A MIXED METHOD APPROACH FOR ASSESSING THE ADJUSTMENT OF INCOMING FIRST-YEAR ENGINEERING STUDENTS IN A SUMMER BRIDGE PROGRAM

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Abstract

For nearly half a century, institutions of higher education have implemented bridge programs in order to increase the retention and graduation rates of at-risk students (Pascarella & Terenzini, 2005). In fact, summer bridge programs (SBPs), which typically occur prior to a student's freshman fall term, are among the oldest strategies used to improve college retention rates (Garcia, 1991). Surprisingly, even though SBPs are widely acknowledged by both students and program administrators to be beneficial, there is very little empirical evidence assessing their effectiveness (Garcia, 1991; Kluepfel,1994; Pascarella & Terenzini; Rita and Bacote,1997; Ackerman 1990; Gandara & Maxwell-Jolly, 1999). This study, therefore, used a mixed methods approach to investigate the various adjustment issues of participants versus non-participants in a summer bridge program for engineering students at a predominantly White institution (PWI) in the mid-southeastern region of the United States. Specifically, the Academic, Social, Personal-Emotional, and Goal Commitment/Institutional Attachment subscales of the Student Adaptation to College Questionnaire (SACQ) were utilized (Baker & Siryk, 1999) for this purpose. One important finding that the SACQ revealed was that the personal-emotional scale was significant for gender since scores for men were higher than for females. The Summer Bridge Inventory (SBI) that was employed in this research also revealed that summer bridge participants and the director of support programs shared similar opinions about the strengths and weaknesses of the program and its related activities. In conclusion, college administrators and directors of summer

support programs should carefully assess programmatic outcomes to ensure that their institutions' SBPs provided the needed supports that will enhance the retention and graduation rates of at-risk students in engineering.

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CHAPTER ONE: INTRODUCTION

In 2007, former President G.W. Bush announced a $136 billion dollar program to encourage innovation and strengthen the ability of the U.S. to compete in the global economy. In particular, he stressed the importance of science and engineering to the United States with the statement that "the nation needs to graduate more engineers or India and China will eat our lunch" (Wadhwa, 2007). The "lunch" Bush alluded to was our competitiveness in science and engineering.

The engineering professions have had an inestimable impact on this country's economic growth and global impact, and American universities have historically been the principal incubators for many generations of talented, highly trained engineers (National Science Board, 2003). But as noted above, other countries are challenging this country's competitiveness. In order for the U.S. to remain at the forefront of advances in engineering and science, we need to cultivate a diverse pool of candidates to address current and future global needs (National Science Board).

One pressing concern for American educators is the overall graduation rates for college students in the STEM (science, technology, engineering and math) fields. In 1975, the U.S. was the third leading "producer" of students earning bachelor degrees in math and science. However, 2004 statistics from the National Science Board (2003) revealed an alarming drop in rankings, with the U.S. slipping to 17th among nations awarding science and engineering degrees to college students between the ages of 18-24. In overall terms, 18% of degrees conferred in 1996 in U.S. universities consisted of engineering majors, with 11,316 (18%) of those awarded to women and 51,798 (82%) awarded to men (National Science Board, 2003). Compounding the low output of students receiving undergraduate degrees in STEM fields (National Science Board) is the low

representation of racial and ethnic groups (i.e., Blacks, Latinos, and Native Americans) receiving a science, math, or engineering degree. On average, only 12% of engineering degrees are earned by individuals from underrepresented groups (Chang, 2004). Therefore, our society will need to take bold steps to increase the access and graduation rates of women and currently underrepresented populations (defined in this study as racial and ethnic groups that are insufficiently or inadequately represented) to higher education in engineering. These groups consist of African-Americans, Mexican-Americans, Native Americans (American Indians, Alaska Natives, and Native Hawaiians), and mainland Puerto Ricans (Smedley, Butler & Bristow, 2004). In short, the enrollment, retention, and graduation of underrepresented students from U.S. schools of engineering are becoming increasingly important, especially given the drop in rankings discussed above.

College Retention and Summer Bridge Programs

The Education Commission of the States (ECS) has projected that enrollments in institutions of higher education will steadily increase. In fact, by 2015, 19.6 million students are likely to be enrolled in U.S. institutions of higher education, compared to about 16.7 million students in 2005 (Ruppert, 2004). Hand-in-hand with managing increased enrollments is ensuring that graduation rates remain correspondingly high. Therefore, retaining these students is and will continue to be a critical issue facing higher education.

Retention, as defined by Lenning, Sauer, and Beal (1980), refers to an institution's ability to keep a student enrolled until he/she completes an undergraduate degree. Tinto's (2004) study on retention reported that, on average, less than 55% of students entering four-year colleges eventually earn their degrees. Moreover, 56% of all dropouts at America's colleges and universities leave before the start of their second year. Given this information, it is not surprising

that stagnating graduation rates among all students are on the agenda of college presidents and policymakers across the country. However, retention becomes an even bigger concern for those who are dealing with the comparatively low matriculation rates among underrepresented groups.

Students who exit systems of higher education voluntarily before receiving their degrees tend to leave for three reasons. One reason is the lack of psychological and social support (Astin, 1999). The second reason is the lack of institutional fit and campus integration (Swail, Redd, & Perna, 2003). The third reason is associated with increases in college tuition and fees (Orfield & Paul, 1988).

There are many different types of retention programs that assist college students in developing academically and socially (Tinto, 1993). Of interest to this study, however, are the various initiatives that fall into the category of a "bridge program." Specifically, a bridge program is a type of retention program geared towards at-risk students to assist them in acclimating to the college setting in order to be academically successful and graduate (Pascarella & Terenzini, 2005). On the average four-year college campus, a bridge program that occurs the summer prior to an incoming freshman's first fall term—hence the name "summer bridge program" (SBP)—is available at many locations across the country.

Despite the varying language used to describe this type of assistance program, research has indicated that SBPs are among the oldest strategies used to improve college retention rates (Garcia, 1991). Surprisingly, even though SBPs are generally acknowledged to be advantageous for their target populations, there is very little empirical evidence assessing their effectiveness (Ackerman 1990; Gandara & Maxwell-Jolly, 1999, Garcia, 1991; Kluepfel, 1994; Pascarella & Terenzini, 2005; Rita & Bacote,1997). Given the number of institutions of higher education providing retention programs of this sort, it is therefore vital to investigate their effectiveness.

One reason for examining retention programs in general is that they demonstrate an institution's commitment to student welfare and success (Tinto, 1990). In other words, when an institution provides students a variety of opportunities to improve their performance, the institution will likely produce higher graduation rates. The establishment of retention programs also demonstrates a university's obligation to enhance the graduation rates of every student, regardless of their ethnic background or level of preparedness (Tinto).

Another reason to focus on the effectiveness of retention programs is that they are indicators of an institution's ability to deliver quality education (Tinto, 1990). Smith, Smith, and Clark (2007) stated that quality is the apparent individual nature of something, often tied to a degree of excellence. They continued by asserting that quality has a consumer value component associated with it. In the context of higher education, a quality education is essential not only to students, but also to the many different stakeholders who need evidence that college students are receiving excellent training and skills. Of course, the quality of retention programs is very much tied to the dedication and skills of those who administer them. And indeed, the research shows that administrators of these types of programs tend to be highly motivated individuals committed to producing or providing products or services of high quality and merit (Gandara & Maxwell-Jolly, 1999).

While their organizational structure may vary, the fundamental goal of most retention or bridge programs is to provide an environment that is conducive to mentoring, assessing skills and abilities, and facilitating faculty interaction and engagement in order to help academically-, physically-, or socially-challenged students to better integrate themselves into the institution and achieve greater academic success. Not only do participating students have a chance to interact with dedicated personnel, they also have opportunities to become more familiar with the

advantages and disadvantages associated with a particular program of study. Effective retention and bridge programs can also educate students on how to avoid obstacles while enrolled in college (Gandara & Maxwell-Jolly, 1999; Tinto, 1990).

The final reason for examining effective retention programs is to understand how they promote inclusive communities that are welcoming to an increasingly diverse student body (Tinto, 1990). Developing a nurturing academic environment for a diverse community of learners is a challenge to many campuses. Retention and SBPs, however, can increase a student's awareness of different ethnic/cultural perspectives through more personal interactions with other learners, especially those from underrepresented groups. Most universities are, in fact, actively seeking ways to improve campus climate and it is believed that retention programs could be utilized to explore and demonstrate increased diversity within their community.

As indicated above, many campuses already have some type of summer bridge retention programs in place for incoming freshmen. Given that fact it is surprising that there are so few studies documenting if and how SBPs assist students in overcoming difficult academic and social obstacles in the unfamiliar college environment (Maton, Hrabowski, & Schmitt, 2000; Rita & Bacote, 1997). It is therefore vital that researchers provide empirical evidence corroborating the effectiveness of these programs, as well as specific documentation of how they have assisted students in various types of institutions.

Case Study: Virginia Tech's Engineering SBP

An SBP at a Research I PWI was the focus of the present study. This program was instituted in 1995 by the administrator charged with increasing the diversity of the graduates from the institution's College of Engineering. This program was broadly designed to help

students transition more successfully to the college environment—and especially to the academic rigors associated with programs of engineering.

Since its inception nearly 15 years ago, the SBP associated with this study has served more than 350 students. Initially, the program was expressly designed for incoming African American freshman engineering students. Hispanic students were added to the target population in 1999. Later on, the program began to include students from all underrepresented populations [1] who had applied to the College of Engineering, but did not meet the admissions criteria. To be more specific, these students would initially enroll in the university's general studies program but could transfer to the College of Engineering if they were able to maintain a B average in all the SBP classes, as well as pass the math readiness exam set by the university. In 2005, the bridge program also began to invite first generation college students, as well as students at the lower end of the academic spectrum who had been offered admission to the College of Engineering.

Procedurally, all students who participate in this SBP are required to complete an application. This process is intended to stress the voluntary nature of the program, although in many cases students are highly encouraged by their high school guidance counselors or freshmen orientation officials to apply. While entry into the program is voluntary, the program's guidelines and activities are mandatory: students must attend all classes and participate in all activities sponsored by the program.

For most of the history of the 5-week program, enrollment numbers have remained at about 30. However, with the addition of the first generation and other transfer students, supplementary resources have enabled the program to accommodate up to 100 students annually,

[1] First Year Generation, Women, African-Americans students that were in University Studies Students

with the largest cohort to date being 68 students. While the overarching goals of the program (listed below) have remained consistent, the various programmatic logistics associated with implementing the program have undergone necessary modifications, such as increasing the number of faculty associated with the program, expanding class schedules, and increasing the number and involvement of the resident assistants in the program.

The program's specific goals include the following:

A. Provide students with academic enrichment opportunities in all of the classes offered.
B. Provide students with an atmosphere and activities conducive to social development.
C. Provide students opportunities to develop personally and professionally, both within the university setting as well as within the larger community when and where appropriate.

Logistically, several classes are required during the five weeks of the program, which runs Monday through Friday, from 8:00 AM to 4:00 PM. Each day includes a lunch break and/or some personal time prior to afternoon classes (see Appendices A & B). The classes are not credit bearing. In order to enhance the students' adjustment to the fall term, classes are designed to be somewhat similar to what they will experience during their first freshman term. In other words, the summer bridge courses include quizzes, tests, some in-class assignments and a significant amount of homework. Moreover, the students receive instruction in math, engineering, and chemistry. The program is designed to stress the rigorous nature of these types of classes and how students must keep up with the work if they are to be successful.

To summarize, the general purpose of the SBP that was examined in this study is to support and aid in the development of these students through non-credit bearing college courses that focus on content that has been historically difficult for first-term students (chemistry and chemistry lab, math, and engineering). More specifically, the program aids students in developing better time management skills and academic strategies to be successful in college. It also provides students with vital opportunities to become acclimated to more rigorous, complex, or ambiguous material during courses designed to mimic what they will experience during their fall freshman term. The program also provides students an opportunity to familiarize themselves with the institution and the community prior to their academic year. Finally, the program provides students with personal and professional development through various activities both on- and off-campus.

Purpose of the Study and Research Questions

The purpose of this study was to investigate the academic, social, goal commitment/ institutional attachment, and personal-emotional adjustment of participants versus non-participants in a SBP for engineering students at Virginia Polytechnic Institute and State University (Virginia Tech), a R1 predominantly White institution (R1 PWI) in the mid-southeastern region of the United States. The Academic, Social, Personal-Emotional, and Goal Commitment/Institutional Attachment subscales of the Student Adjustment to College Questionnaire (SACQ) were used for this study (Baker & Siryk, 1999). The research addressed the following questions:

1. How do participants versus non-participants in an engineering Summer Bridge Program rate their Academic Adjustment (AA), Social Adjustment (SA), Personal-

Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) during their first term of college?

2. Is there a significant difference in how the participants versus non-participants in an engineering Summer Bridge Program rate their Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) during their first term of college?
3. Do the Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) experiences of participants versus non-participants differ by race or gender?
4. Is there a significant difference in participants versus non-participants in fall term college grade point average with respect to retention after their first year in the college of engineering and the institution?
5. What were the benefits and difficulties with participating in Summer Bridge Program according to participants and the director of engineering support programs?

Significance of the Study and Implications for Future Research

Because of the many factors (economic, managerial, organizational, logistic) associated with instituting and running a SBP, there was a real need to know whether these programs were actually successful in helping participants to persist in engineering fields until graduation. Reber (1985) stated that being persistent means striving against opposition. But thus far, the majority of the research related to persistence in colleges of engineering has centered on how pre-enrollment characteristics affect retention (Moore, Madison-Colmore, & Smith, 2003). Recently, studies have broadened and are examining how other factors, including post-enrollment programs, have positively impacted graduation rates in colleges of engineering (Anderson,

2006). Therefore, the present study has significance for further practice, research and policy in higher education. The results of this study are likely to be useful for administrators/directors of multicultural engineering programs, underrepresented students and their parents, policymakers at the institutional, state, and federal levels, and even employers of engineering graduates who wish to diversify their workforce with well-trained employees.

This research is also significant with respect to the adjustment of underrepresented engineering students. As is well known, diversity is an important issue for most institutions of higher learning, and especially when it comes to programs of engineering which have traditionally been populated by White males (Gold, Deming, & Stone, 1992). Because of this mono-cultural history, many institutions of higher learning have hired skilled professionals (sometimes called "Multicultural Engineering Directors") to identify and implement ways to increase the number of underrepresented students, as well as to enhance their matriculation rates (Maton, Hrabowski, & Schmitt, 2000; Sharp, Kleiner, & Frechtling, 2000). The findings of this study can provide these professionals at Research I institutions with important information concerning the adjustment of underrepresented engineering students. As a result, directors will be able to assess the effectiveness of components of these initiatives based on the results of this research.

This study could be beneficial to underrepresented students and their parents with respect to important transitional issues they may face in college at Research I institutions—and thus the need for support or enrichment programs. This study could also assist underrepresented students in understanding their own college adjustment issues; while at the same time providing parents with information on how to better assist their child adjust to life on a college campus. For

example, parents could help students select the best program(s) to help them overcome adjustment issues both before and during their college years.

This study also paves the way for future research. The current study examines the adjustment of participants versus non-participants in a SBP for engineering students at a single R1 PWI over the course of a single term. A longitudinal study that compares participants and non-participants over a longer period of time is warranted. Other types of SBPs that aid students in non-engineering departments at Research I colleges and universities should also be examined. A broader study could also compare various types of SBPs across diverse departments and their impacts on graduation rates. Additionally, future studies could focus on the different types of universities or colleges with SBPs. These types of studies will expand information on the overall effectiveness of SBPs and student perceptions of their own college adjustment issues. The results could create a more comprehensive understanding of the adjustment issues that many students face—regardless of their cultural/ethnic background.

Finally, this study is significant in terms of policy at the institutional, state, and federal levels. Policymakers who are better informed on the adjustment issues facing engineering students are more likely to make smarter decisions when it comes to supporting college students. In particular, administrators at the institutional level who have financial and other oversight for these programs will be better equipped to make knowledgeable assessments of these programs in terms of funding, recruitment strategies, and retention policies.

In terms of state and federal level decision making, policymakers could use the results of this study to help pre-college students make informed decisions about entering and persisting in Research I college programs for engineering. Moreover, since in many cases state and federal level policymakers have the financial means to allocate funding to SBPs, it would benefit them

to be better informed of their efficacy. For example, they could be influential in expanding access to SBPs for all students interested in studying engineering at Research I institutions.

Definition of Terms

The following alphabetized list contains definitions pertinent to this study.

Academic Adjustment (AA): One of the four SACQ subscales, which is associated with higher education learning experiences. The AA section of the instrument measures the success in dealing with various demands within college. An example of AA item is "I am having a lot of trouble getting started on homework assignments" (Baker & Siryk, 1999).

Academic Integration: Opportunities for developing meaningful associations within and outside the classroom setting, thereby enhancing one's overall academic experience. These affiliations, for example, can be academic group meetings with peers, faculty and staff that facilitate sharing useful knowledge and experiences (Tinto, 1993).

Adjustment: The assumption that the overall college experience is complex, involving demands that vary in kind and degree, all of which require a variety of coping strategies (or adjustments) (Baker & Siryk, 1999).

First Generation College Student: A student who is the first of his/her generation to attend college; i.e., neither parent attended college (McGregor, et.al, 1991).

Goal Commitment/Institutional Attachment (GCIA): One of the four SACQ subscales, which corresponds to a student's dedication to his/her educational goals and connection to the institution of choice. An example of GCIA item is "Lately I have been giving a lot of thought to transferring to another college"(Baker & Siryk, 1999).

Persistence: An individual's efforts to overcome opposition (Reber, 1985).

Personal-Emotional Adjustment (PEA): One of the four SACQ subscales, which is associated with the psychological and physical aspects of students. The PEA section of the instrument measures the success in dealing with various demands within college. An example of PEA item is "I have been feeling in good health lately" (Baker & Siryk, 1999).

Research 1 Predominantly White Institution (R1 PWI): A college or university whose student population is predominantly White, which offers doctoral degrees and is research extensive (The Chronicle of Higher Education, 2000).

Retention: An institution's ability to keep a student enrolled until he/she completes an undergraduate degree (Lenning, Sauer, & Beal, 1980).

Social Adjustment (SA): One of the SACQ subscales, which is associated with the social aspects of a higher education environment. The SA section of the instrument measures the student's success in dealing with various social demands within college. An example of SA item is "I am satisfied with the extracurricular activities available at college" (Baker & Siryk, 1999).

Social Integration: The transition "between membership in past communities and membership in the new communities of college" (Tinto, 1993, p. 125).

Student Adjustment College Questionnaire (SACQ): A comprehensive survey designed to measure adjustment to college a measure of potential success (Baker & Siryk, 1999).

Summer Bridge Program (SBP): A retention effort, normally occurring during the summer, which is geared toward at-risk students to assist them in acclimating to the college setting, thereby increasing their likelihood of persisting to graduation (Pascarella & Terenzini, 2005).

Transitional Programs: A program that assists students in developing academically and socially (Tinto, 1993).

Underrepresented: Racial and ethnic populations that are insufficiently or inadequately represented based on the Institute of Medicine of the National Academies; usually associated with African-Americans, Mexican-Americans, Native Americans (American Indians, Alaska Natives, and Native Hawaiians), and mainland Puerto Ricans (Smedley, Butler, & Bristow, 2004).

Organization of the Study

This study is organized into five chapters. Chapter One introduces the research topic, purpose of the study, research questions, significance of study, limitations, organization of the study, and definition of terms. Chapter Two provides an extensive overview of the existing literature relevant to the topic. Chapter Three describes the methodology used in the study, including sampling procedures and procedures employed to collect and analyze the data. Chapter Four presents the results of the study. Chapter Five discusses the findings and offer conclusions and implications for future practice, research, and policy.

CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

The purpose of this study was to investigate the academic, social, goal commitment/ institutional attachment, and personal-emotional adjustment of participants versus non-participants in a SBP for engineering students at a R1 PWI in the mid-southeastern region of the United States. This chapter begins with the conceptual framework for the research, followed by a discussion of the pertinent research in this area. This chapter then discusses adjustment to college, affiliation, the role of faculty in retention, instrumentation to measure adjustment, and summer bridge programs. This chapter concludes with a summary section.

Conceptual Framework for the Problem

The conceptual framework for this study was developed from Tinto (1987), Astin (1984), Pascrella (1980), and Baker and Siryk (1999). The research study focused on the academic, social, personal emotional, and goal commitment adjustment of engineering college students. These factors are believed to be directly related to a student's ability to integrate both academically and socially to the university environment, which in turn can affect a student's personal and physiological involvement. These factors are also positively correlated with a student's interactions with peers and faculty. Figure 1 depicts three of the important components involved in a student's readiness for an engineering education.

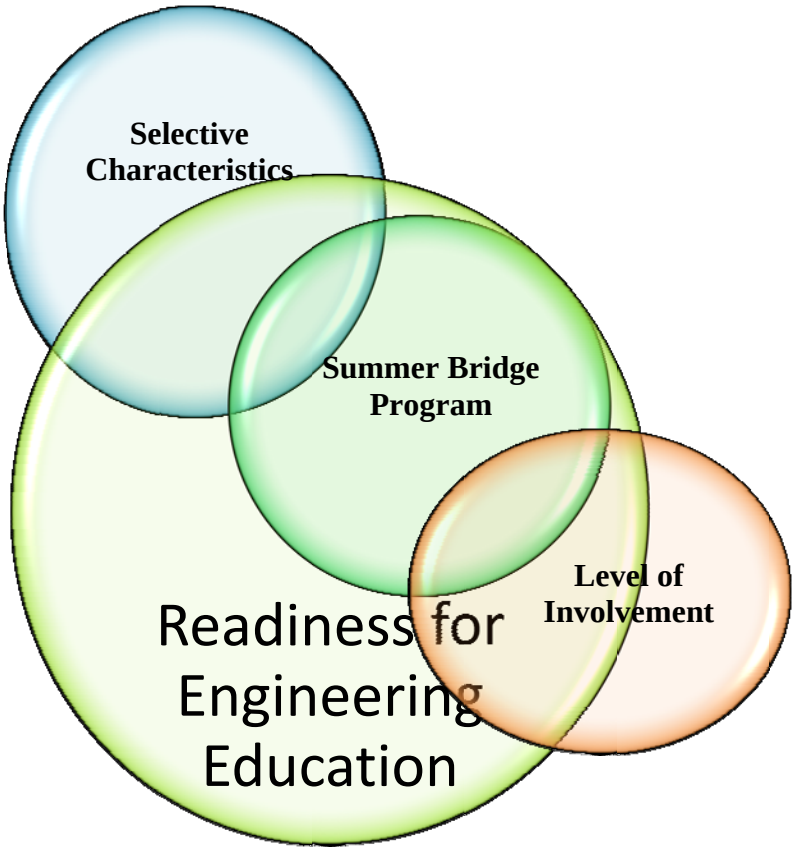

Figure 1. Factors that Positively Impact Readiness for Engineering Education

A portion of the conceptual framework is the notion of selective characteristics. Selective characteristics deal with the idea of students having various experiences in their academic and social setting prior to entering higher education. Another portion the conceptual framework is the summer bridge program and engineering education. There are colleges and universities that offer engineering as a field study. There are many constituent groups interested in having students ready for engineering education. These various constituent groups have created summer bridge programs to assist students in preparing for their engineering college career. Many colleges and universities have SBP in order to assist students prepare them for engineering education. The level of involvement is the final section of the conceptual

framework. Level of involvement deal with the student's psychological and psychical involvement in their learning inside and outside the classroom.

If undergraduate students are to thrive at college, it is essential that they successfully adjust to the various academic and behavioral expectations they will face on most university campuses. Even though administrators on college campuses across the country have increased efforts to enroll students, insufficient attention has been paid to helping students overcome the variety of adjustment issues they will have to face once they arrive (Tinto, 1990). Sometimes these adjustment issues are unexpected, demanding, and challenging and can negatively impact a student's ability to succeed. The population at greatest risk for adjustment difficulties are freshman, who are often unprepared for the magnitude of the changes they will encounter (Baker & Siryk, 1986).

The conceptual framework for this study provides the empirical foundation for this investigation. In this section of the paper, the four bodies of interrelated literature used for this review—specifically, those developed by (1) Vincent Tinto, (2)Alexander Astin, (3) Ernest Pascarella, and (4)William Baker and Bohdan Siryk—are described. Many studies have used these same frameworks to investigate a variety of issues facing college students, which include adjustment, factors that influence departure, and factors that encourage success. Baker and Siryk's (1999) instrumentation was utilized to better analyze and synthesize data collected for this study. These frameworks have been utilized by other researchers, but never as one overall conceptual model. Instead of relying on traditional measurements such as high school grade point average and SAT/ACT scores for predicting the adjustment and success of college students, we need to incorporate other qualitative and quantitative measures to identify and deal with the various adjustment issues that could impact student success. Therefore, this study was

designed to assist researchers and personnel who utilize assessment information with respect to the effectiveness of SBPs as they formulate services and activities and create procedures to increase attrition and enhance the success of students.

Adjustment to College

One critical theoretical framework used for this review was from Vincent Tinto's 1987 landmark book, *Leaving College: Rethink the Causes and Cures of Student Attrition*, in which he discussed the complex issues surrounding student attrition in college. Although Tinto conducted an extensive review of the existing literature on college student attrition/retention, he found that the reasons for student attrition were by no means obvious. As he discussed, the complications surrounding a thorough grasp of this phenomenon were likely due to the overuse of psychosomatic theories in college student attrition frameworks, as well as the failure to fully comprehend how institutional policies impact these trends.

Tinto's (1987) theory was designed to offer a longitudinal model to explain the various factors that influence students to stay or withdraw for the university. The National Longitudinal Survey (NLS) results were utilized to view the departure of high school graduating class of 1972. Tinto examined the scope and patterns of departure at both two-year and four-year institutions. The findings for a four-year institutions demonstrated that approximately 44 of every 100 new college student would leave their first institution. Also, Tinto stated that 42% for the students would transfer to another institution. The researcher indicated that the NLS data reported was not the same for each institution. However, the findings were aggregated in order to describe the behavior characteristics of groups at various types of institutions.

Tinto's (1987) theory features the mostly widely used and cited framework in empirical studies, which is centered on the following six constructs that college students experience as they

transition from a secondary education/family environment to the more independent university environment.

1. Pre-entry attributes (e.g., prior schooling, family background, and skills/abilities)
2. Goals/commitment (e.g., students' aspirations and institutional goals)
3. Institutional experience (e.g., academics, faculty interaction)
4. Integration (e.g., academic and social)
5. Goals/commitment (e.g., intentions and external commitments)
6. Outcome (e.g., departure, decision-graduate, transfer, dropout)

These six constructs are based in part on the work of Émile Durkheim (1951), who is considered an influential figure in modern sociology. Late in the 19th century, Durkheim conducted a detailed study of suicide, which then fundamentally changed the way sociological research was conducted. In essence, Durkheim maintained that suicidal tendencies increased in individuals who were not integrated socially and normatively into a supportive social system. One of the terms he developed was "egoistic suicide," which he tied to individuals with few connections to any social groups that could help that person cope with changes. Tinto (1987) later used this concept in discussing "student departure," which he defined as the action of a college student leaving his or her specific institution of higher learning, or abandoning the entire system of higher learning altogether. Tinto's student departure model led many researchers to develop their own psychometric instruments for understanding student departure.

William Spady (1970) also utilized Durkheim's suicide theories (1951) to formulate his own hypothesis of student attrition, which later influenced Tinto's theoretical framework. Spady examined the literature on the dropout process from a variety of operational definitions and intellectual frameworks. Thus, the researcher used a variety of distinct approaches to

examine several variables simultaneously in order to bring empirical clarity to the drop-out process. In a study of 683 first-year undergraduates at the University of Chicago, Spady concluded that students who did not interact socially with other students, or did not feel integrated into the social systems of their college, were more likely to withdraw.

Influenced by these earlier studies, Tinto (1975) linked leaving an institution of higher learning to suicidal behavior, in that an unsuccessful college student was unable to adequately integrate socially and/or academically to the institutional culture. These various theories that stemmed from Durkheim's (1951) seminal study of suicidal tendencies are valuable in that they provide higher education administrators with some of the key factors that could cause students to withdraw from a college or university. If these factors are known and understood, they can be used to develop reasonable strategies for assisting college students to integrate socially and normatively to the college environment, thereby enhancing their likelihood of graduating.

Foundation for Involvement

Many theorists that have investigated student involvement and the impact it has on educational accomplishments and personal growth. Kapp (1979) indicated in an earlier study that approximately 80% of traditional age college students participate in one or more extracurricular activities that take place outside of the classroom. There are several ways that involvement impacts students' development. First, psychosocial development is enhanced by extracurricular activities (McCluskey-Titus, 2003). Second, extracurricular activities contribute to cognitive development (Terenizini, Pascarella & Blimling, 1996). Although the concept of "student involvement" might seem somewhat vague, researchers agree that it involves participation, an obligation or a desire to commit (which is a step above minimum expectations for course work, such as voluntary self-engagement with the material, e.g., through study

sessions), and networking with peers, staff, and faculty outside of the academic setting (Adams, 1979, Astin, 1984, Willis, 1993). Adams asserted that a key component of involvement is the student genuinely connecting with university activities and the people. If that occurs, the individual will feel motivated, better able to become self-guided, and will likely be more committed to his or her purpose.

Practitioners in the field, also agree on the importance of student involvement. For example, Beakley and Chilton (1972) reported that engineering educators have long advocated the involvement of students in their own education. They believed that such involvement would increase the students' motivation to learn the complex analytical skills needed to complete most programs of engineering. Moreover, they maintained that by involving undergraduate students in assignments that are both educational and enjoyable, it would enhance their abilities and eagerness to master essential academic skills. Also, these practitioners indicated that involving students in their own learning can remove some of "traditional pressures and compunctions, and by offering incentives apparently more meaningful than grades or threats of failure" (pg. 877).

Newell (1984) provided a useful overview of involvement and learning. He stated that "half of the students who start college never finish" (pg. 7), and maintained that the critical reason why this occurs is that students have a difficult time adjusting to the university setting. He states that the persistent students in college tend not share a coherent experience about college. Newell indicated that half the college students commute. Some of the students maintain a job. Also, some of the students pursue higher education part-time. Therefore, students that commute, maintain an outside job, and attend college part-time would have a more difficult time in adjusting.

Newell (1984) stated that colleges have lost a more liberal education focus due to specifications by the accrediting agencies and the interest of faculty in pursuing their scholarly interests rather than just teaching. One rationale is due to the low expectations that professors tend to have of average students. Another reason may be of the lack of faculty participation in a true evaluative process. In other words, students who receive constructive feedback and evaluation of their work are likely to outperform students who do not. Newell included a list of suggestions for institutional administrators and faculty members to bring greater involvement to the learning process, thereby increasing the retention of students. These include (1) increased instructor involvement e.g., through office hours, (2) having up-do-date teaching materials and methods, and (3) conducting more routine evaluation of students.

Willis (1989) indentified two types of student involvement: *academic* and *institutional*. She interviewed 58 undergraduate students to understand their perceptions of involvement, as well as how they become involved and what issues over time could change their involvement. The participants provided a number of definitions for involvement. They also demonstrated different levels of involvement in their undergraduate classes. The data revealed that a student's personal approach to learning impacts both their involvement in learning as well as the activities in which they engage. Moreover, her data revealed that females were more likely than males to be involved with their academics—possibly due to the fact that females were more likely to combine personal and vocational interests in their choice of courses. Willis also discussed how context is important in influencing involvement. Specifically, course involvement developed from a combination of personal interests and contextual factors, such as relevance of the coursework, skill of the instructor, and the types of assessments used. She concluded that an involved student wants to learn and is more likely to persist.

Astin's Student Involvement Theory

Astin's (1984) Student Involvement Theory is deeply rooted in a longitudinal study based on college student dropouts. The aim for this study was to examine the factors that impact college students' persistence at a university. Tinto (1999) stated that every" significant effect could be rationalized in terms of the involvement concept" (pg. 523). Thus, positive variables tend to increase a student's involvement, while negative variables tend to decrease a student's involvement leading to withdrawing from the university.

Astin identified a number of significant ways for a college student to become involved. These include residence hall experiences, extracurricular activities (e.g., recreational sports and athletics, student run political settings, etc.), involvement in honors curriculum, and by networking with faculty and peers. With these factors in mind, Astin (1993) later studied survey data amassed from 1985 and 1990, received from 25,000 students, in order to look at attrition by college major. Astin (1993) determined that there was a high attrition rate among engineering students in the sample population he surveyed as compared to other majors. Specifically, only about 44% of engineering students emerged with an undergraduate degree in their field. Astin also reported a student's interest in the field of engineering generally diminished between their freshman and sophomore years of college. Astin attributed this reduction in interest and subsequent attrition in part to an instructor's use of traditional bell curves for assigning grades, which equated higher achieving students with average performers.

Astin (1985) asserted that "involvement is also very similar to what learning theorists call 'vigilance' or 'time –on-task' (p. 135). According to Astin, involvement equates to motivation and behavior—a student's active, directed activities. Astin further described the five main components of his theory.

1. "Students learn by coming involved" (p. 133).
2. It is underpinned by a wide array of literature on the environmental issues that impact student development.
3. It is loosely coupled with psychoanalysis and classical learning theoretical principles such as Content Theory, Resource Theory, and Individualized (Eclectic) Theory.
4. The idea behind involvement pertains proportionally to students and faculty.
5. Researchers can utilize these concepts to examine the development of students and faculty while at the same time creating efficient and valuable learning settings.

Astin's (1984) Involvement Theory has become a cornerstone for describing and understanding the impact of environmental influences on student development. It is still widely used to investigate and more fully comprehend student development processes, thereby aiding administrators in fostering educational settings that are more conducive to success. Astin's Involvement Theory is deeply rooted in the Freudian notion of cathexis, which is the concentration of emotional or psychic energy in a person, object, or idea (Astin, 1985, 1999). The "object" in his theory is loosely defined. It can be as general as a student's experience in college, or as specific as how a student prepares for an engineering test. But as noted earlier, Astin was very specific as to the meaning of involvement, which he defined as "the amount of energy that the student devotes to the academic experience" (1984, p. 27). Later, he refined the term "involvement" to be the amount of "physical and psychological energy that the student devotes to the academic experience" (Astin, 1999, p. 518). According to Astin (1985), an involved student is an individual who does the following: a) spends a significant amount of time studying, b) spends a lot of time on the college campus, c) joins and participates in student organizations, and d) networks with peers and faculty members.

In addition to his cathexis construct, there are four other constructs associated with Astin's theory. One construct is the notion that "regardless of its object, involvement occurs along a continuum" (Astin, 1999, p. 519). In other words, college students all develop differently; therefore a student will likely experience varying degrees of involvement depending on the "object" in question. Moreover, a student's time commitment to that object—and thus his or her involvement—will vary. Another construct maintains that "involvement has both quantitative and qualitative features" (Astin, 1999, p. 519) —and thus can be assessed in both ways. For example, researchers and administrators can quantitatively measure the amount of hours a student spends studying for an examination, but can also qualitatively determine how students prepare for tests or review material for classes.

It is the last two constructs, however, that provide the most useful clues for developing improved educational programs for students. The first is that the "amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program" (Astin, 1999, pg. 519). The second states that "the effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement" (Astin, 1999, p. 519).

It should be noted that Astin (1984) described some important characteristics of an involved student: "An involved student is an individual that is academically, emotionally and socially engaged. The individual dedicates significant energy to educational endeavors, spends much time on the college setting, contributes actively in student extracurricular activities, and interact often with faculty" (p. 292). Concurring with this definition, Pascarella and Terenzini (1991) emphasized the primary responsibility of the student in determining the extent and nature of growth according to the quality of effort or involvement with the resources provide by the

institution. And indeed, subsequent research has confirmed that the more time and energy a student freely devotes to the college experience as a whole, the more likely it becomes that the student will do well academically. For example, both Pascarella and Terenzini and Tinto (1987) asserted that students who are satisfied with their educational and social experiences are more likely to matriculate or persist throughout college. This corroborates the earlier findings of Astin, who was convinced that students will learn more if they are highly involved in both the academic and social aspects of higher education.

Faculty Role in Retention

In 1980, Pascarella created a conceptual model to examine the withdraw process. Specifically, he was interested in understanding the importance of informal faculty-student contact with respect to persistence. Pascarella proposed several variables that he thought would impact a student's likelihood of engaging in student-faculty informal contact, which could then impact that student's academic achievement, his/her intellectual and personal development, and ultimately that individual's institutional persistence. These variables include a) institutional image, b) administrative policies and decisions, c) size, d) admissions, and e) academic standards. Pascarella maintained that these variables would impact whether or not a student engaged in informal contacts with faculty members, thereby impacting that individual's educational experience and ultimate decision to persist or withdraw. He also discussed other educational experiences (e.g., peer environment, courses, and leisure time or extracurricular activities) and outcomes, such as academic performance, psychological development, personal development, career aspirations, college fulfillment and assimilation into the institution—all of which could impact persistence rates. In fact, Pascarella asserted that a student's background

characteristics could be expected to directly impact the institutional variables, informal contact with faculty, other college experiences and educational results.

Instrumentation to Measure Retention and Adjustment

Many theoretical frameworks have been designed to examine retention (Astin, 1975; Pascarella & Terenzini, 1980, 1981; Swail, 1995; Tinto, 1987). Some of the retention models are based upon research on students who withdraw from their university. Many colleges and universities have a significant number of students who have difficulty adjusting to their new and oftentimes challenging environment. Freshmen year is typically the most difficult adjustment period for college students. Thus, it is imperative to understand the variety of adjustment issues that college freshman face before examining the motives for withdrawing from an institution of higher learning. Specifically, administrators need appropriate research that addresses adjustment issues so that they can create new or enhance existing bridge intervention support programs to enhance persistence rates. Drawing on Baker's and Siryk's (1999) conceptual model for adjustment, the next section outlines methods for understanding attrition, the foundation for these theories, and their common constructs. A longitudinal project at Clark University, which was sponsored by funds from the Andrew W. Mellon Foundation, helped researchers to better understand how college students adjust.

In 1975 and 1976, with support from the Andrew M. Mellon Foundation, Baker and Nisenbaum (1979) were charged with developing what later became known as the Transitional Group Program (TGP). The Mellon funding allowed the researchers to work with two groups of entering Clark University freshmen in small group settings to discuss their shared experiences and anxieties about adjustment. Even though the TGP only lasted about six weeks (the length of time needed to determine whether or not participants had successfully adjusted), it led Baker to

collaborate with Siryk (1984) on a subsequent study using his clinical experiences with students transitioning to college. This later study used individuals that had been identified with adjustment issues in order to design and implement appropriate interventions.

Methods for Understanding Attrition

Siryk (1981) reported several methods for understanding attrition. These include methods for examining the dimensions of a range of personal attributes and their association to attrition, methods for examining the association of a variety of components linked to the college environment, and methods that could be used to implement intervention programs to assist in reducing or eliminating attrition. Several extensive scales were created to examine the range of issues associated with the college environment. For example, Pace (1962) and Stern (1963) are associated with two important scales: the College Characteristic Index and the College and University Environment Scales (CUES). Pace developed the CUES, which is a survey intended to assist administrators in defining the cultural, social, and intellectual climate of the college environment and the impact it has on students. In the nearly 50 years since it was developed, researchers have questioned the usefulness of the CUES survey. Siryk (1981), for example, maintained that the characteristics the original survey sought to determine—and these include educational motivation, social propensity, and academic ability—are actually difficult to evaluate with absolute certainty because they can change over time. Thus, the predictive power of these variables is questionable.

Foundation for Adjustment Theory

Incoming college freshmen typically face a variety of adjustment challenges. Siryk (1981) identified three areas that are still relevant nearly 30 years later. The first is the increased academic rigor of college. Essentially, a student's ability to adjust to more challenging

coursework and assignments is highly related to his or her ability to persist through graduation. Conversely, if students are unable to adjust to an increased workload, they are more likely to withdraw. The second area involves the social environment. Siryk asserted that a residential college has the potential to successfully blend its social and academic communities. However, there a number of personal and environmental factors (i.e., age of student, living arrangements, time spent together, perception of university setting, among others) that will invariably impact how a student adjusts to the new residential setting. Students who are unable to adjust tend to withdraw from the university. The third area deals with the choice of college and the student's personal attachment to that institution. The student that is able to bond or connect to the university is more likely to adjust to the college environment and matriculate to graduation.

Several investigators have developed very simple measures consisting of a single item or a small number of items for assessing and understanding how students adjust to college (Pervin & Rubin, 1967; Pascarella & Terenzini, 1980; Terenzini & Pascarella, 1977). Long (1976), for example, designed an effective predictive model of college student adjustment in work he did at Southern Illinois University Carbondale (SIUC). Responses to the simple question, "What are your feelings about SIUC?" were used to assess academic attachment in the survey by using concurrent validity. The 56 goal statements in the WICHE (Western Interstate Commission for Higher Education) inventory were modified for this study's survey. There were four domains designed for this model. The first domain is *academic environment*, which features three measurement scales: instructional quality, a student's perception of curricular impact, and perception of the academic climate. The second domain is *political climate*, which can be measured by four scales: student independence, student participation, student activism, and authoritarian governance. The third domain is *academic alienation*, which was assessed using

three scales: academic estrangement, academic cynicism, and academic powerlessness. The fourth domain, *university authorities,* can be measured through the use of two scales: administrative excellence and affect scales. After surveying 460 participants, Long revealed that two domains were significant after several discriminate analyses were conducted—namely, academic environment and alienation. In the area of academic environment, low instruction quality, poor academic climate and lack of academic effect were correlated to academic detachment. The scales for academic alienation correlated well to academic detachment, 0.43($p=0.001$).

Pascarella and Terenzini (1980) developed a multi-item model to predict freshman persistence and dropout rates using Tinto's multidimensional measure of social and academic integration. Their longitudinal study of voluntary attrition originally included 773 student participants—90 of whom decided to leave their university. Administrators from the institution told several students to withdraw from the university. These students were not included in the study because the study examined voluntary attrition. Pascarella and Terenzini developed 32 Likert items to examine each of the five dimensions constructed by Tinto. Initially, there were 55 Likert items, but the researchers had the items judged and critiqued in order to shorten the amount of items. These dimensions were intellectual development, peer group interactions, interactions with faculty, and institutional and goal commitments. In their analysis, cumulative grade point average and extent of involvement in extracurricular activities in student's first year were controlled because Tinto asserted that these two components were important for social and academic integration. Their results revealed that the five factors were consistent with dimensions of Tinto's model. Among the students who did not withdraw, their average scores were almost one standard deviation higher than those who did withdraw. It is important to note

that their study indicated that the "quality and impact of student-faculty informal contact may be as important to student's institutional integration" (pg. 72).

In an earlier study, Bryant and Trower (1973) examined the amount and level of difficulty in social interaction for a group of second-year Oxford University students. About 10% of the participants were from a lower social class, came from small families, and reported having a difficult time in social situations. In fact, these participants reported they tried to avoid social situations. A principal component analysis revealed the questions that demonstrated social difficulty. Bryant and Trower concluded that some students lacked the basic social skills needed for establishing friendships or meeting individuals.

Other researchers have also developed multi-item measures for examining adjustment (Bryant & Tower, 1973; Long, 1976; Pace, 1963; & Stern, 1963), but several of these did not demonstrate much apprehension for psychometric elements (Baker & Siryk, 1984), and thus were not incorporated in this study. Others, however, have proposed useful theoretical frameworks for interpreting the various issues that students face in college (Astin, 1999; Tinto, 1987; & Pascarella, 1980). The one that was used in this study is the Student Adaptation to College Questionnaire (SACQ), which was created by Baker and Siryk (1999) in response to the lack of a systematic way for measuring a student's adjustment to college.

Constructs for the SACQ Instrument

Baker and Siryk (1984) examined several components of adjustment that entering college students face, three of which are theoretically related: (1) degree of involvement in institutional activities, (2) attrition from school, and (3) academic achievement. The instrument they subsequently developed, the SACQ, originally contained 52 statements (later expanded to 67), which were clustered around four domains of adjustment: a) academic adjustment, b) social

adjustment, c) general bonding adjustment, and d) intra-personal adjustment. Baker and Siryk (1999) maintained that a student who has a difficult time adjusting to one or more of these frameworks would experience emotional distress with the existing environment.

In a 1985 study, Baker, McNeil and Siryk described the distinction between a participant's initial expectations concerning college adjustment, and his or her post-enrollment expectations of attained adjustment, which they then correlated to various behavioral criteria. These behavioral criteria included completing college on time, utilizing available psychological and counseling services, and obtaining academic honors. This study also described how a participant's post-enrollment expectations for personal-emotional adjustment tended to be accurate, while social, academic, and institutional commitment adjustment tended to be exaggerated.

As noted previously, Baker and Siryk (1984) created the SACQ survey in response to the lack of a systematic way for measuring a student's adjustment to college. They asserted that the SACQ could be used "as a source of dependent variable in investigations of the role of personality and environmental determinants of adjustment to college" (pg. 179), as well as to identify students who may be having a difficult time transitioning to college. Such information, they believed, could be effectively used by college administrators to help students at risk through appropriate remedial interventions. Baker and Siryk also wanted to remedy the fact that many investigators did not report necessary reliability data for instruments that examine adjustment.

The SACQ was specifically designed to assess a student's overall adjustment to college, detect possible problems, guide intervention strategies, and promote retention. Specifically, it measures adjustment in four areas: Academic Adjustment (AA), Personal-Emotional Adjustment (PEA), Social Adjustment (SA), and Goal Commitment/Institutional Attachment to

the Institution (GCIA). The SACQ was selected for this study because its four subscales relate very well to the major activities of the SBP examined in this study. Use of the SACQ provided an appropriate structure for rigorous inquiry, facilitated a more secure basis for prediction, and enhanced the researcher's ability to interpret the data (Merriam & Simpson, 1995).

Summer Bridge Programs

Many colleges of engineering at Research 1 predominantly White institutions (PWIs) throughout the country have made dramatic and systemic changes to their retention efforts by developing targeted programs for improving the retention and graduation rates of their underrepresented student populations, especially Black and Hispanic students (Gold, Deming, & Stone, 1992; Maton, Hrabowski, & Schmitt, 2000; Robbins & Smith, 1993). Specifically, SBPs for incoming freshmen have been developed and instituted with the following goals: (1) to help familiarize incoming students with the university community prior to the start of their academic year; (2) to augment the academic skills of students in selected subject areas; and (3) to provide incoming engineering freshman students opportunities for personal and professional development.

Pascarella and Terenzini (2005) described another type of transitional or retention program—the SBP (SBP). This type of program is geared toward at-risk students to assist them in acclimating to the college setting, thereby increasing their likelihood of persisting to graduation. They identified several important characteristics of a SBP that distinguishes it from a summer orientation program:

1. Specialized goals.
2. Usually longer in length.
3. Programmatic focus.

4. Varied content and structure.
5. Targets high school graduates attending a specific institution.
6. Residential in nature.
7. Includes course and workshops.
8. Intended to familiarize students with the campus and faculty, staff and peers.

Green (2006) described the many types of SBPs found at both Historically Black Colleges and Universities (HBCUs) and PWIs. Regardless of their location, the primary rationale for these programs is to help underrepresented students successfully transition from secondary to higher education. SBPs at PWIs are especially important in helping underrepresented students adjust to an environment where they are likely to comprise only a small percentage of the student population.

As shown in Figure 2, SBPs consider the four important adjustment constructs in developing programs to enhance college success.

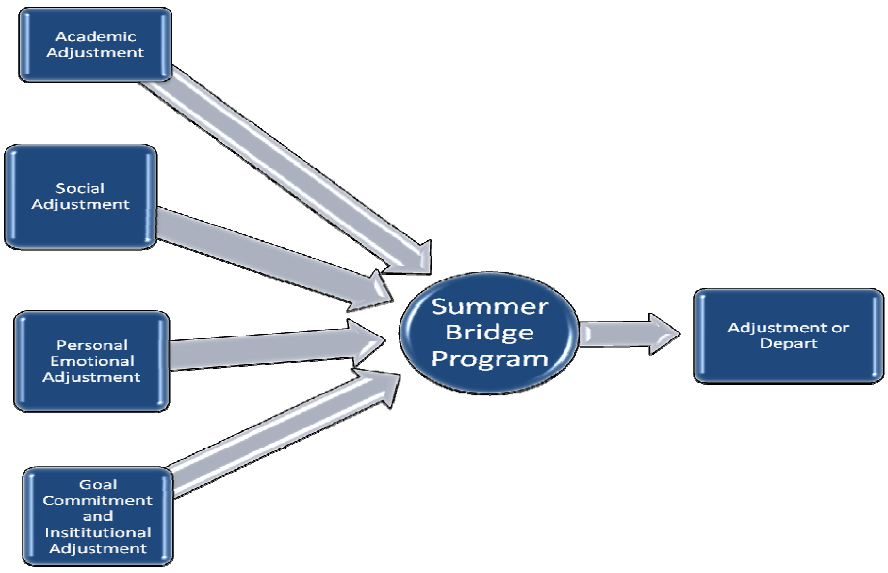

Figure 2. Summer Bridge Program Design

History

The increase in African-American students attending institutions of higher education coincides with the Civil Rights Movement of the 1960s—a turbulent decade for U.S. public colleges and universities (Noel, Levitz, Saluri et al., 1985). For the first time, institutions were forced to openly address equal opportunity for underrepresented students or disadvantaged groups. With the advent of the 1970s, the retention of African-American students—generally less well-prepared than White students—became a major issue. Therefore, retention programs were created to meet the "changing demands and needs and to provide a staying environment for all students" (p. 78).

As noted above, the 1960s was a watershed decade for the entrance of African-Americans in institutions of higher education, facilitated in part by the passage of important pieces of legislation. The *Civil Rights Act of 1964,* for example, was a landmark act that outlawed discrimination in public and private facilities based on race, color, religion, sex, national origin. This act had huge implications for colleges and universities that received federal funds because it mandated equal admission practices. This act facilitated the acceptance—at least on paper—of more African-Americans in higher education (Kaplin & Lee, 1997; Levin & Levin, 1991; Robert & Thomson, 1994; Swail, Redd, & Perna, 2003).

A second critical legislative action was the *Higher Education Act of 1966,* which provided financial assistance for students in need who otherwise could not have attended college. This act provided many African-Americans and other lower-income individuals the opportunity to attend college in greater numbers (Kaplin & Lee, 1997; Levin & Levin, 1991; Swail, Redd, & Perna, 2003).

The *Elementary and Secondary Education Act*, passed in 1965, provided additional funding for professional development, instructional materials, and resources to support educational programs. Most importantly, *Title I* of the act funneled much needed support to school districts with a higher percentage of students from low-income families. Thus, this important piece of legislation was instrumental in helping to educate African-Americans and other low-income students and fostered a sense of achievement amongst the student (Kaplin & Lee, 1997).

Although these laws were passed with the goal of increasing the number of underrepresented students attending the nation's colleges and universities, administrators and educators at predominantly White institutions were not prepared to deal with some of the social and academic issues that African-American students faced at these colleges (Levin & Levin, 1991). One troubling issue was the hostile environment perceived by African-American students attending PWIs. These students did not resemble the standard profile of most students attending college in the '60s and '70s. Another major dilemma for many African-American students was their relative lack of preparedness from high school to college as compared to majority students (Levin & Levin, 1991). In response to these issues, retention programs began to appear to help meet some of the needs of African-Americans and other underrepresented groups.

Objectives of a Summer Bridge Program

Although the specific mechanics of bridge programs may differ from institution to institution, they share several common themes and objectives, as noted above. One important area concerns the overall transition process from high school to college, particularly in view of the differing capabilities of the entering freshmen. A second major area concerns the social integration of the students. Social integration, as defined by Tinto (1993), relates to the

transition "between membership in past communities and membership in the new communities of college" (p. 125). Tinto maintained that the average college campus is made up of many communities, which either individually or collectively provide a way for students to become acclimated to campus life, thus enhancing their likelihood of being successful in college. Another important area that guides the development of a SBP is the concept of academic integration. For this study, the term "academic integration" refers to opportunities for developing meaningful associations within and outside the classroom setting, thereby enhancing the overall academic experience (Tinto). These affiliations, for example, could be academic group meetings with peers, faculty and staff that facilitate the sharing of useful knowledge and experiences.

Research on Summer Bridge Programs

In an interview conducted with Michael Hovland from the Noel-Levitz Centers (a consulting firm that works with colleges and universities to help them exceed their goals for enrollment and student success) (Kluepfel, 1994), he indicated that SBPs are economical, for the most part self-supporting, and accomplish many important objectives. For starters, they give students a leg-up on building the skills they will need to succeed in higher education. SBPs also familiarize students with the academic "lay of the land" and the different resources and expectations in place at their college of choice. Students also gain a better understanding of how to structure and balance their time in light of competing academic and social demands. Finally, summer bridge students get a chance to build important relationships with faculty, staff, and other students in advance of their first freshman term.

Bragg, Kim, and Rubin (2005) also investigated SBPs, which they defined as "transition and outreach programs designed to provide assistance to high school juniors and seniors who demonstrate interested in attending college, or to prepare recent high school graduate and

incoming college freshmen for college course work and college readiness" (p. 15). They stressed that these programs are especially important for racial and ethnic underrepresented students and/or low income students who may need extra help in transitioning from high school to college.

Many institutions use SBPs to assist underrepresented students in the STEM fields, and these are well documented in the literature (Bayles, Morrell, & Spence, 2006; Bayles, Spence, & Morrell, 2004; Brannan, & Wankat, 2005; Boyer & Bayles, 2005; Chapman & Logan,1996; Coppula,1997; Dale & Zych, 1996; Diefes-Dux, 2006; Dimitriu & O'Connor, 2002; Flecter, Newell, Newton, & Anderson-Rowland, 2001; Fletcher, & Anderson-Rowland, 2000; Hendley, 1997; Hudspeth, & Aldrich, 2000; Nagchaudhuri & Singh, 2001; Ohland & Collins, 2002; Ohland & Crockett, 2002; Waller & Watford, 2004; Wang, Velasquez-Bryant, Adams, Batchman, Cantrell, Jacobson, E., et al., 2004; Varde, 2004; White, Curtis, & Martin, 2001). However, many of the papers reviewed were not found in the scholarly journals. This demonstrates a need for a study.

Sharp, Kleiner, and Frechtling (2000) investigated several federally funded programs that promote participation of underrepresented college students in the STEM fields. One program that has been particularly successful is the Louis Stokes Alliances for Minority Participation Program (LSAMP), which is funded through the National Science Foundation (NSF). According to the NSF (2007) website,

> This program is aimed at increasing the quality and quantity of students successfully completing science, technology, engineering and mathematics (STEM) baccalaureate degree programs, and increasing the number of students interested in, academically qualified for and matriculated into programs of graduate study. LSAMP supports

> sustained and comprehensive approaches that facilitate achievement of the long-term goal of increasing the number of students who earn doctorates in STEM fields, particularly those from populations underrepresented in STEM fields. The program goals are accomplished through the formation of alliances. Phase I awards place emphasis on aggregate baccalaureate production. Phase II awards augment the Phase I emphasis with attention to individual student retention and progression to baccalaureate degrees. Phase III awards augment the Phase I and Phase II with attention to aggregate student progression to graduate school entry.

Sharp, Kleiner, and Frechtling identified the following components as being critical to the program's success: (a) summer bridge experience, (b) research experience, (c) mentoring, (d) drop in center, (e) caring staff, and (f) alliance structure. In 2001, nearly 22,000 underrepresented students who were enrolled in LSAMP institutions earned bachelor's degrees in STEM fields.

The Meyerhoff Scholars Program at the University of Maryland was developed to increase the number of underrepresented students pursuing a graduate or professional degree in the science and engineering fields. In examining this program, Maton, Hrabowski, and Schmitt (2000) used both quantitative and qualitative methods to measure undergraduate education outcomes. For example, they studied bachelor-level retention and graduation rates and grade point averages in science, engineering and mathematics courses. They also conducted interviews with the students, many of whom reported that they developed close, supportive relationships with other participants, which helped to sustain them in the sometimes unfamiliar and challenging college environment. Using a comparison group and MANCOVA analysis, the researchers demonstrated that Meyeroff student performed significantly higher on science,

engineering, mathematic assessments. Maton, Hrabowski, and Schmitt concluded that a well designed transitional program could increase the retention and graduation rates of African-American students in engineering, science, and mathematics, which they positively correlated to the increased enrollment of these students in graduate and/or professional programs.

Ackerman (1991) examined the benefits of a SBP at the University of California Los Angeles (UCLA) for underrepresented and low income students. The researchers used quantitative and qualitative data from the summer bridge cohort of 1988 that reflected their academic performance during their first two quarters at UCLA, as well as attitudinal survey information. Chi-square tests were run to determine if there was a difference between the types of students that returned the survey. The researchers found no significant differences. The results of the study demonstrated that with a strong curricular component, an SBP can assist students transition and successfully adjust to college.

Gold, Deming, and Stone (1992) investigated another bridge program at Georgia State University. As background, in 1984 six institutions across the state instituted SBPs when the University System of Georgia was found to be in noncompliance with the 1978 Desegregation Plan. The Georgia Board of Regents implemented the bridge programs, which enabled up to 50 students to participate in the various courses (e.g., mathematics, computer training, reading, and composition, etc.) and related activities (e.g., multicultural opportunities, study skills remediation and seminars, etc.). Extensive evaluations were conducted on the program's effectiveness. Students reported that the program made them feel more confident and improved their learning skills. With regard to quantitative outcomes, one-year retention rates of African-American students revealed that, on average, 90% of the bridge students remained in school, compared to 67% of the regularly admitted African-American students.

Rita and Bacote (1997) reported on the benefits of college discovery SBPs for underrepresented and low-income pre-freshmen at Bronx Community College (BCC). The program provided six weeks of rigorous instruction in mathematics, English composition, and reading comprehension. Students also received counseling, learning skills seminars, and tutoring. The results of the study proved that African-American students' self-confidence and social/cultural adjustment at BCC increased after participating in the SBP. Overall, 95 % of the students agreed that the program facilitated their transition to college life.

Robbins and Smith (1993) evaluated an enhancement program for 193 entering majority and underrepresented university freshmen at a predominantly White southeastern university. The one-credit hour program was held for 10 weeks and provided information on campus resources, study skills, and university procedures. Students were also afforded opportunities to interview faculty members and visit the campus career center as part of the program. The investigators used a 2X2 ANCOVA to assess the effects of group membership and ethnicity on the resulting course satisfaction survey scores. They found that although sex as a covariate was non-significant, underrepresented students were significantly higher "satisfaction with the course and greater knowledge and use of university resources" (p. 513) when compared to White students.

Another SBP for disadvantaged students was examined by Bundy (1993). The Counselor Tutorial Program at Purdue University was designed in 1971 to assist high-risk freshmen with engineering courses generally perceived as difficult (e.g., calculus, chemistry, and physics). Although the program was initially developed for underrepresented students, it has since become open to any student in need. As a result of longitudinal data gathered from the study, Bundy found a direct correlation between first term grade point average and graduation. He also

reported that underrepresented students earned double the number of A's in courses when compared to the majority students.

Garcia (1991) reported on a system-wide SBP conducted at the California State University. The four to six week residential program, which convened weekly in a classroom setting, was designed to enhance the academic performance of its students across a general education curriculum (engineering, biology, history, public speaking, etc.). Resulting data demonstrated that 85% of first-year students who participated in the program eventually enrolled in at least three consecutive terms. Also, Garcia reported that the SBP enhanced underrepresented student retention and raised freshmen retention rates for the third and fourth cohort.

Underrepresented Students in Higher Education: Pre-College Factors

Doing well as a freshman in a college of engineering can be difficult for students of any ethnic background. However, it can be especially difficult for underrepresented students. For example, Kahlenberg (2004) reported a study in which she assessed the reading and math skill levels of underrepresented students (especially Latinos and African-Americans) in the 12th grade. She stated that, on average, their performance in these two areas was comparable to the performance of White students at an 8th grade level. Moreover, the NSF (2006) has reported that many high school students both in mathematics and science do not achieve "proficient" performance levels. This, of course, translates to performance difficulties in college—and as noted above—especially for underrepresented students at PWIs.

Many pre-college factors are responsible for poor persistence rates among low-income students and underrepresented students (Choy, 2002; Kahlenberg, 2004; National Academy, 2007). One such factor relates to a lack of sufficient resources in their secondary education

systems, including the shortage of underrepresented teachers. "Teachers can and do affect students' academic preparation, opportunities to learn, self-esteem, and motivation to achieve. Teacher's' expectations for students are largely influenced by their beliefs about race, ethnicity, and social class" (McDonough, 2004, p. 15). Statistically, the numbers are quite startling. The National Center for Education Statistics (2003) reported that, on average, 84% of teachers are White, 8% are African-American, 75% are women, and 25% are men. This underrepresentation (especially by African-American male K-12 teachers) has had a devastating impact on African-Americans attending public secondary institutions.

Moreover, research shows that secondary education teachers tend to be less well prepared for their profession. For example, the NSF (2006) indicated that "college graduates who became teachers took fewer rigorous academic courses in high school, had lower scores on 12th grade achievement tests, scored lower on college entrance examinations, and graduated from less-selective colleges"(p. 2). In addition, the report stated that only 17% and 28% of math and science teachers, respectively, were fully credentialed in those areas.

One critical impact of these statistics is the lack of mentoring that is available for African-American students from African-American teachers, a relationship that has been proven to have a highly positive influence (Choy, 2002; Kahlenberg, 2004; National Academy, 2007). Because most K-12 teachers are middle-class, White women, they are less capable of truly relating to the experiences and issues of many African-American students and what they bring to the classroom (Howard, 2006).

Another resource scarcity that impacts pre-college success is inadequate facilities and equipment for instruction. If secondary institutions do not provide or have the proper educational tools, subject matter expertise, or equipment resources, this will hinder the progress

of students when they attend college (Darling-Hammond, 2004; Oakes, Joseph, & Muir, 2004). For example, many high schools in low income areas do not have college counseling centers, provide opportunities to visit college campuses, or even receive visits from college recruiters (Kirst, 2004; Oakes, Joseph, & Muir, 2004). If students were given a better sense of what college was like, they would be more likely to apply. Moreover, they would be more likely to transition successfully than students who were completely unfamiliar with the expectations of college.

Another pre-college factor is the inconsistent experiences of K-12 students. Unfortunately, this is virtually unavoidable in a country whose secondary education performance standards vary from state to state, city to city, and even school to school—especially in the case of public vs. private education. Moreover, students mature at different levels cognitively and socially, which certainly has an impact on their rates of learning. Kirst (2004) maintained that there is a miscommunication about the skills that high schools student should possess in order to be successful in college. In other words, while a student may complete high school with all of the required credentials, they may still be academically under-prepared for college-level courses.

Underrepresented Students in Higher Education: College Factors

Once an underrepresented student enters an institution of higher education (especially a PWI), they are subject to a number of academic and social challenges that could impede their scholastic persistence (Tinto, 1993). This section will examine the various factors that could negatively impact an underrepresented student's goal of earning an undergraduate degree.

As discussed earlier, many researchers have discussed the issue of retention among college students, and especially among underrepresented groups. Tinto (1993), for example, identified two primary factors associated with college retention: academic integration and social

integration. Successful academic integration occurs when a student develops intellectually and is able to earn good grades. Social integration refers to the various interactions that a student experiences with peers, staff/administrators, and faulty. These concepts are interrelated and both contribute to retention. As an example, a student involved in extracurricular activities (e.g., club sports, academic clubs) would be more likely to achieve social and academic integration (Tinto, 1993) than a student who was not.

Orfield and Paul (1988) studied enrollment patterns in five major metropolitan areas and identified four barriers impeding underrepresented students' access to two- and four-year institutions:

1. Segregation in schools
2. High college tuition and fees
3. Inadequate assistance for unprepared students
4. A lack of commitment to equal opportunity for every student enrolled in colleges and universities.

With regard to access to and retention in colleges of engineering, there are additional factors that impede the progress of underrepresented students (Swail, Redd, & Perna, 2003; Tinto, 1993). Apart from poorer academic performance—especially in engineering prep courses—underrepresented students have tended to score lower on SATs than their White and Asian counterparts. The literature also reported lower success rates for underrepresented students in advanced placement courses that are critical for admittance to colleges of engineering. These findings corroborate those of Anderson (2006), Choy (2002) and Kirst (2004), who reported that a reliable predictor of a student's successful completion of the bachelor's degree is the rigorousness and value of his or her secondary education. In fact, Swail, Redd and Perna stated

that completing a more rigorous curriculum in high school is a stronger predictor of success than test scores such as the SAT.

Another motive for underrepresented students abandoning their intended engineering majors, or even dropping out altogether, is the lack of their involvement within the college or within the institution as a whole. Astin's (1999) seminal work on student involvement strongly linked the physical and psychological energy that a student dedicates to the university experience to increased retention and graduation rates. Students have to be engaged in their academic setting and have a personal investment in the college experience to fully embrace it. This requires the student to seek assistance when needed, be involved with non-academic activities (e.g., sports or service activities), as well as be active in academic extracurricular activities (Astin).

A final factor that helps explain why underrepresented students withdraw from engineering degree programs is the campus climate of the institution. Swail, Redd, and Perna (2003) stated that institutional fit and campus integration—although important for all students—are essential for underrepresented students. Student who are uncomfortable in an academic setting are unlikely to interact in any significant way with peers, faculty and administrators, thereby compromising their academic progress.

Zhang et al. (2002) examined retention rates among engineering students between 1987 and 2000. The researchers used six independent variables (ethnicity, gender, high school grade point average, SAT math scores, SAT verbal scores and citizenship status) to measure graduation and retention rates. The researchers used data from eight colleges of engineering. Students included in the study were only those who had matriculated. The researchers did not include a difference between first-time freshmen and transfer students. On average, the cohorts from 1987

through 1994 had 25-54% graduation rates. Zhang et al. used logistic regression and found that retention was significantly correlated with all six predictors. Specifically, high school grade point average and SAT math scores were positively correlated with retention at all eight institutions. Also, the researchers indicated that being a female or African-American was negatively correlated with retention.

Summary

In summary, the literature on the evolution of transitional programs revealed that many seminal legislative statutes have helped to create retention programs such as SBPs. The review provided an overview of information on the difference in transitional program and intervention programs and how both programs co-exist to assist the various types of students to adjust to the rigors of college. The conceptual model (See Figure 1) demonstrates how the elements interrelate. A mix-method was employed to gather both quantitative and qualitative data. The data was analyzed independently to provide a rich context to investigate the complexity of the issue. Finally, this review confirmed the very real issues that have and continue to impede college students at secondary and post-secondary levels of their education.

CHAPTER THREE: METHODOLOGY

Introduction

The purpose of this study was to investigate the academic, social, goal commitment/ institutional attachment, and personal-emotional adjustment of participants versus non-participants in a SBP for engineering students at a R1 predominantly White institution (R1 PWI) in the mid-southeastern region of the United States. The Academic, Social, Personal-Emotional, and Goal Commitment/Institutional Attachment subscales of the Student Adjustment to College Questionnaire (SACQ) were used for this study (Baker & Siryk, 1999). The research addressed the following questions:

1. How do participants versus non-participants in an engineering Summer Bridge Program rate their Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) during their first term of college?
2. Is there a significant difference in how the participants versus non-participants in an engineering Summer Bridge Program rate their Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) during their first term of college?
3. Do the Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) experiences of participants versus non-participants differ by race or gender?
4. Is there a significant difference in participants versus non-participants in fall term college grade point average with respect to retention after their first year in the college of engineering and the institution?

5. What were the benefits and difficulties with participating in Summer Bridge Program according to participants and the director of engineering support programs?

This chapter describes the research design, research site, participants, sample selection, instrumentation development, and the procedures used to collect and analyze the data.

Research Design

The research design for this study featured a mixed methodology approach involving both qualitative and quantitative components. Table 3.1 identifies the approaches to align the research questions with the methods. Although designed to accomplish different goals, Patton (2002) asserted that both research methodologies are complementary and can be combined effectively. By conducting qualitative research, an investigator can illuminate the individual differences between subjects in a study, as well as create a more detailed portrait of the findings, while a quantitative design provides more generalizable data.

Table 3.1. *Summary of the Phase of this Research Aligned with Research Questions*

Phase of the Research	Research Phase Questions	Participants	Type of Data Collection	Instruments/Methods Used	Data Obtained	Data Analysis
1	RQ 1 RQ 2 RQ 3 RQ 4	67 summer bridge participants 67 non-summer bridge participants	Quantitative	Demographic Questions Student Adjustment College Questionnaire	Demographic Information Student Adjustment College Questionnaire Data (Academic, Social, Personal Emotional, Goal Commitment and Institutional Adjustment)	Median Mean Standard Deviation P-Plots Mann-Whitney T-test
2	RQ 5	1 Director of Engineering Support Programs 43 summer bridge students	Quantitative	Formative Evaluation Questionnaire	Activity Evaluation	Cronbach Alpha Likelihood Ratio Pearson Test Mean Standard Deviations Confidence Intervals Levels Tukey-Kramer
		1 Director of Engineering Support Programs and 12 summer bridge students	Qualitative	Open Ended Questions	Interview and Focus Groups	Content Analysis

*RQ means research question followed by the number

Creswell (2003) provided a convincing rationale for the use of quantitative research methods. In short, he maintained that quantitative research allows a researcher to identify variables and assess their relationships in ways that are measurable and reliable. Quantitative research also enables an investigator to formulate unbiased and viable causal explanations for a given phenomena. This can be done through the use of formal instruments that reduce data to statistical indices. One format that employs quantitative research methods is surveying methodology (Patton, 2002).

Merriam and Simpson (1995) maintained that surveying is among the most common data-gathering techniques. Surveying, which can be conducted through oral interviews or via the use of written instruments, is an effective tool for eliciting useful information from a study's participants. For this study, the researcher used written questionnaires to examine the adjustment of students in engineering.

Merriam and Simpson (1995) also discussed the two types of written questionnaires, closed and open, both of which have certain advantages as well as limitations as effective survey tools. A closed questionnaire helps the researcher to guide the participants throughout the survey. Typically, a closed questionnaire will have related lines of thought associated with the research topic. On the other hand, an open questionnaire allows participants more freedom in responding to survey questions, which Merriam and Simpson referred to as "a wider latitude of possible responses" (p. 147). The advantage of utilizing an open questionnaire is that it can then help the researcher develop clear and concise questions for a subsequent closed questionnaire, which forces participants to pick between a limited number of choices on the survey instrument. The challenge of using this type of questionnaire is that it forces the researcher to develop a

system to code the responses and categorize the data in order to be able to interpret the variety of responses.

Researchers have also discussed the variety of ways in which surveys can be administered, as well as their potential assets and drawbacks. For instance, Babbie (1990) and Rossi, Wright, and Anderson (1983) confirmed that a self-administered on-line survey can be an effective way for capturing survey data. Bourque and Fielder (1995) later reaffirmed the reports of Babbie and Rossi et al. in describing the various advantages and disadvantages of surveys as data collection devices. Some important advantages for using surveys include the fact that (1) the instructions are consistent for all participants, (2) they are useful in pretesting, and (3) the confidentiality of respondents can be maintained. Conversely, there is also a trio of important disadvantages in connection with the use of surveys: (1) there is no control over a participant's response (especially true in the case of open ended questionnaires), (2) it can be difficult to investigate sensitive topics in a survey, and (3) surveys can be expensive to develop and administer.

In addition to the quantitative data collected for this study, the researcher also included a qualitative component, which helped to answer the "how and what" lines of inquiry (Creswell, 2003). According to Patton (2002) and Rossman and Rallis (2003), the aim of qualitative research is to understand the ways in which people create, construe, and give significance to occurrences they have experienced in their lives. In an earlier study, Lincoln and Guba (1985) stated that qualitative research allows an investigator to do the following: a) use a natural setting for the collection of data, b) use humans as instruments for a study, c) conduct purposeful sampling, d) engage in inductive analysis, and, e) generate thick and rich descriptive reports. Moreover, Lincoln and Guba discussed "prolonged engagement" and "persistent observations"

in connection with qualitative research. These terms refer to the necessity of spending sufficient time with participants in order to make sure that events and stories align.

Another important component of qualitative research involves the triangulation of data, which corresponds to the use of a variety of examples to connect and illustrate what is being examined. According to Patton (2002), triangulation of data is essential to research because it will "demonstrate that different data sources or inquiry approaches yield essentially the same result" (pg. 248). In other words, triangulation is an authoritative way of understanding and gaining insight, making implications, drawing conclusions, and contributing to the trustworthiness of the resulting data (Patton, 2002; Rossman & Rallis, 2003).

For this study, the researcher administered a Summer Bridge Inventory (SBI) to the participants, which consisted of two parts. The first part was the rating survey, while the second portion of the SBI involved two focus group meetings with participants, as well as an interview with the director of support programs that included the use of semi-structured questions. The purpose for the two qualitative methods was to provide an additional descriptive component of the SBP. Specifically, it enabled participants (both the students and the director) to describe their experiences in their own terms, which then aided the researcher in identifying salient themes with respect to adjustment. These data were captured during the Spring 2008 term.

As noted, two focus group sessions were held, each involving summer bridge participants. In general, the use of focus groups encourages participants to freely express their beliefs, attitudes and emotional reactions to a particular topic—in this case, college adjustment. To be most effective, focus groups should be held on the participants' "home turf" so that they feel comfortable in expressing their thoughts openly. Focus groups are also important in that

they can encourage participants to build on each other's statements/recollections and the researcher is able gather rich, thick data (Rossman & Rallis, 2003).

As noted, the focus groups conducted in this study provided the researcher with greater insights with respect to the participants' adjustment processes—and especially what activities or events were most effective in a student's adjustment. Despite the obvious advantages of acquiring rich personal data from focus group sessions, there are several important limitations associated with this method of data collection that must be noted. The first one deals with bias. For example, an interviewee can be biased to the interviewer due to his or her relationship to the study (Patton, 2002). In addition, an interviewee can be biased to the study if and when the subject feels the need to tell the interviewer what he/she wants to hear. A second limitation deals with the tendency of participants to identify with each other and parrot group responses rather than promulgate a response that could be in opposition to other focus group members.

These limitations were overcome in three primary ways. First, a skilled moderator was used who was able to recognize these various forms of bias due to their previous educational training. Second, member checks were conducted, which required group members to verify the information obtained from the focus groups. The researcher allowed the participants to review the transcripts to check the data for accuracy. Finally, this study also utilized a peer debriefer. A peer debriefer is an individual who can review and code the transcripts along with the researcher for parallel information. The peer debriefer for this study had a doctoral degree in qualitative measures.

Participants and Sample Selection for SACQ

The research site was Virginia Tech, a Research I Predominately White Institution located in the mid-southeastern region of the U.S. At the time of this study, the institution had

an enrollment of approximately 22,000 undergraduates, with 5,700 of those enrolled in its College of Engineering. Of those 5,700 engineering students, about 1,300 were first-year students.

A total of 134 participants were recruited for this study, all of whom took the Student Adjustment to College Questionnaire (SACQ) survey. This number included 67 first-year engineering students who participated in the College of Engineering's 2007 SBP, and an equal number of non-participants. Two requirements guided the identification of participants for the study. The first requirement was that participants had to be first-year college students in engineering. The second requirement was that participants had to be between 16-20 years old, principally because the SACQ was validated based on participants in this age group (Baker & Siryk, 1999). The participants for SACQ portion of this study were closely matched based on math SAT scores, gender and race. To increase the participation and response rate, the researcher developed an incentive for contributing to the study. Specifically, two $100 dollar gift certificates for the university bookstore were raffled to two students who participated in the study.

Forty-two first-year engineering students from the SBP participated in the SBI written portion of the survey. Of those 42 students, 12 also served as focus group members. The director of engineering support programs participated in the SBI written portion, and also was interviewed by the researcher. This individual was hired to increase the number of undergraduate students graduating in engineering, since she completed all three degrees at Virginia Tech and worked several years in the field of engineering and higher education. And indeed, the director was responsible for many support programs that have impacted the increase of students graduating in engineering.

Instrumentation Development

SACQ

The Student Adjustment to College Questionnaire (SACQ), which features a user's manual (Baker & Siryk, 1999), was used in this study. Designed to measure adjustment to college, the SACQ was first published in 1989 and is now maintained and updated by Western Psychological Services[2]. Typically, the SACQ is administered several weeks into the academic term once students have had an opportunity to be exposed to the various aspects of the college environment (Baker & Schultz, 1992a, 1992b).

The SACQ survey consists of 67 questions, requiring participants to identify their responses based on a scale from 1 ("doesn't apply to me at all") to 9 ("applies very closely to me"). Students were asked to provide their subjective replies based on their feelings at the time they took the survey.

The entire SACQ instrument was employed in this research. The instrument is composed of 4 scales. The *Academic Adjustment, Social Adjustment, Personal-Emotional Adjustment, and Goal Commitment/Institutional Adjustment.* The scales fit the research purpose and questions related to student adjustment to college in ways that could later be coded into quantitative data. A copy of the SACQ that was used in this study is shown in Appendix C.

The first section of the survey required participants to provide demographic data, which generated an overall description of the sample. These demographic questions were designed and based on the literature Astin (1993) and Tinto (1993). The ten general demographic questions are listed in Appendix D.

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[2] Western Psychological Services,12031 Wilshire Boulevard, Los Angeles, CA 90025-1251,www.wpspublish.com

The Academic Adjustment (AA) subscale contains 24 items associated with higher education learning experiences. This subscale is divided into four clusters: (1) motivation, (2) application, (3) performance, and (4) academic environment. *Motivation* corresponds to a student's feelings concerning educational goal setting and being in college. *Application* refers to the initiative that a student takes in achieving academic goals. *Performance* indicates the effectiveness of a student's academic performance. *Academic Environment* signifies the institutional environment in which a student performs and what that environment has to offer to the student. Examples of the AA statements associated with each of these four clusters are shown below (Baker & Siryk, 1999).

1. I know why I'm in college and what I want out of it. (*Motivation*)
2. I have been keeping up to date on my academic work. (*Application*)
3. I am finding academic work at college difficult. (*Performance*)
4. I am satisfied with the number and variety of courses available at college. (*Academic Environment*)

The Social Adjustment (SA) subscale contains 20 items associated with the social aspects of a higher education environment. Similar to the AA subscale, the SA subscale is divided into four clusters: (1) general, (2) other people, (3) nostalgia, and (4) social environment. *General* signifies the ease with which students engaged in social activities. *Other People* corresponds to whether or not students develop relationships with other individuals within the university setting. *Nostalgia* refers to the social rearrangement of a student's surroundings and how well he or she adjusts to being away from home. *Social Environment* corresponds to the fulfillment a student felt with the college experience. Examples of SA statements associated with each of these four clusters are shown below (Baker & Siryk, 1999).

1. I am very involved with social activities in college. (*General*)
2. I have had informal, personal contacts with college professors. (*Other People*)
3. Lonesomeness for home is a source of difficulty for me now. (*Nostalgia*)
4. I am pleased now about my decision to attend this college in particular. (*Social Environment*)

The Personal-Emotional Adjustment (PEA) subscale contains 15 items associated with the psychological and physical aspects of the students. The PEA subscale is divided into two clusters: (1) psychological and (2) physical. *Psychological* signifies the student's welfare in terms of either comfort or degree of distress. *Physical* corresponds to bodily responses. Examples of PEA statements associated with each of these two clusters are shown below (Baker & Siryk, 1999).

1. I have been feeling tense or nervous lately. (*Psychological*)
2. I have felt tired much of the time lately. (*Physical*)

The Goal Commitment/Institutional Adjustment (GCIA) subscale contains 15 items associated with students' dedication to their educational goals and their institutional connection. Similar to the PEA subscale, the GCIA subscale is also divided into two clusters: (1) general and (2) this college. *General* signifies one's overall satisfaction with being in college. *This college* corresponded to how students feel about attending their college. Examples of GCIA statements associated with each of these two clusters are shown below (Baker & Siryk, 1999).

1. I am pleased now about my decision to go to college. (*General*)
2. I wish I were at another college or university. (*This College*)

Table 3.2 identifies the number of items for each full scale and subscales.

Table 3.2.

An Overview of the Items for the SACQ Full Scale and Subscales

Scale	Number of Items	Items that Overlap on a Scale
Academic Adjustment (AA)	24	Item 36 appears on GCIA
Social Adjustment (SA)	20	Items 1, 4, 16, 26, 42, 56, 57, 65, appears on GCIA
Personal-Emotional Adjustment (PEA)	15	-
Goal Commitment/Institutional Adjustment	15	Items 1, 4, 16, 26, 42, 56, 57, 65, appears on SA Item 36 appears AA
Full Scale	67	-

Note: Items 53 and 67 are not scored on any scale but a part of the Full Scale. There are 9 items that are utilized on several scales which are noted above. Between AA, SA, PEA, and GCIA there are total of 77 items overall, but if you subtract the overlapping 9 items you have 65 items plus items 53 and 67 would give you a grand total of 67 items for SACQ.

It should be noted that there was some overlap between the subscales. This was purposefully built in because the constructs were not mutually exclusive. Specifically, there is one question that was used in both the AA and GCIA subscales (see Table 3.1), and eight questions used in both the SA and GCIA subscales (see Table 3.1). Baker and Siryk (1999) maintained that items from the other subscales were empirically driven from the use of the original 52-item version of the SACQ. This empirical evidence was based on attrition in the two samples of freshmen examined at Clark University where the SACQ was developed.

Moreover, there were two questions that did not add to the four subscales mentioned above, but contributed to the Full Scale. These questions were:

1. I feel I have good control over my life situation at college.
2. I feel confident that I will be able to deal in a satisfactory manner with future challenges here at college.

Baker and Siryk (1999) cautioned researchers not to use the full scale on its own because the four subscales provide distinctive information about college student adjustment and can provide important associations.

SBI

To further investigate the topic of college adjustment, the researcher designed a survey that was based on the SACQ survey, but tailored to specifically examine the impact of summer bridge activities. This survey was termed "The Summer Bridge Inventory" (SBI) (see Appendix E). In order to ensure that the instrument was clear and concise and would yield data that was pertinent to the study, the researcher's committee members suggested a number of modifications to the original design before the SBI could be administered. Specifically, the committee members recommended that the researcher create a matrix in order to capture data that would provide information about the summer bridge activities. The committee members also suggested that the SACQ instrument be used as a framework to examine the summer bridge activities.

The development of the SBI took several months. Two doctoral students assisted the researcher in brainstorming and asking relevant questions. The doctoral students were utilized as a springboard for exchanging ideas and suggestions throughout the development of the SBI. Also, the researcher received feedback from committee members about the structure and layout of the instrument. The researcher implemented the committee member suggestions and submitted the SBI for final review, after which it was reviewed by a team of experts at Virginia Tech's Department of Statistics. The experts examined the SBI several times, indicating that although it was lengthy, it would likely reveal some interesting results. The researcher also utilized the Dept. of Statistics to assist in examining the data for the SBI.

One final meeting was held with committee members to evaluate the revised SBI, after which it was approved for a pilot study with former summer bridge participants. Based on Patton's (2002) assertion that a pilot study is useful for assessing the reliability and validity of an instrument, a pilot study of the SBI was conducted in January 2008. The cohort that completed the SBI included a sample of past SBP participants from an array of engineering academic disciplines (N=12) and the director of support programs (N=1). The pilot study participants provided important feedback on the instrument, especially with respect to layout and the time needed to complete the SBI. Subsequent revisions were made to the instrument based on their comments.

The SBI was composed of two parts: the quantitative inventory instrument, and the qualitative focus groups and interview. The inventory consisted of the 29 summer bridge activities. These activities were rated, ranked and grouped around several sections: 1) Academic Adjustment, 2) Social Adjustment 3) Personal-Emotional Adjustment and 4) Goal Commitment and Institutional Adjustment. In addition to completing the required demographic survey, the participants were asked to rate their experiences with the 29 activities of the SBP, and rank/indicate the dominant subscale for each activity. The rating was between 1 ("does not relate well to me") and 5 ("relates well") for the first 4 elements of the SBI.

The first section of the SBI was devoted to Academic Adjustment. This section consisted of 29 activities that drew out data for the following four clusters: motivation, application, performance and academic environment. The definition for the Academic Adjustment clusters is located in Appendix E. The second section of the SBI was devoted to Social Adjustment. This section consisted of 29 activities that drew out data for the following four clusters: general, other people, nostalgia and social environment, which are defined Appendix E. The third section of

the SBI was devoted to Personal-Emotional Adjustment. This section consisted of 29 activities that drew out data for the following two clusters: psychological and physical, which are defined in Appendix E. The fourth section of the SBI was devoted to Goal Commitment and Institutional Adjustment. This section consisted of 29 activities that drew out data for the following two clusters: general and this college, which are defined in Appendix E.

The fifth section of the SBI required participants to identify the dominant subscale for each activity (see Appendix E). The subscales were assigned a number, as follows:

1. Academic Adjustment
2. Social Adjustment
3. Personal-Emotional Adjustment
4. Goal Commitment and Institutional Adjustment

The participants could only assign one number to each activity.

The revised SBI was then used in the full study. First, all the summer bridge participants received an email introducing the SBI and explaining the need for their participation. Forty-two participants agreed to take part in the study. In March 2008, the researcher distributed hard copies of the SBI to study participants in a neutral, comfortable setting on campus (an engineering building). The interview with the director of engineering support programs was conducted in May 2008. The researcher collected and inputted the data into Excel, which enabled him to have an electronic version of each participant's data in order to subsequently import in several statistical data packages. This process took approximately two weeks, after which two other individuals double-checked his data entry for accuracy.

The final part of the SBI was comprised of the focus groups and the interview. It should be noted that during the pilot study phase, the researcher conducted a focus group with the past

summer bridge participants to make sure the structured questions were clear and concise. The suggestions and feedback from the pilot study participants were implemented.

Reliability and Validity

It is vital to understand the reliability and validity of any instrument in order to properly assess the resulting data—which is why the area of survey reliability has been so broadly considered. In general, reliability refers to the extent to which a measurement instrument yields consistent, stable, and uniform results over repeated observations or measurements under the same conditions each time (Creswell, 2003). Stated more simply, Fink (1995) asserted that a survey is reliable if it is relatively free of measurement error. Internal consistency, also referred to as homogeneity, is the extent to which the survey measures the same characteristic (Fink). Internal consistency allows interpretation of the data and helps determine the relationships between variables.

SACQ Reliability

The SACQ instrument was utilized in this study, since it has been used reliably with a variety of different cohorts for a number of years at different research sites (Baker & Siryk, 1999). The SACQ instrument was developed to assess how well students acclimate to the university environment. Its comprehensiveness makes it useful for both basic research and for more specific applications, such as in the area of college counseling. With respect to the study described herein, there were several types of reliability data to be considered, since the different variables used in the survey were not consistent for every student. In fact, variables can typically change due to circumstantial and environment changes (Baker & Siryk). Robert and Siryk used several statistical tests to assess the reliability of the SACQ. One test is one factor principal components analysis (Asher, 2007), which is a variable reduction technique used when variables

are highly correlated. It is commonly used for large sample analysis. When applied to the SACQ, the analysis displayed a large loading of respondents for every variable. This technique is useful in summarizing the correlation between variables, as well as displaying which survey subscales are somewhat independent of each other. Table 3.3 shows the one factor principle component analysis for the SACQ for selected types of colleges and universities.

Table 3.3.

One-Factor Maximum Likelihood Solutions and Principal Components from Intercorrelations of SACQ Subscale Scores for Selected Colleges

		Maximum Likelihood Loadings				
Sample	n	Academic Adjustment	Social Adjustment	Personal-Emotional Adjustment	Goal Commitment/ Institutional Attachment	Percent Variance
Auburn University	49[a]	.59	.76	.39	.98	51
	96[b]	.53	.87	.43	.97	54.2
Brandon University	780	.59	.76	.39	.98	51
Salem University	121	.56	.82	.50	.97	54.4
University of Maryland	104	.25	.92	.38	.88	46.2

[a]African-American Students
[b]White Students
(Adapted from Baker & Siryk, 1999, pgs. 42-44)

A second method used was Cronbach alpha, which is a statistic that is common used to assess the internal consistency reliability of a psychometric tool, as well as how well a set of variables measures a one-dimensional underlying construct (Hinkle, Wiersma, & Jurs 1998). In

1984, the internal consistency for the 52-item version of the SACQ was .82 to .87 for the Academic Adjustment subscale, and .83 to .89 for the Social Adjustment subscale. The authors subsequently added more items to the SACQ in order to improve the reliability of the subscales.

Internal consistency is reported for reliability. Baker and Siryk (1999) reported internal consistency data from several different types of institutions of higher learning. The coefficient alpha values are reported for this study. The subscales displayed high internal consistency for the coefficient alpha. Specifically, the coefficient alpha for the Academic Adjustment subscale ranged from .90 to .82. The coefficient alpha for the Social Adjustment subscale ranged from .91 to .73. The Personal-Emotional Adjustment subscale ranged from.89 to .78. The Goal Commitment Institutional Attachment subscale ranged from .90 to .84. The Full Scale ranged from .94 to .89. Since, the average scores for the coefficient was .7 or higher, a highly dependable internal consistency was indicated. Table 3.4 demonstrates the alpha coefficients for the SACQ for various types of colleges and universities and Table 3.5 displays the internal consistency of coefficients for critical items.

Table 3.4

Alpha Coefficients for the SACQ for Freshmen at Various Colleges

Sample	N	Academic Adjustment (24 items)	Social Adjustment (20 items)	Personal-Emotional Adjustment (15 items)	Goal Commitment/ Institutional Attachment (15 items)	Full Scale (67 items)
George Washington University	166	.86	.86	.78	.87	.89
University of California	65	.85	.91	.82	.90	.94
University of Colorado	141	.85	.85	.79	.87	.91
University of Mississippi	125	.85	.85	.82	.84	.93
Worcester Polytechnic Inst.	262	.86	.89	.82	.88	.94
York University	34[a]	.82	.73	.89	-	.90
	28[b]	.90	.79	.87	-	.93

[a]Learning disabled [b]Non-learning disabled (Adapted from Baker & Siryk, 1999, pg 36)

Table 3.5

Internal Consistency Coefficients for Critical Item

Cluster	Number of Items	Term 1 Total (N=1075)	Term 2 Total (N=607)
Academic Adjustment			
Motivation	6	.74	.78
Application	4	.71	.77
Performance	9	.74	.73
Academic Environment	5	.74	.74
Social Adjustment			
General	7	.84	.85
Other People	7	.67	.67
Nostalgia	3	.74	.70
Social Environment	3	.60	.56
Personal-Emotional Adjustment			
Psychological	9	.79	.81
Physical	6	.64	.66
Goal Commitment/Institutional Attachment (GCIA)			
General	3	.77	.78
This College	4	.91	.90

(Adapted from Baker & Siryk, 1999, pg 36)

SACQ Validity

Babbie (2005) referred to validity as the degree to which an instrument sufficiently measures the construct under consideration. More recently, Asher (2007) reviewed the SACQ

and asserted that its validity could be determined. A key way of assessing the validity uses the concept of intercorrelation. Simply stated, intercorrelation is the connection between two or more items. Significant intercorrelation of elements is interpreted to mean that the items or components are measuring the same or closely related constructs in a reliable manner. Low levels of intercorrelation among items suggest that the construct is not being measured reliably—that there are sources of unexplained error in the measurement.

Baker and Siryk (1999) used intercorrelation and criterion relations to show validity. First, the researchers collected data from 21 different types of institutions and showed that certain subscales shared questions in common. For example, the AA subscale has one item in common with the GCIA subscale; while the GCIA subscale has eight items in common with the SA subscale. Therefore, the intercorrelation will be higher for these paired scales (Baker & Siryk).

Criterion relation has also been used to validate the SACQ. Criterion-related validity is the ability to precisely evaluate one measure with another measure to demonstrate that it is valid (Dahmus & Bernadin, 1992). The goal is to examine the relationship between a scale and independent real-life behavior that may demonstrate the effect of the variables being assessed (Baker& Siryk, 1999). Dahmus and Bernardin asserted that criterion validity is present in the SACQ survey. The association between the SACQ subscales and independent real-life behaviors and results has also been analyzed. One way that criterion-related validity was examined in the SACQ survey was through the AA subscale. This was done with freshman-year grade point average and the selection of students for an academic honors organization at Clark University. The purpose of the Clark University research was to measure if students who attained higher AA subscale scores would be more likely to demonstrate academic achievement in college. And

indeed, there was a significant difference between a high score on the AA subscale and academic achievement based on their grade point average and student selection into the honors organization (Baker & Siryk, 1999). Baker and Siryk (1999) concluded that the college students that were well adjusted would demonstrate academic success and vice versa.

The second criterion-related validity that was examined in the SACQ survey was via the SA subscale. One criterion involved the social activities checklist and the second criterion measured if the student had become a residential advisor during his or her second year (sophomore status) or third year (junior status). Baker and Siryk (1999) indicated the reason for the "checklist was to provide an index of the extent of involvement with and commitment to, the immediate social system of which the student is a part" (pg. 45). There was a significant difference between the SA subscale and both criterions.

A third criterion related validity studied in the SACQ survey was through the PEA subscale. This was assessed according to whether students at Clark University had visited the campus psychological service center on more than one occasion. The results demonstrated that students scoring lower on the PEA subscale were considerably more likely to seek out psychological services.

The final criterion related validity studied in the SACQ survey was through the GCIA subscale, which was associated with attrition. This was significantly interrelated with GCIA and AA. The GCIA subscale level was significantly stronger than the AA subscale (Baker & Siryk, 1999).

Although the SACQ is generally acknowledged to be a valuable survey instrument, there are several limitations associated with it. One limitation has to do with its "transparency of purpose" (Baker & Siryk, 1999, pg. 5), which means that it would be apparent to someone taking

the questionnaire that it was intended to assess college adjustment. Therefore, a student could skew his or her answers accordingly. A second limitation is that the norms were determined from data from just one college when they first administered the 52-item survey (Baker & Siryk, 1999), which may or may not be generalizable to other institutions of higher education. A final limitation is that the "user should be careful not to place too much interpretive value on individual item responses" (Baker & Siryk, 1999, pg. 5). Therefore, although the SACQ has been shown to be useful in advancing a holistic understanding of an empirical sample of scores, responses should never be analyzed out of context.

SBI Validity

There are a variety of ways for testing validity. Rubio (2005) identified two interrelated types of validity: face validity and content validity. While similar to content validity, face validity relates to whether an instrument appears to be valid to its users, to the professional personnel who make a decision on its use, and to other pilot study participants. Rubio (2005) simplified its meaning in stating that face validity is "the extent to which a measure appears to be valid" (pg. 495). The second validity type, content validity, requires a quantitative assessment. Unlike face validity, content validity is usually associated with more rigorous testing, e.g., by a board of evaluative specialists (Rubio, 2005).

For the present study, the validity of the SBI was corroborated by several means. As discussed earlier, it was reviewed and revised by committee members, doctoral students, and several statistical consultants. The committee members made recommendations on how to utilize the SACQ instrument to create a matrix for the SBI. The researcher met with several doctoral candidates to assist with the SBI. The researcher developed and devised a framework and received feedback from committee member several times. The researcher also consulted

with statistical department experts for appropriate revisions. In addition, the initial pilot study involving past participants in an SBP was also useful in improving the validity of the instrument.

SBI Reliability

The researcher also conducted estimates of internal reliability, which did not result in the elimination of any of the SBI items. The Cronbach Alpha was used to demonstrate reliability analysis which was conducted by SPSS 16.0. Table 4.10 documents the coefficient alpha for each scale. As a result, the researcher decided to examine the coefficient alpha for each subscale.

Data Collection Procedures

SACQ

The following procedures were used to conduct this study. First, the researcher received permission from the director of the support programs to use the data from the 67-student cohort in the Summer 2007 SBP as the "participant data." Permission was also obtained from the corresponding administrator who managed college-wide information to identify a matched cohort of 67 students that would comprise the "non participant" cohort. Permission was also granted from the Internal Review Board (IRB) to collect the necessary data for this study. An amendment was later added to expand the participant pool to non-participants. The amendment was approved on October 26, 2007 (see Appendix F).

To conduct this study, the researcher obtained the following information:

1. List of students names, emails, telephone numbers, and all the demographic variables for participants and non-participants.
2. Grades assigned for the Fall 2007 Term (requested in January 2008).
3. Retention status in the institution and the department collected in Summer 2008.

In addition, the researcher requested permission from the director of summer programs to conduct focus groups with the summer bridge participants, as well as an interview with the director in order to understand their perceptions of the SBP experiences.

In October 2007, the researcher contacted Western Psychological Services (WPS) to obtain permission to use the SACQ instrument. This was required to ensure that the on-line survey complied in both content and format with WPS guidelines. Approval was granted, as documented as Appendix G.

Another important aspect of the study was to ensure that the SACQ online survey would be accessible to every student in the study, regardless of the kind of computer or browser used to access it. To do so, the researcher met with a web designer who helped design an appropriate, easy-to-use webpage to host the survey. This included discussions of format (color and layout), shortcomings to avoid, and accessibility issues. Once approved by the researcher and his committee members, the on-line survey was administered to a small group of volunteers as a pilot study (described below). After completing the pilot study, volunteers' comments with respect to usability were evaluated and changes were made as needed. Throughout the study, the researcher contacted the web designer with respect to any concerns with the on-line survey.

As noted above, the researcher conducted a small pilot study to test the survey instrument. Ten upper-class engineering students who had previously participated in SBPs were asked to complete the survey as "participants." In addition, five faculty members also completed the pilot study. The pilot study participants received an email that served as a letter of introduction to the study. In the email, they were given the direct internet site location (URL) for the survey, as well as a password to access the site. After they completed the survey, the

researcher obtained their feedback by both email and through telephone interviews—especially their responses to the following three questions:

1. Were the instructions clear and concise?
2. How long did it take you to complete survey?
3. Where you at ease taking the survey?

The pilot study was useful because it enabled the researcher to identify problems with data transference, as well as correct several typographical errors. Overall, the pilot study participants indicated that the survey was clear and concise. One participant suggested a useful change with regard to the default button for the responses; while another recommended some phrasing changes. The pilot study participants indicated that it took them an average of 15 minutes to complete the survey.

Prior to collecting the data for the full study, the researcher received training from the Institutional Review Board (IRB) to ensure compliance with the institution's policies and procedures on ethical research procedures. Once permission was given, the researcher contacted the 134 participants who had agreed to participate in this study (67 students who took part in the SBP and 67 students who had not). Similar to the pilot study, participants were contacted via an emailed letter of introduction, which fully explained the study and provides the URL for the survey (see Appendix H). The letter included information about the researcher, the rationale for the study, and comprehensive instructions for completing the on-line survey.

A critical step in the study was to obtain the informed consent of every participant to certify that they understood and acknowledged the benefits and risks associated with the survey. Because the SACQ was administered online, everyone taking the survey had to click on the button "Yes, I Understand and Continue" before they were able to fill out the demographic

questions associated with the SACQ survey. This informed consent form also included a statement ensuring the confidentiality of the responses.

The study featured email reminders for anyone who had not completed the survey in a timely way (see Appendix I). The researcher also phoned participants as needed to request that they complete the survey. Participants were offered an opportunity to receive the results of the study once it was completed. Importantly, participants were reassured that withdrawing from the study at any time and for any reason would be honored without penalty of any kind.

SBI

The researcher followed the protocol summarized in the IRB. The SBI packet was developed and prepared for the participant meetings to fill out the SBI. The packets included a descriptive outline of the SBI and a copy of the informed consent form for the entire study. The packet also included additional information for the SBI focus groups. Specifically, the participants were asked once again if they wanted to participate in the focus group. If yes, the researcher informed the participants of the details for the focus groups. Each volunteer received a flier and were assigned a time slot to participate in one of two focus groups once they had handed in their completed SBI. The flier included the time, place and location for the focus groups. The researcher also informed the volunteers that two email reminders would be sent prior to the session. The researcher coordinated directly with the director of the support programs to complete the SBI and the interview.

Data Analysis

SACQ

With respect to the quantitative data, the researcher created a database to store the results from the survey. After the data was assessed for usability, the Statistical Package for Social

Sciences (SPSS) 16.0 was used to conduct statistical analyses. It was envisioned that SPSS would be essential for interpreting the data in order to answer the three research questions posted in this study.

For the first and second research question listed below:

1. How do participants versus non-participants in an engineering Summer Bridge Program rate their Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) during their first term of college and is there a significant difference?
2. Do the Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) experiences of participants versus non-participants differ by race or gender?

The researcher used descriptive statistics to report the responses for the Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) scales and clusters for each scale. Since this study concerned the differences in the adjustment experiences of participants versus non-participants in a Summer Bridge Program, the scales were sorted into two groups: summer participants and non-participants. In addition, the researcher calculated and identified the mean, range, and standard deviation scores for both summer participants and non-participants. The full scale total was also included.

The researcher used the two-tailed t-test in order to determine if there were any significant differences in the mean response with respect to the AA, SA, PEA, GCIA experiences of participants versus non-participants, as well as any differences by race or gender. The two-

tailed t-test assisted the researcher in assessing whether the means of the populations were statistically different from one another.

Two assumptions had to be verified prior to running a two-tailed t-test. The first assumption was that both groups would have a normal distribution. One way of checking for normality was by running a Normal Probability Plot for each group, which confirmed whether the data was normally distributed. If the data were not normal or turned out to be questionable, a Mann-Whitney Test would be conducted. The second assumption was that the variance of the outcome variable would be the same for both groups. The statistical package selected for this study checked the equality of variance within the t-test procedure. Also, the researcher used two-tailed t-test to examine whether mean scores differs when the population was analyzed by race, gender, and fall term college grade point average.

SBI

The SBI was developed to explore the academic, social, personal-emotional and goal commitment and institutional adjustment of participants in a SBP. The researcher analyzed the data by race and gender. The data was analyzed using SPSS 16.0, JMP, NUD*IST and content analysis. For the quantitative portion of the SBI, the researcher examined the differences in academic, social, personal-emotional and goal commitment and institutional adjustment of the participants based on race and gender. The researcher used simple descriptive statistics to analyze the majority of the data for the SBI. The rankings and mean scores were reported for all scales and subscales, after which the data were arranged into appropriate groupings. Estimates of internal consistency were done to demonstrate reliability. The mean scores, standard deviation, confidence intervals and levels were calculated and reported. Chi-square statistics was used to establish if there were significant differences in the mean responses ($p < .05$). To further

investigate, the researcher conducted One-way Analysis of Variance (ANOVA). The Tukey-Kramer HSD test was used to assess differences among the means, as well as to control for Type I error.

For the qualitative portion of the SBI, the researcher asked the participants whether the SBP activities assisted them in their overall academic, social, personal-emotional and goal commitment and institutional adjustment in their first term in college. Moreover, the researcher asked general questions to examine strengths and weakness of the program. The responses from the focus groups and interview were coded and sorted in appropriate tables based on Patton (2002). The frequencies of the codes were reported (see Tables 4.45 through 4.55 in Appendix P). Content analysis and NUD*IST were used to interpret the data. In sum, the various methods utilized for the SBI were considered adequate to tackle the research questions.

Researcher's Stance

For the second phase of the study, the researcher has to reflect on his own role since he was the primary instrument for this phase. Lincoln and Guba (1985) indicated that the best instrument is the researcher, since he or she is able to create a non-human instrument that can be adjusted to the realties that come up in focus groups and interviews. Nonetheless, since the researcher had been personally involved in the SBP for about six years working with over 300 students, it was vital to identify and acknowledge any personal beliefs or biases. For example, since the aim of this study was to investigate adjustment issues for first-year engineering students in a summer bridge program, the researcher would have a natural tendency to assume that the program was doing its job—evidenced by participants of the SBP stating that they considered themselves to be adjusting well. Thus, the researcher had to be sure to interpret responses

dispassionately. Nonetheless, it was gratifying to be receiving data from both the focus groups and the interview in order to make suggestions and changes to assist future students.

Moreover, since the researcher was the moderator for the focus group and interview, his role may have had an effect on the responses given by the Summer Bridge Participants and the director for support programs. This was necessary, however, due to the lack of resources to train another person.

In summary, the results of this investigation could have been biased due to the participation of the PI of this study. The interviewees might have been reluctant to criticize the SBP, which may have limited suggestions on how to improve the various parts of the program and hinder an in-depth understanding of salient adjustment issues. However, the researcher tried to reduce this effect as much as possible in every interaction with study participants.

CHAPTER FOUR: RESULTS OF STUDY

Introduction

This chapter describes and interprets the data collected from a phased research study designed to investigate the academic, social, goal commitment/institutional adjustment and personal-emotional adjustment of participants versus non-participants in a SBP for engineering students. Analyses also examined differences related to race, gender, and GPA. Finally, the various SBP activities were ranked ordered by the participants in terms of relative importance to their adjustment preparation for college.

Research Design

A mixed-methods research design that combined both quantitative and qualitative methods was used. As discussed earlier, the research was completed in two phases so that information from the first phase could inform the work completed in the second phase.

For the first phase, the researcher used the SACQ to collect the data. Specifically, the first portion of the study used quantitative measures to determine the adjustment of engineering students at a predominantly White institution (PWI) in the mid-southeastern region of the United States. This initial segment of the research also examined the data from the perspective of race and gender to facilitate data interpretation.

For the second phase of the study, the researcher developed the Summer Bridge Inventory (SBI) as a set of quantitative and qualitative procedures to explore in-depth the college adjustment of 42 engineering students who participated in the SBP. The *quantitative* portion of the SBI analyzed the activities in which the participants engaged during the summer and their perspectives on those activities. In addition, the researcher asked the program director to complete the SBI survey in order to ascertain the director's perspective of the activities. The

researcher utilized SACQ definitions to categorize the activities within subscales, and also examined the data from the point of view of race and gender. During the *qualitative* portion, the SBI measured the degree to which the summer bridge participants felt the summer bridge activities assisted them in their overall academic, social, personal emotional, and goal commitment and institutional adjustment during their first term of college. The researcher also interviewed the director of support programs to view her overall impressions on how the SBP activities supported the academic, social, personal emotional, and goal commitment and institutional adjustment of the participants in the SBP. The qualitative information was then transformed to a story format in order to create a narrative of the findings.

Quantitative Findings: Phase 1

Introduction

For the quantitative portion of the research study, the Student Adaptation to College Questionnaire (SACQ) was given to all students who had participated in the College of Engineering SBP in 2007 (n = 67), and a non-participating cohort (n=67) matched on similar characteristics to the participants. The student participants in the SBP were a very diverse group. As a result, it was a challenge to capture a cohort that had parallel academic and racial characteristics due to the low numbers of underrepresented students in the College of Engineering. The majority of the respondents were 18 years old (comprising 77.6% of the SBP participants and 79.1% of the non-participants, and most were Caucasian (52.2% of the SBP participants and 59.7% of the non-participants). Women were underrepresented, accounting for 40.3% of the SBP participants and 41.0 of the non-participants. Table 4.0 (see Appendix D) summarizes the demographic characteristics of the participants in this phase of the study. A total of 134 SACQ surveys were administered and analyzed. The SACQ data were used to answer the

first three research questions associated with this Phase 1 of the study. Grade point averages were used to answer research question four.

Research Question 1

1. How do participants versus non-participants in an engineering Summer Bridge Program rate their Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Adjustment (GCIA) during their first term of college?

To answer the first research question, the raw scores from each of the four sections of the SACQ were analyzed by participation. Normal probability plots were used to assess the normality assumption of the four sets of raw scores. The analysis revealed that the AA and PEA raw scores tended to follow a normal distribution (see Figures 4.1 and 4.2 in Appendix J). This result contrasted with the SA and GCIA raw scores in which the normality assumption was violated (see Figures 4.3 and 4.4 in Appendix J).

Results from these normal probability plots helped determine the appropriate test to use to detect significant differences in these raw scores by participation, gender, and race. Since the distributions of the AA and PEA raw scores were approximately normal, two-sample independent T-tests were conducted. However, as indicated above, the distribution of the SA and GCIA scores were not normally distributed. Therefore, Mann-Whitney nonparametric tests were conducted. Table 4.1 provides the test statistics and p-values for each of the two sample T-tests and Mann-Whitney tests conducted. This research detected that gender was important issue to examine in the data.

Table 4.*1*

Two-Sample T & Mann-Whitney Significance Tests on SACQ Raw Scores for Subscales

	Two-Sample T / Mann-Whitney Test Statistics		
	by participation	by gender	By race
AA	.274(.785)	-.288(.820)	1.043(.299)
PEA	.192(.848)	-2.008(.047)*	.059(.953)
SA	-1.647(.100)	-.197(.844)	-.646(.518)
GCIA	-.935(.350)	-.373(.709)	-1.485(.138)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Descriptive analyses were conducted to obtain medium, mean, and standard deviations for the AA, SA, PEA and GCIA scales and subscales. The scores were grouped on the following scale:

Low Adjustment: 1 through 3.49

Medium Adjustment: 3.5 though 6.49

High Adjustment: 6.5 though 9

These scores are based on a cut off system developed by the researcher. The researcher determined the total score for each scale and question. The total score was identified as low, medium, or high adjustment score. The low, medium, and high adjustment choices provide a range to demonstrate where the groups are maintaining on the scale or question.

The AA overall total mean scores for the summer participants was 7.01 (high adjustment) and 6.94 (high adjustment) for non-summer participants (see Table 4.2 in Appendix K), and mean scores for each question were very close. The highest rated question for both summer participants (mean score of 7.91-high adjustment) and non-participants (mean score of 8.45-high adjustment) was related to motivation: “Getting a college degree is very important to me.” The lowest rated question for summer participants was related to performance: “I am finding

academic work at college difficult" (3.79-medium adjustment). The non- participants also ranked this item as the lowest (3.39-medium adjustment).

The SA overall total mean scores for the summer participants was 6.97 (high adjustment) and 6.75 (high adjustment) for non-summer participants (see Table 4.3 in Appendix K). The mean scores for each question were also similar in this category. The highest rated question for participants related to other people: "I have some good friends or acquaintances at college with whom I can talk about any problems I may have" (7.67-high adjustment). The highest rated question for non-participants related to social environment: "I am pleased now about my decision to attend this college in particular" (8.16-high adjustment). The lowest rated question for summer participants related to other people: "I've had informal, personal contacts with college professors" (5.58-medium adjustment); the non- participants also ranked this item as the lowest (5.31-medium adjustment).

The PEA overall total mean scores for the summer participants was 6.11(medium adjustment) and 6.06 (medium adjustment) for non-participants (see Table 4.4 in Appendix K). The mean scores for each question were close. The highest rated question for participants was related to psychological: "I've given a lot of thought lately to whether I should ask for help from the Psychological/Counseling Services Center or from a psychotherapist outside of college" (7.45-high adjustment). This was also ranked the highest for non-participants (7.82-high adjustment). The lowest rated question for summer participants was related to physical: "I have felt tired much of the time lately" (4.31-medium adjustment). The non-participants also ranked this item as the lowest (4.48-medium adjustment).

The GCIA overall total mean scores for the summer participants was 7.26 (high adjustment) and 7.34 (high adjustment) for non-participants (see Table 4.5 in Appendix K). The

mean scores for each question were similar. The highest rated question for participants related to general: "Lately, I have been giving a lot of thought to dropping out of college altogether and for good" (7.85-high adjustment). The highest rated question for non-participants related to general: "I'm pleased now about my decision to go to college" (8.34-high adjustment). The lowest rated question for summer participants related to this college: "I'm pleased now about my decision to attend this college in particular" (7.12-high adjustment); the non-participants also ranked this item as the lowest (7.40-high adjustment). Tables 4.2, 4.3, 4.4, and 4.5 recap the scores on each subscale of the SACQ.

Research Question 2

2. Is there a significant difference in how the participants versus non-participants in an engineering Summer Bridge Program rate their Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) during their first term of college?

The analysis indicated that there were no statistically significant differences in raw scores by participation for the AA (T=.274, df=125.414, p=.785), SA (Z=1.647, p=.100), PEA (T=.192, df= 130.225, p=.848), and GCIA (T=-.935, p=.350). This research detected that participation was not an important.

Research Question 3

3. Do the Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Attachment (GCIA) experiences of participants versus non-participants differ by race or gender?

As shown in Table 4.6, there were statistically significant differences in the PEA raw scores by gender. Specifically, the results indicate that PEA raw scores for males were

considerably higher than females. However, there were no significant differences in the four sections by race.

As an extension of the research questions, the clusters for each subscale were analyzed. Table 4.6 reports the test statistics and p-values of the two-sample T-tests or Mann-Whitney tests conducted on the cluster raw scores by participation, gender, and race. The outcome from these tests revealed that the psychological cluster for PEA was significantly different by gender, i.e., the mean scores for males were notably higher than females. These low scores indicate that females are not transitioning well.

Table 4.6

Two-Sample T & Mann-Whitney Significance Tests on SACQ Raw Scores for Subscales and Clusters

	Two-Sample T / Mann-Whitney Test Statistics		
	by participation	by gender	By race
AA	.274(.785)	-.288(.820)	1.043(.299)
Motivation	-.203(.839)	.633(.528)	1.620(.109)
Application	-1.612(.109)	.692(.490)	1.121(.264)
Performance	1.398(.164)	-1.412(.160)	.054(.957)
Academic Environment	.191(.849)	.142(.887)	.805(.422)
PEA	.192(.848)	-2.008(.047)*	.059(.953)
Psychological	-.170(.865)	-2.045(.043)*	.056(.956)
Physical	.715(.476)	1.675(.096)	-.224(.823)

Table 4.6, Con't

	Two-Sample T / Mann-Whitney Test Statistics		
	by participation	by gender	By race
SA	-1.647(.100)	-.197(.844)	-.646(.518)
General	-1.819(.069)	-.736(.462)	-.478(.633)
Other People	-1.294(.196)	-1.146(.252)	-.466(.641)
Nostalgia	-1.245(.213)	-.735(.462)	-.389(.697)
Social Environment	-.309(.757)	-.337(.736)	-.255(.799)
GCIA	-.935(.350)	-.373(.709)	-1.485(.138)
General	-.184(.854)	-.844(-.398)	-1.263(.207)
This College	-.021(.983)	-.170(.865)	-1.539(.124)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Research Question 4

4. Is there a significant difference in participants versus non-participants in fall term college grade point average (GPA) with respect to retention after their first year in the college of engineering and the institution?

This research question required analyzing the first term grade point average and the retention of participants versus non-participants.

Recall that 134 students participated in the initial study in the fall of 2007. Of this number, 73 (54%) students earned a 3.0 GPA or above, while 61 students (45%) did not. Regarding retention numbers, 125 students (93%) returned for their second year of college, while 9 (7%) did not. Moreover, 117 students (87%) remained in the College of Engineering, while 17 (13%) did not.

Two-sample T test was used to determine if a significant difference existed in retention based upon participation. The researcher also examined retention based on race and gender. The Two-Sample T-test analysis revealed no significant relationship between first term grade point average and retention when compared to participation, gender, and race (see Table 4.7). It basically means there is no statistical evidence that there is a difference.

Table 4.7

Two-Sample T-Test on Fall Term GPA, College Engineering and Institutional Enrollment

	Two-Sample T		
	by participation	by gender	By race
Fall Term GPA	-.387(.699)	-1.928(.056)	-.892(.374)
Still enroll in College of Engineering after 1st year	1.826(.070)	1.180(.240)	-.536(.593)
Still enrolled in the Institution after 1st year	1.032(.304)	-.065(.949)	-.912(.363)

P-values are in parentheses.

Quantitative Findings Phase 2

Research Question 5

In the second phase of the research, the researcher analyzed the following question:

What were the benefits and difficulties with participating in Summer Bridge Program according to participants and the director of engineering support programs?

The researcher developed the Summer Bridge Inventory (SBI) (see Appendix E) in order to ascertain the most and least beneficial aspects of the SBP. The SBI has 4 scales as well as 12 subscales. These 4 scales and 12 subscales were designed to capture various facets of the

summer bridge activities related to SACQ elements. The SBI has a section for ranking the activities and the 4 scales.

To understand the beneficial aspects of the SBP, the researcher examined 29 activities associated with the program. The 29 items measured by the SBI were not expected to be reliable variables. An initial review of all response sheets was conducted to ensure that the participants took the tasks seriously and entered response that indicated a serious approach to the task. A Cronbach's Alpha was conducted with each subscale for further evidence of reliability (see Table 4.8). The researcher calculated estimates of internal consistency to demonstrate that the variables were reliable. Table 4.8 presents alpha coefficients for the first version of the SBI subscales. However, the estimates of internal consistency demonstrate that the variables for each subscale were reliable based on Cronbach's Alpha.

Table 4.8

Cronbach's Alpha for Summer Bridge Inventory Subscales

SBI Academic Adjustment	.95
SBI Academic Motivation	.88
SBI Academic Application	.81
SBI Academic Performance	.90
SBI Academic Environment	.89
SBI Social Adjustment	.95
SBI Social General	.88
SBI Social Other People	.85
SBI Social Nostalgia	.93
SBI Social Environment	.80
SBI Personal-Emotional Adjustment	.96
SBI Personal Psychological	.92
SBI Personal Psychical	.94
SBI Goal Commitment/Institutional Adjustment	.94
SBI General Other	.91
SBI General This College	.89

Demographic Characteristics of the SBI Participants

There were a total of 67 students that participated in SBP. Forty-two participants (62%) completed the SBI for this portion of the study. There were 22 males (52%) and 20 females (47%) who ranked the various activities in the SBI. The participants were also required to define their racial background, according to majority or minority. Twenty-seven participants (64%) ranked themselves as Caucasian; while the remaining 15 minority participants (36%) were comprised of 2 Asian and Pacific Islanders (5%), 10 African Americans (24%), and 3 Hispanics (7%).

SBI Analysis Overview

Chi-square statistics were used to examine whether distributions of categorical variables differed from one another. Tables 4.11 through 4.24 (see Appendix L) list the p values for the likelihood ratio Chi-square and Chi-square Pearson for the categorical variables (race and gender). First, likelihood Ratio Chi-square tests were calculated as twice the difference of the log-likelihoods between the full model and the model constrained by the hypothesis to be tested (the model without the effect) (Hinkle, Wiersma, & Jurs, 1998). Afterwards, the Chi-Square tested the hypothesis that the response rates were the same in each sample category. This is typically calculated by summing the squares of the differences between observed and expected cell counts. The Chi-square exploits the fact that frequency counts tend toward a normal distribution in very large samples (Hinkle, Wiersma, & Jurs).

Chi-square analysis demonstrated that race and gender rankings were significant for particular summer bridge activities. The cluster application for SBI AA (see Table 4.11 in Appendix L) revealed that some of the summer bridge activities were positive by race and gender. Race was grouped as majority (White and Asian) and minority (African American and Hispanic). Gender was grouped as male and female. Individual and group picture, chemistry class, engineering class, math class, campus tour, seminar sponsored by Fortune 500 Company, and on-line survey were significant for race by majority (White and Asian). White and Asian students enjoyed these activities. The etiquette dinner was the only summer bridge activity positive for gender by males. Male students enjoyed these activities.

The cluster motivation for SBI Academic (see Table 4.12 in Appendix L) revealed that rankings for some of the summer bridge activities were positively different by race and gender. Individual and group picture, skating, lab tours and on-line survey were positive for race by majority (White and Asian). White and Asian students enjoyed these activities. The floor

meeting was the only summer bridge activity positive for gender by females. Female students enjoyed the activities.

The cluster academic environment for SBI AA (see Table 4.13 in Appendix L) revealed that rankings for two summer bridge activities as positively different. The chemistry lab class was the only summer bridge activity positive for race by majority (White and Asian). White and Asian students enjoyed this activity. Registration and class sign up/information for fall term was positive for gender by females. Female students enjoyed these activities.

The cluster performance for SBI AA (see Table 4.14 in Appendix L) revealed that ranking for one summer bridge activity is positively different. The on-line survey was significant race by majority (White and Asian). White and Asian student enjoyed this activity. Gender had no significance.

The cluster social environment for SBI SA (see Table 4.15 in Appendix L) revealed that rankings for two of the summer bridge activities were positively different by race and gender. The university freshmen orientation was significant by race by majority (White and Asian). White and Asian students enjoyed this activity. The move-out meeting was positive by gender for females. Female students enjoyed this activity.

The cluster general for SBI SA (see Table 4.16 in Appendix L) revealed that rankings for some of the summer bridge activities were positively different by race and gender. The 4th of July cookout and university freshmen orientation were positive for race by majority (White and Asian). White and Asian students enjoyed this activity. The introduction meeting and student panel was positive by females. Female students enjoyed these activities.

The cluster nostalgia for SBI SA (see Table 4.17 in Appendix L) revealed that rankings for some of the summer bridge activities were positively different by race and gender. The floor meeting, Friday seminars, and trip to the mall were positive by race for majority (White and

Asian). White and Asian students enjoyed these activities. The campus tour was positive by gender for females. Female students enjoyed this activity.

The cluster other people for SBI SA (see Table 4.18 in Appendix L) revealed that rankings for one of the summer bridge activities were positively different by majority. This activity was move-out meeting for race by majority (White and Asian). White and Asian students enjoyed this activity. Gender did not have activities that were significant.

The cluster psychological for SBI PEA (see Table 4.20 in Appendix L) revealed that rankings for two of the summer bridge activities were positively different by race and gender. Updating resumes was significant by majority (White and Asian). White and Asian students enjoyed these activities. The 4th of July cookout was significant gender by females. Female students enjoyed this activity. The researcher did not find any of the activities to be positive for the cluster physical (see Table 4.19 in Appendix L).

The cluster general and this college for SBI GCIA (see Table 4.21 and 4.22 in Appendix L) revealed that rankings for three summer bridge activities were positively different by gender. For general, the university freshmen orientation was positive by majority (White and Asian). White and Asian students enjoyed this activity. The researcher did not find any of the activities to be positive for gender. For this college, university freshmen orientation was positive by race by majority (White and Asian). White and Asian student enjoyed this activity. The researcher did not find any of the activities to be positive for gender.

The researcher did not find race and gender to be positively different for the ranking scale for summer bridge activities. However, there was positive difference in race and gender when examining the dominate subscales for each summer bridge activity. There were four summer bridge activities that were positive. The orientation meetings with Associate Dean of Engineering and Friday seminar were positive by majority (White and Asian). White and Asian

students enjoyed these activities. The individual/group pictures and floor meeting were significant gender by males. Male students enjoyed these activities.

The participants ranked and categorized each of the 29 SBI activities. As depicted in Table 4.25 (see Appendix M), the rankings revealed that the four courses taught during the SBP (engineering (25.40), math (22.93), chemistry lab (22.21), and chemistry (22.00) were ranked most highly by the students, while the four bottom activities (seminar sponsored by a Fortune 500 Company(7.48), Move-out (7.17), University Freshman Orientation (5.19), and On-line Survey (4.57)) were ranked the lowest. The results for categorizing the activities revealed that none of activities were equated with Goal Commitment/Institutional Adjustment. Instead, many of the participants identified SBI activities as Social Adjustment activities (see Table 4.26).

The researcher was able to identify the activities in order of how they relate to students for each subscale. Tables 4.27 through 4.38 (see Appendix O) indicate the mean scores and standard deviation for all the activities for each subscale.

ANOVA for SBI

In order to better understand the SBI data, a one-way analysis of variance (ANOVA) was conducted to determine the correlation of the four types of scales (academic, social adjustment, personal emotional adjustment, and goal commitment/adjustment) on the 29 dependent variables, namely, the summer bridge activities. The ANOVA were significant, $F(3, 344)=7.07$, $p<.0001$. Table 4.37 shows the means, standard deviations and the confidence intervals on the dependent variables for the four scales.

Table 4.3*7*

Means, Standard Deviations, and Confidence Intervals on the Dependent Variables for the 4 Scales for the Summer Bridge Inventory Activities

Scales	M	SD	CI-Lower 95%	CI-Upper 95%
Academic	3.06	0.90	2.89	3.22
Social Adjustment	2.74	0.78	2.60	2.88
Personal Emotional Adjustment	3.17	0.73	2.98	3.37
Goal Commitment/Adjustment	2.67	0.59	2.51	2.82

Follow-up tests were conducted to evaluate pairwise differences among the means. The researcher chose not to assume that the variances were homogeneous; therefore, the researcher conducted post hoc comparisons using the Tukey-Kramer HSD test, which does not assume equal variances among the four scales. There was a positive difference in the means between the groups listed in the table below, along with the confidence limits for the pairwise differences as well as the p-value (see Table 4.38).

Table 4.38

Difference in Upper and Lower Confidence Limits on the Dependent Variables for the 4 Scales for the Summer Bridge Inventory Activities

Scales for Adjustment		Difference	CL Lower	CL Upper	P-value
Personal Emotional	Goal/Commitment	0.50	0.12	0.88	.0006*
Personal Emotional	Social	0.43	0.10	0.76	.0007*
Academic	Goal/Commitment	0.39	0.06	0.72	.0024*
Academic	Social	0.31	0.04	0.58	.0025*
Personal Emotional	Academic	0.11	-0.21	0.44	.3574
Social	Goal/Commitment	0.07	-0.25	0.40	.5848

*Scales were significantly different

Also, it is important to view the sum of squares. The sum of squares records the distance for each source of variation. The total sum squares was 229.80. The sum of squared distance from each point to its respective group mean was 216.46. There is the remaining unexplained error (residual) sum squares after fitting the analysis of variance model, which was 13.34.

Table 4.39 shows that the levels not connected by the same letter were significantly different. The researcher was able to use the levels to list the variables by letter to demonstrate the fitting of each group mean.

Table 4.39

Overall Levels and Mean Score for SBI Scales

Level			Mean
Personal Emotional	A		3.17
Academic	A		3.06
Social		B	2.70
Goal		B	2.67

A one-way analysis of variance (ANOVA) was conducted to evaluate the effects of 12 subscales on the 29 summer bridge activities. The means and standard deviations for the 12 subscales as a function of the 29 factors are presented in Table 4.40. The ANOVA indicated significance between the subscales and activities, $F(11, 336)=4.25$, $p=.001$. The positive values show pairs of means that are significantly different.

Table 4.40

Means, Standard Deviations, and Confidence Intervals on the Dependent Variables for the 12 Subscales for the Summer Bridge Inventory Activities

Level	Mean	SD	CI-Lower 95%	CI-Upper 95%
Academic Application	3.18	0.95	2.82	3.55
Academic Environment	2.96	0.77	2.66	3.25
Academic Motivation	2.75	0.80	2.45	3.06
Academic Performance	3.34	0.99	2.96	3.72
Goal Other	2.73	0.58	2.51	2.95
Goal This College	2.60	0.61	2.37	2.84
Personal Emotional	2.80	0.43	2.63	2.96
Personal Physical	3.55	0.78	3.25	3.85
Social Environment	2.73	0.67	2.47	2.98
Social General	2.69	0.87	2.35	3.02
Social Nostalgia	2.81	0.71	2.54	3.09

Level	Mean	SD	CI-Lower 95%	CI-Upper 95%
Social Other	2.71	0.89	2.37	3.05

The primary purpose of this analysis was to determine which subscales were significant for summer bridge activities. The follow-up tests consisted of all pairwise comparisons among the subscales. The Tukey-Karamer HSD procedure was use to control for Type I error across the pairwise comparisons (Hinkle, Wiersma, & Jurs, 1998).

The total sum squares was 229.80. The sum of squares distance from each point to its respective group means was 201.7. There was remaining unexplained error (residual) sum squares after fitting the analysis of variance mode, which was 20.09.

The results of this analysis indicated how many subscales were needed and which levels should be in each cluster. There was a significant difference between the following subscales listed in Table 4.41. Table 4.42 demonstrates the various levels. The levels that are not connected by the same letter are significantly different. The researcher was able to use the levels to list the variables by letter to demonstrate the fitting of each group mean.

Table 4.41

Difference in Upper and Lower Confidence Limits on the Dependent Variables

Level	Sub-Level	Difference	Lower CL	Upper CL	p-Value
Personal Physical	Goal This College	0.94	0.54	1.34	<.0001
Personal Physical	Social General	0.86	0.46	1.26	<.0001
Personal Physical	Social Other	0.84	0.44	1.24	<.0001
Personal Physical	Social Environment	0.82	0.42	1.22	<.0001
Personal Physical	Goal Other	0.82	0.42	1.22	<.0001
Personal Physical	Academic Motivation	0.79	0.39	1.19	0.0001
Personal Physical	Personal Emotional	0.75	0.35	1.15	0.0002
Personal Physical	Social Nostalgia	0.73	0.33	1.13	0.0003
Academic Performance	Goal This College	0.73	0.33	1.13	0.0003
Academic Performance	Social General	0.65	0.25	1.05	0.0014
Academic Performance	Social Other	0.63	0.23	1.03	0.0021
Academic Performance	Social Environment	0.61	0.21	1.01	0.0028
Academic Performance	Goal Other	0.61	0.21	1.01	0.0029
Personal Physical	Academic Environment	0.59	0.19	0.99	0.0038
Academic Performance	Academic Motivation	0.58	0.18	0.98	0.0043
Academic Application	Goal This College	0.58	0.18	0.98	0.0046
Academic Performance	Personal Emotional	0.54	0.14	0.94	0.0081
Academic Performance	Social Nostalgia	0.52	0.12	0.92	0.0102
Academic Application	Social General	0.49	0.09	0.89	0.0149
Academic Application	Social Other	0.47	0.07	0.87	0.0202
Academic Application	Social Environment	0.45	0.05	0.85	0.0255
Academic Application	Goal Other	0.45	0.05	0.85	0.0260
Academic Application	Academic Motivation	0.42	0.02	0.82	0.0355

Table 4.42

Levels and Mean Score for SBI Subscales

Level					Mean
Personal Physical	A				3.55
Academic Performance	A				3.34
Academic Application	A	B	C		3.18
Academic Environment		B	C	D	2.96
Social Nostalgia		B	C	D	2.81
Personal Emotional			C	D	2.80
Academic Motivation				D	2.75
Goal Other				D	2.73
Social Environment				D	2.73
Social Other				D	2.71
Social General				D	2.69
Goal This College				D	2.60

Qualitative Findings Phase 2

Introduction

For the second phase of the research, the researcher analyzed the following question:

What were the benefits and difficulties with participating in Summer Bridge Program according to participants and the director of engineering support programs?

This phase of the study also featured a qualitative investigation. Specifically, two focus groups were held with participants from the SBP to juxtapose their perception. An interview was also conducted with the director of engineering support programs. The researcher used a list of structured questions for the focus groups and the interview which is included in the SBI packet (see Appendix E). Both of these activities provided rich data about the SBI. In particular, the focus groups with the students allowed them to (1) describe how the summer bridge activities

assisted with their own adjustment, and (2) provide feedback on the activities in order to better serve future participants of the SBP with their adjustment processes.

This qualitative discussion includes direct quotes which capture each respondent's unique viewpoints and experiences. The narratives are presented in two segments. The first segment describes the groups of participants involved in the study and how the groups were formed. The second segment recaps group findings.

Demographic Characteristics of the Sample

The researcher developed the SBI focus group questions based on the SACQ subscales, after which volunteers were recruited to participate in the focus groups. Table 4.43 lists the 12 focus group participants and their pseudonym name, race, gender, college major and overall fall term grade point average.

Table 4.43

Focus Group Participants and Characteristics

Pseudonym	Race	Gender	College Major	Fall 2007 GPA
Carlos	African American	Male	General Engineering	3.53
Jerel	African American	Male	Aerospace Engineering	3.43
Taurius	African American	Male	Mechanical Engineering	3.04
Amy	African American	Female	Mechanical Engineering	2.22
Tim	Caucasian	Male	Materials Science Engineering	3.49
Mark	Caucasian	Male	Wood Science	2.28
Micah	Caucasian	Male	Computer Science	1.76
Martha	Caucasian	Female	Engineering Science Mechanics	3.74
Cori	Caucasian	Female	Mechanical Engineering	3.5
Lucy	Caucasian	Female	Mechanical Engineering	2.28
Yael	Hispanic	Female	Mechanical Engineering	3.48
Kim	Pacific Islander	Female	Electrical Engineering	3.58

Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling explaining the phenomena as comprehensively as possible, focusing on specific meanings (Patton, 2002). For this study, the researcher focus groups were a representative of the total population SBP. Two focus groups were held, each lasting 60 minutes. The researcher conducted the two focus groups in April 2008, and the interview with the director of support programs was conducted one month later. The researcher audio taped both focus group sessions, as well as the interview; both were later transcribed verbatim. The transcripts were sent to the participants to check for accuracy and make any needed corrections. The interview with the director of engineering support programs lasted for 30 minutes.

The two focus groups, which included a total of 12 participants, reached saturation. Patton (2002) states that saturation is when the researcher is no longer hearing or seeing new information from the data. This was confirmed by the fact that no new data emerged from the focus groups or interview; thus, the researcher determined that adequate data had been captured to account for all features of the observed phenomena (Patton, 2002). The duration of each focus group continued until the dialogue reached saturation. Replication confirmed and ensured understanding and wholeness of the study (Patton, 2002). The focus groups and the individual interview were audio taped and transcribed word for word, after which the participants were given an opportunity to review the transcripts to ensure accuracy and completeness. Any necessary corrections were made.

The researcher developed a method to organize group responses that would aid in capturing emerging themes and possible thematic saturation (Patton, 2002). The data were then examined using content analysis theory and coded accordingly. The researcher also sent the transcripts and group responses to an outside reader for parallel coding. The outside reader and researcher meet to discuss their initial coding and field notes. They began to finalize a coding scheme to identify any overarching themes within the data. It should be noted that the review of

the transcripts involved several important steps. First, the researcher made notes in the right and left margins of the all transcripts (focus groups and the interview with the director). The researcher compared notes in the margins to the emerging patterns discussed in the debriefing meetings with the outside reader. Second, the researcher listened to the audio tapes while reviewing the typed transcripts. The purpose was to examine and focus on the emerging patterns while listening attentively to the participants' insights, as well as the undertones that participants assigned to the specific terminology they used. Last, the researcher color-coded the transcripts using Excel 2007 in order to recognize the emerging themes. This methodology follows Patton (2002), who suggested that transcripts of this type should evaluated a number of times to ensure that the information contained therein is interpreted accurately.

The researcher also checked for consistency of the patterns. Content analysis and "Non-numerical, Unstructured Data Indexing, Searching and Theorizing" (NUD*IST) was used to analyze the information from the transcripts and debriefing sessions. Content analysis and NUD*IST are two techniques that researchers use to interpret qualitative data. In this study, content analysis was employed to code the participants' responses to their overall academic, social adjustment, personal emotional adjustment, and goal commitment/institutional adjustment during their first term of college. NUD*IST was then used to identify patterns from the coding, which also enabled the researcher to retrieve pertinent statements from the transcripts.

Thirty-six issues were identified from the data. These issues were clustered based on their commonalities. Patton (2002) recommended the constant comparative data analysis method for grouping items. The goal of this analytical method is to use common questions so that responses can be clustered in an organized way. This would allow a researcher to investigate issues from different perspectives. For this study, constant comparative data analysis was done in two phases. During the first phase, the researcher examined the data, which facilitated the identification of the following 7 recurring categories:

1. Independence vs. Dependence
2. Introduction
3. Learning Styles
4. Preparation
5. Skills and abilities
6. Motivation
7. Networking

The second phase involved coding classification. Patton (2002) asserted that "developing some manageable classification or coding scheme" is essential to analysis (pg. 463). The coding classifications and findings for the present study, which were developed from relevant literature reports, are organized according to the main domains of the SACQ (which are AA, SA, PEA and GCIA). The data was then grouped into the following comment categories: (1) comments about pre-college characteristics, (2) comments about involvement, and (3) comments about the benefits of a SBP. The actual codes and definitions are found in Table 4.44.

Table 4.44

Definition of Codes and Terms

Code or Term	Term Defined
Pre-college characteristics	This classification refers to students who are more independent and know how to use prior knowledge and relationships to transition to collegiate atmosphere.
Involvement	This classification refers to activities in the summer bridge program that challenge and motivate participants to learn for themselves and assist each other in realizing their goals, choices, and decisions.
Benefits of a Summer Bridge Program	This classification refers to participants' opinions on their overall experience and usefulness of the program during their first year of college
Independence vs. Dependence	The term independence means the direction of one's own affairs without intrusion. Dependence is being influenced and determined by something; the individual relies on someone to provide them assistance.
Introduction	This term means a dialogue which initiates or guides the way to the main subject.
Learning styles	This term means the individuals preference taking in and processing information in different ways.
Preparation	The term means the act of being geared up or made ready.
Motivation	This term means the driving force that initiates and direct behavior. It is the internal and external energy which drives a individual to do something.
Skills and Abilities	This term means the aptitude to identify and execute; proficiency; talents.
Networking	This term means the process of using one contact to gain others. This would allow the individual to create a system through alliances can be formed.

The researcher also identified a number of themes from the coding classifications. The first coding classification was "comments about pre-college characteristics." This classification refers to students who were more independent and knew how to use prior knowledge and relationships to transition to collegiate atmosphere. Some of the themes associated with this classification included independence versus dependence, introduction, learning styles and preparation. The second coding classification, "involvement," refers to activities in the SBP that challenged and motivated participants to learn for themselves and to assist each other in realizing their goals, choices, and decisions. Some of the involvement themes that participant mentioned were motivation, skills, and abilities. The final coding classification was "comments about the benefits of the SBP," which refers to participants' opinions on their overall experience and usefulness of the program during their first year of college. Some of the themes that emerged in this category were independence versus dependence, preparation, and networking.

Quotes from the transcripts and journal were used to explicate the themes. All coding classification and themes are presented in Tables 4.45 through 4.55 (see Appendix P). The quotes were categorized according to the four scales (academic, social, personal emotional adjustment and goal commitment/institutional adjustment) and by gender and/or race, as were the themes from the interview with the director. Gender was defined as male and female. Race was defined as majority and minority, majority is defined as Caucasians and Asians. The other races (i.e., African American and Hispanic) constituted the minority category. The responses for each theme were reported for the focus group participants based on race and gender. The column labeled Director signifies the data for the interview with the director of the summer programs.

For the phase of this study, the researcher discussed the most and least beneficial aspects of the SBP based on the participants and director of engineering support programs. Only the

data from the dominant themes is presented herein. This is not to take away from the importance of the other themes, but rather to provide a snapshot of the data.

Benefits of Participating in SBP

Academic Adjustment

Preparation means geared up and ready to face college challenges. Preparation was the most consistent theme expressed by the participants and the director with respect to the academic adjustment question—especially when examining pre-college characteristics comments. Kim, a female, minority student stated the following about preparation:

> It showed you how big attention to detail is cause like there is a lot of things that you probably knew that you probably studied back in high school but you forgot and when you went to take a test, it was on that test and really showed you that you had to go back and look at everything that you learned for you to be prepared for the test and things like that.

The Director stated the following about preparation:

> It gives them the opportunity to experience what it is like being a college student and see how they react to it. There's some students that recognize, "Oh wow, this is really hard. I need to study more." There's some students that, you know: "Oh wow, this is really hard, but this doesn't count. So I'll just blow it off. It's no big deal." There's some that don't think it's very hard at all.

Social Adjustment

Again, preparation was the most consistent theme expressed by the participants and the director with respect to the social adjustment question—especially when examining the comments about the benefits of the SBP. From a Caucasian male perspective, Tim indicated the following about preparation:

> I think we can all pretty much say that definitely being able to meet people and make friends and all that before we even started college has definitely helped cause you know you have a support group with you already when you are starting college, and you can only find small groups of those people who went to the same high school and are still friends and they usually room together, but definitely having people there who can help you is really nice, and it definitely helped me get more socially adjusted to college when I began, and also kind of how the [the summer bridge program] pretty much forced us to go into the [theme housing programs].

The Director stated the following about preparation:

> I see some of the same type of bonding that goes on between the African-American students and between the Hispanic students amongst themselves; they also are forming bonds with (fairly strong bonds, I think) with some of the majority students, which I think is a really good thing.

Personal Emotional Adjustment

Networking was the most consistent theme expressed by the participants and the director with respect to the personal emotional adjustment question—especially when examining comments about the benefits of the SBP. From the perspective of an African American male, Carlos stated the following about networking:

> Personally, like I didn't back in high school, I didn't have a lot of positive friends. And coming to [the summer bridge program], they showed me that there were positive people out there, and I realize when you are around positive people you tend to be more positive. You are a product of your environment. I think without [the summer bridge program], I might have gravitated toward the wrong type of people or the wrong crowd when I got here to college, and that is what I got out of it personally.

The Director stated the following about networking:

> They learned a lot about themselves in terms of what they like, what they don't like, what they're capable of doing… I think that it gives them confidence from the standpoint of they know where everything is around here. It gives them a really strong Virginia Tech

> faculty/staff connection with people in the [the summer bridge program] office, with the faculty with the program, the staff, the advisors.

Goal Commitment and Institutional Adjustment

Motivation was the most consistent theme expressed by the participants and the director with respect to the goal commitment and institutional adjustment question—especially when examining the comments about involvement. From the perspective of an African American male, Carlos stated the following about motivation:

> Before [the summer bridge program], I didn't have any set goals, I didn't study, I didn't do anything. That is the aspect of it, like any ratio, it was like a slap in the face, like you better get on your aim because without [the summer bridge program], I probably would have been on academic probation or something like that and it turned out I feel like because of [the summer bridge program] and because of other programs like [engineering theme housing], it is the reason why I made the Dean's list and things like that.

The Director stated the following about motivation:

> We have five kids who just blew this whole thing off [summer bridge program]. How did they do during the fall term? And maybe even be able to present that data to the [incoming summer bridge] students and say, "This is what happened two years ago. They were the students in [the summer bridge program]: [this group] got really good grades, the ones that got mediocre grades, and the ones that didn't do well at all. Here's what happened to the ones that didn't do well at all in the program. Where do you want to end up? And you have your choice of where you end up; you control where you end up.

Difficulties with Participating in SBP

Student's skills and abilities was the most consistent theme expressed by the participants and the director with respect to difficulties—especially when examining the comments about involvement. From the perspective of an African American male, Tarius stated the following about skills and abilities:

> I go along with what Amy says about the learning environment [in the summer bridge program]. Every time you have a question and you want them to slow down because they were so far ahead of where I was because I had to take Calculus later, and then when you have to take tests and this is your first time seeing them, and they have been taking years of it, it messes up the grade curve. I did well, but everybody who did it for the first time did just either average or below average.

The Director stated the following about skills and abilities:

> I think we do need to begin providing some opportunities for college success strategies. I'll call them that, just in general. And more purposeful scheduled opportunities beyond… cause I told them all. If you want to know about this stuff just come to my office. I'll tell you. No one has showed up. No one has asked me. I've talked to them about counseling information; it's in my office… But maybe they need more purposeful guidance, still optional, not required. Because they still have to make that choice; they still have to make that purposeful decision, "I'm going to try and be a better student." Because if they don't make that decision, nothing you can do can help.

Summary

In summary, Phase 1 of this study was quantitative in nature and the researcher examined the academic, social, goal, commitment/institutional adjustment of personal-emotional adjustment of participants versus non-participants in a SBP for engineering students at R1 PWI in the mid-southeastern region of the United States. The data analysis for sex was significant for the Personal-Emotional Adjustment (PEA) subscale. Specifically, PEA cluster psychological was significant for Research Question 3. The mean scores for males were significantly higher than for females. However, the data analysis revealed there was no significant difference for the other research questions.

The second phase of this study was a mixed method. For the second phase in quantitative findings, the researcher found that race and gender was significant for some of the summer bridge activities (see Table 5.1a and 5.1b). The participants ranked the four summer bridge

courses as the highest. In addition, the data revealed that majority of the activities were considered social and none of the activities equated with Goals Commitment/Institutional Adjustment.

For the qualitative component, the researcher was able to gather in-depth data on the experiences of 12 participants to demonstrate how the items interrelate according to the conceptual framework (see Figure 1). The focus groups and interview was coded and then organized into tables to be compared by the director of the summer support programs and participants then sorted by race and gender. The researcher indicated that among director of the SBP and participants similarities. Race and gender had many similarities and difference with the participants based on the tables. The findings revealed that the results of the study, as well as implications of the findings for future practice, policy, and research are discussed in Chapter Five.

CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

Introduction

The purpose of this mixed-methods study was to investigate the academic, social, personal-emotional, and goal commitment/institutional adjustment of participants versus non-participants in a Summer Bridge Program for engineering students at an R1 predominantly White institution (R1 PWI). This concluding chapter has six primary purposes. First, this chapter will discuss the study's findings. Second, this chapter will address how the current findings relate to prior research. Third, the researcher will discuss a number of conclusions. Fourth, the limitations of this research will be discussed, as well as areas for future research. Fifth, the implications for future practice, research, and policy will be investigated. Last, the researcher will offer some reflections.

Discussion of Findings

This research study was conducted in two phases. For the first phase of the investigation, the researcher examined the four research questions. For research Questions One through Three, the researcher analyzed the responses to the Student Adaptation to College Questionnaire (SACQ) among participants and non-participants, which required them to respond to 67 questions. Specifically, the participants had to rank their responses on a scale from 1 ("doesn't apply to me at all") to 9 ("applies very closely to me"). Students were also asked to provide their subjective replies based on their feelings at the time they took the survey. The scores were grouped on the following scale:

Low Adjustment:	1 through 3.49
Medium Adjustment:	3.5 though 6.49
High Adjustment:	6.5 though 9

The total score was identified as low, medium, or high adjustment score. The low, medium, and high adjustment choices provide a range to demonstrate where the groups are maintaining on the scale or question. Also, the second research question studied if there is a significant difference in how participants and non participants adjust based on SACQ scores. Moreover, do the SACQ scores differ by race and gender?

Three research questions were used to investigate how participants and non-participants rated their experiences. The experiences of each group were rated using four subscales of the SACQ to understand their adjustment. The four subscales are Academic Adjustment (AA), Social Adjustment (SA), Personal-Emotional Adjustment (PEA), and Goal Commitment/Institutional Adjustment (GCIA).

Overall, the participants in the SBP ranked GCIA as the highest adjustment scale, with a total mean score of 7.26 out of 9 on the SACQ. The SBP students indicated more dedication to his/her educational goals and connection to the institution The non-participants also ranked GCIA as the highest scale, with a similar total mean score of 7.34 out of 9. The second highest ranked total mean scale corresponded to AA for both participants (7.01 out of 9) and non-participants (6.94 out of 9). The third highest ranked total mean scale was SA for both participants (6.97 out of 9) and non-participants (6.75 out of 9), while the lowest ranked total mean scores scale was for PEA for both participants (6.11 out of 9) and non-participants (6.06 out of 9). As indicated in the scale above, the lowest ranking total mean score still falls within the "medium adjustment" range. This demonstrates that SBP was moderately effective.

In terms of how these scores can be interpreted, it is important to note that the groups (participants and non-participants) had very similar scores. For example, the GCIA total mean score was ranked the highest for both groups, indicating that both participants and non-participants expressed a strong connection to higher education. The results revealed that the both groups were trying to stay in college, and were balancing the idea of fitting into the college

environment and meeting other people. This research also indicated that college students tend to disregard their physical and emotional well being when they attend college. These students may not be aware of the various resources offered by on-campus wellness and counseling centers. It is vital that students be made aware and avail themselves of these opportunities in order to help them deal with any psychological and physical roadblocks then encounter in college.

Using SACQ scores, the researcher examined research Questions Two and Three in order to ascertain if the participants' and non-participants' adjustment experiences differed by participation, race, and gender. With respect to differences in the adjustment experiences of students by participation and race, no significant differences were identified since the mean scores for both groups were so similar. There were no significant difference in adjustment experiences by participation and race for any of the subscales. However, the researcher did find significant differences by gender, which revealed that female scores were slightly lower than the male scores. There were also significant differences in PEA adjustment for the psychological subscale with respect to gender.

The PEA subscale was designed to examine a student's sense of psychological and psychical well being. As this investigation revealed, the psychological subscale was significant for gender in that it indicated that females would be more likely experience personal and emotional adjustment issues than males. This finding supports literature reports (Astin & Sax, 1996; Seymour & Hewitt, 1997) indicating that a disproportionate number of women in engineering fields described obstacles to entering the field. Moreover, as reported by Seymour and Hewitt, issues relating to low self-worth and self-esteem are interrelated factors that contribute to the career choices that women make. Huang and Brainard (2001) later postulated that the higher the level of self-esteem, the more likely the individual is to persist and achieve academically in engineering.

Research Question Four focused on whether there was a significant difference in the academic performance of participants versus non-participants as measured by fall term college GPA. College of Engineering retention rates were also compared to university-wide retention rates. According to our findings, there were no significant differences in the grades earned by participants versus non-participants; both groups earned approximately the same grade point average. In addition, first-year College of Engineering retention rates were comparable to overall institutional retention rates; no significant differences were noted.

For the second phase of the investigation, the researcher examined one research question using a mixed method approach. Research Question Five required participants to identify the most and least beneficial aspects of the SBP. For the first portion of Phase II of this study, the researcher created the Summer Bridge Inventory (SBI) survey using the SACQ as a framework for examining the summer bridge activities.

The Summer Bridge Inventory (SBI) was developed in order to ascertain the most and least beneficial aspects of the SBP. The SBI has 4 scales as well as 12 subscales. These 4 scales and 12 subscales were designed to capture various facets of the summer bridge activities related to SACQ elements. The SBI has a section for ranking the activities and the 4 scales. The respondents for this study had to rate 29 summer bridge activities. The participants were to identify their responses based on a scale from 1 ("does not relate at all") to 5 ("relates well"). Students were asked to provide their subjective replies based on their feelings at the time they took the survey. This SBI results were analyzed for any possible race/gender differences.

The scores ranged from high ("relates well") to low ("does not relate well"). The scores were grouped on the following scale:

Low—does not relate at all	1 through 2.49
Medium—neutral	2.5 through 3.49

High—relates well 3.5 to 5

The respondents' experiences were rated using four subscales on the SBI. (Note: The quantitative data for the director was not reported in this research study because the research consultants indicated the data of the students could not be compared.) These four subscales were SBI Academic Adjustment (SBI-AA), SBI Social Adjustment (SBI-SA), SBI Personal-Emotional Adjustment (SBI-PEA), and SBI Goal Commitment/Institutional Adjustment (SBI-GCIA) were aligned with SACQ instrument. The researcher examined the clusters to better understand the implications of the participant responses.

For the SBI academic subscales, the higher the score for the activity the more it relates to the students and the lower the scores the activity did not relate to the students. The SBI-AA subscale contained four clusters. When examining the mean ranges of the summer bridge activities by cluster, several commonalities were noted. The "motivation" cluster scores ranged from 4.64 to 2.05 (see Table 4.27 in Appendix O). The "application" cluster scores ranged from 4.64 to 1.59 (see Table 4.28 in Appendix O). The "performance" cluster scores ranged from 4.66 to 1.39 (see Table 4.29). And the final cluster scores pertaining to "academic environment" ranged from 4.48 to 1.64 (see Table 4.30). The various summer bridge activities—in this case, classes—that related highly on these clusters were the following: chemistry class, chemistry lab class, engineering class, and math class in all SBI academic subscales.

For the SBI social subscales, the higher the score for the activity the more it relates to the students and the lower the scores the activity did not relate to the students. The SBI-SA subscale also contained four clusters. When examining the mean range scores of the summer bridge activities by cluster, a number of commonalities were noted. The "general" cluster scores ranged from 4.93 to 1.49 (see Table 4.39 in Appendix O). Scores for the second cluster, "other people," ranged from 4.81 to 1.48 (see Table 4.40 in Appendix O). The third cluster was "nostalgia" with a corresponding range of from 4.48 to 1.71 (see Table 4.41 in Appendix O). The final cluster

pertained to “social environment;” its scores ranged from 4.38 to 1.86 (see Table 4.42 in Appendix O). The following summer bridge activities related highly on these clusters: Fourth of July cookout, bowling, skating, ropes course, etiquette dinner, and the trip to the mall.

Unlike the former two clusters, the SBI-PEA subscale contained only two clusters: “psychological” and “physical.” For the SBI PEA subscales, the higher the score for the activity the more it relates to the students and the lower the scores the activity did not relate to the students. As before, several commonalities were observed when examining the mean range scores of the summer bridge activities by cluster. The psychological cluster scores ranged from 4.10 to 2.48 (see Table 4.43 in Appendix O), while the physical cluster scores ranged from 4.17 to 1.52 (see Table 4.44 in Appendix O). The summer bridge activities that related highly on these clusters were the Fourth of July cookout, bowling, skating, and ropes course.

The SBI-GCIA subscale also contained two clusters: “other” and “college.” A number of commonalities were recorded with respect to the mean range scores for the summer bridge activities by cluster. The other cluster scores ranged is 4.24 to 1.81 (see Table 4.45), while the college cluster scores ranged from 4.51 to 2.02 (see Table 4.46). The summer bridge activities that related highly on these clusters encompassed the following courses and activities: engineering class, chemistry class, math class, chemistry lab class, Fourth of July cookout, registration, id pickup, and campus tour. The participants also had to rank the activities from highest to lowest (29 to 1). As shown in Table 4.25, the rankings ranged from 25.40 to 4.57. In order of importance, the top six activities were the following: (1) engineering class, (2) math class, (3) chemistry lab class, (4) chemistry class, (5) registration, and (6) ropes course.

Also important to this study was whether the distributions of the categorical variables for the various summer bridge activities differed from one another. Chi square analysis confirmed that race and gender were significant for particular summer bridge activities. Specifically, there were a total of 23 activities that were significant for race and gender, with the following four

common activities showing the greatest significance: campus tour, Fourth of July cookout, university freshman orientation, and individual/group pictures. The personal-emotional subscale "physical" did not indicate any of the summer activities to be significant. Table 5.1 illustrates a quick snapshot of the data.

Table 5.1a

SBI Activities that were Significantly Positive Based on Race

Summer Bridge Inventory Scales and Clusters	Summer Bridge Inventory Activities	Race Black & Hispanic	Race White & Asian
Academic			
Application	Individual and Group Picture		X
	Chemistry Class		X
	Engineering Class		X
	Math Class		X
	Campus Tour		X
	Seminar by Fortune 500 Company		X
	On-line Survey		X
Motivation	Individual and Group Picture		X
	Skating		X
	Lab Tours		X
	On-line Survey		
Environment	Chemistry Lab Class		X
Performance	On-line Survey		X
Social			
Environment	University Freshmen Orientation		X
General	4th of July Cookout		X
	University Freshmen Orientation		X
Nostalgia	Floor Meeting		X
	Friday Seminars		X
	Trip to Mall		X
Other People	Move-out Meeting		X
Personal-Emotional			
Physical	-		-
Psychological	Updating Resumes		X

Goal Commitment/ Institutional Adjustment		
General	University Freshmen Orientation	X
This College	University Freshmen Orientation	X
Rank	-	

The table illustrates a quick snapshot of the activities that were significant on each scale for the SBI when examining race. The X denotes what was significant for race.

Table 5.1b

SBI Activities that were Significantly Positive Based on Gender

Summer Bridge Inventory Scales and Clusters	Summer Bridge Inventory Activities	Gender Female	Male
Academic			
Application	Etiquette Dinner		X
Motivation	Floor Meeting	X	
Environment	Registration & Class Sign Up and information for fall term	X	
Performance	-		
Social			
Environment	Move-out Meeting	X	
General	Student Panel	X	
	Introduction Meeting	X	
Nostalgia	Campus Tour	X	
Other People	-		
Personal-Emotional			
Physical	-	-	
Psychological	4th of July Cookout		X
	Updating Resumes		X
Goal Commitment/Institutional			
General	-	-	
This College	-	-	
Rank	-	-	
Subscale Rank	Individual and Group Pictures		X
	Floor Meeting		X

The table illustrates a quick snapshot of the activities that were significant on each scale for the SBI when examining gender. The X denotes what was significant for gender.

ANOVA was completed and concluded that there was significance between the subscales and activities.

The researcher concluded Phase II of the study by examining research Question Five using a qualitative approach. The fifth and final research question asked participants (including the program director) to identify the most and least beneficial aspects of the SBP. The SBI survey used the SACQ as a framework to create a list of structured questions to examine the participants' and the director's responses.

The qualitative findings portrayed the respondents' unique viewpoints and experiences with respect to how the summer bridge activities assisted with their own adjustment. There were seven recurring themes, which have been broadly grouped into three comment categories: (1) pre-college characteristics, (2) involvement, and (3) benefits of the SBP. Based on the qualitative findings, a number of conclusions are suggested, which have been organized into the following six sections that offer triangulation of the SACQ and SBI: (1) Academic Adjustment, (2) Social Adjustment, (3) Personal-Emotional Adjustment, (4) Goal Commitment/Institutional Adjustment, (5) Weakness of the Summer Bridge Program, and (6) Strengths of the Summer Bridge Program. It should be stressed that since this research focused on participants in a SBP at an R1 PWI, the results discussed herein should not be generalized to other college student populations, majors, or other institutions of higher learning.

Academic Adjustment (AA)

For AA, the dominant theme was preparation, which in this context refers to the act of being made ready (The Oxford Dictionary). The comments made by the participants and the director were important for assessing this subscale. The student participants indicated that the program helped them adjust academically. Paying attention to detail, relearning information, getting used to college lectures, note-taking, and interacting with faculty were some of the

student comments that pertained to this subscale. In addition, the director stated that the program provided the students with opportunities to learn and experience college life, as well as gain some necessary skills such as time management that would help them improve as students.

Social Adjustment (SA)

The dominant theme for this subscale was also preparation. Both the director and the participants agreed that SBP activities enhanced social adjustment. Specifically, making friends, meeting a variety of people, creating support groups, and their introduction to other networks (e.g., through theme housing) were discussed by the students as ways by which they became better prepared socially in advance of their freshman term. The director stated similar comments, adding that the students created strong social bonds, and learned to adjust with individuals of different social and ethnic backgrounds.

Personal-Emotional Adjustment (PEA)

For this subscale, the dominant theme was networking, which refers to the process or practice of building up or maintaining informal relationships, especially with people whose friendships could bring advantages (The Oxford Dictionary, 1989). In other words, networking enables individuals to create systems through which alliances can be formed. Both the students and the director indicated that the program helped them (the students) adjust personally and emotionally. The students stated that meeting people and making good friends were significant for PEA. In addition, the director noted the student adjust personally and emotionally because of the duration the program enabled them to connect with faculty, staff, and others in ways that were likely to endure beyond the close of the SBP.

Goal Commitment/Institutional Adjustment (GCIA)

The dominant theme for the GCIA subscale was motivation. Motivation refers to the driving force that initiates and direct behavior (The Oxford Dictionary, 1989). It has also been defined as the internal and external energy that drives an individual to do something in order to establish and achieve an objective. Both the students and director indicated that the program assisted in goal commitment/institutional adjustment. Setting goals, defining purpose, accomplishing goals, and clarifying what they wanted out of an engineering program were some the comments made by the students that pertained to this subscale. The director discussed how the students would have to learn how to control their academic and social situations, since there are so many potential choices to make while in college.

Difficulties with Participating Summer Bridge Program

The dominant theme associated with difficulties proved to be students' skills and abilities for minorities and women, which generally refers to the inherent or learned aptitude needed to identify and execute tasks in a proficient manner (The Oxford Dictionary, 1989). With respect to the structure of the SBP, the students stated that although they thought the structure was beneficial and helped them to achieve program goals while they were in the program, it was difficult to implement the summer bridge structure once they started the fall term. Specifically, the students found it more challenging to organize their day wisely and use good time management skills. They contrasted this with how the summer program faculty had helped them by taking the time to explain tasks and break down the academic information into more manageable chunks. This was not the case during the fall term for some of the courses. In fact, some of the participants did not believe they would have the skills and abilities to succeed. The director indicated that the program needed to provide more academic workshops to assist students with their skills and abilities. However, the director cautioned that too much hand-

holding could also be detrimental in that it would hinder students from learning how to make good decisions and being successful in college.

Benefits of Participating Summer Bridge Program

The dominant theme with respect to SBP strengths was preparation. Being "geared up" and ready to face challenges was discussed by both the students and the director as being important. The students mentioned how the ropes course assisted them in dealing with stress. Also, the SBP faculty, staff, and RAs were essential in helping the students adjust by answering their questions and helping them prepare for courses. The director indicated that the SBP facilitated a number of important opportunities for students to adjust to being on their own and developing self-discipline academically and socially.

Association of Findings to Previous Research

The results of this research support previous studies on the experiences of engineering students in SBPs. These include a number of reports (Astin, 1985; Pascarella & Terenzini, 2005; Pascarella & Terenzini, 1980; Tinto, 1987) that have shown that college students who adjust more easily to the social and academic rigors of college tend to do better in classes and experience higher levels of retention. A related study by Rita and Bacote (1997) showed that self-confidence and social/cultural adjustment of students increased after participating in a SBP. Thus, the findings of the present study support these earlier investigations.

Other literature reports associated with this study have also documented the various components that contribute to successful academic, social personal-emotional, and goal commitment/institutional adjustment for college students. For example, there are a number of studies that discussed the importance of academic performance, college readiness, close and supportive relationships, and a sense of belonging to community in helping students adjust to college (Brag, Kim, & Rubin, 2005; Maton, Hrabowski, & Schmitt, 2000; Robbins & Smith,

1993). These are aspects that were discussed by study participants, as well as the director of the SBP.

Conclusions

The results of research added to the body of research on the experiences of engineering students in SBPs. Overall, participants in the SBP indicated positive academic, social personal-emotional, goal commitment/institutional adjustment. This supports the notion of creating an environment in which students can engage and contribute something relevant and meaningful (Kuh, Schuh, Whitt, & Associates, 1991), as well as one in which they can engage in positive interactions with faculty and students (Pascarella & Terenzini, 1991). These results help to lay a solid foundation for SBPs that have undergone or are in the process of becoming more comprehensive programs for other types of college students—not just those enrolled in engineering curricula.

The results of this research also provides support for SBPs preparing students for engineering and the academic, social, personal-emotional, and goal commitment/institutional adjustment experiences they may encounter in the college environment. In addition, the quantitative findings for Phase I of this study indicate a need to further explore and enhance the personal-emotional adjustment of female undergraduate engineering majors. The quantitative findings associated with Phase II of this study indicate that more emphasis should be placed on summer bridge activities that focus on personal-emotional and goal commitment/institutional adjustment. The qualitative findings also show that race and gender are important issues to explore when examining the experiences of engineering students and their academic, social, personal-emotional, and goal commitment/institutional adjustment. The qualitative findings have further indicated that the views of the participants and the director were quite similar when

they discussed academic, social, personal-emotional, and goal commitment/institutional adjustment.

This research adds to the literature on academic, social, personal-emotional, and goal commitment/institutional adjustment and college engineering students. This conceptual model (see Figure 1) can be used to understand students' adjustment or withdraw issues. These findings can be utilized by a variety of educators and researchers who are interested in understanding the ways in which engineering students typically adjust in these four areas. The results can be utilized to help summer bridge managers and administrators to plan and implement programs and activities at their colleges or universities. As the world becomes more competitive with respect to global demands for expertise in science and technology, it is vital that U.S. institutions of higher learning create and support SBP efforts that will assist college students to adjust in more holistic ways so that they can complete their degree programs and join a competitive workforce.

Limitations

There were a number of noteworthy limitations to the study, largely associated with the way this investigation was structured and carried out. The primary limitation had to do with the fact that the population sample was limited to students at single R1 predominantly White institution (R1 PWI) who were participating in a college of engineering SBP. Thus, the population was restricted to that particular cohort. In addition, the culture of the particular university may have an effect on the findings. Findings might be different at a smaller private college, or another type of institution.

Second, the sample may have been biased towards students who were already involved in the SBP. Since these college students were already participating in the SBP, they may have been inherently more motivated to want to make a smoother transition from high school to college.

The third limitation was that participants in the sample consisted of students who had willingly replied to the invitation to contribute to the quantitative and qualitative portion of the SBI. It is possible, therefore, that the volunteers differed in some way from those who did not volunteer to participate. This may have resulted in the SBI data being skewed and may not have reflected a holistic picture of the SBP activities and perspectives.

Fourth, the researcher collected the data over a seven-month time period. However, it is known that adjustment to college is a time-sensitive issue, and that the developers of the SACQ recommended that results be obtained in a timely fashion (Baker, & Siryk, 1999). Therefore, it is possible that those who participated in the SBP had more time to make the adjustment to college compared to students who did not participate in the SBP. This could have influenced the findings based on time and perception. Summer Bridge participants could have perceived themselves as well adjusted.

Finally, the results of the interview data could have been skewed by the way in which they were collected. This study relied on the perceptions and experiences of students and the director. However, since the researcher was associated with the SBP under scrutiny, the student response could have been influenced by social desirability. In other words, the students might have felt pressured to answer in ways that did not truly reflect their opinions. If the focus group and interview data had been collected by other students or by another person with no connection to the program, perhaps the response would have been different (Patton, 2002).

Areas for Future Research

Some of the limitations described above are also applicable as areas for future research. These include, but are not limited to the following:

1. A follow-up qualitative study involving non-participants in a SBP should be conducted to view what activities assisted them in their academic social, personal-emotional, and goal commitment/institutional adjustment.
2. Follow-up studies should be conducted yearly with the summer bridge students to determine what other adjustment issues they faced as undergraduates—and whether and how they overcame them.
3. A future research study could examine other demographic differences in adjustment, for example socioeconomic differences, among others.
4. A comparative quantitative study should be conducted to determine if there are similarities and/or differences among other SBPs at predominantly White institutions?
5. A comparative qualitative study should be conducted to determine if there are similarities and/or differences among other SBPs at Historically African-American Colleges and Universities?
6. A meta analysis and findings should be conducted to determine if the findings discussed herein are indicative of all SBPs?
7. A follow up quantitative and qualitative study to further explore how to enhance the personal-emotional adjustment of female undergraduate engineering majors.
8. A follow up study using the SACQ should be conducted within 2 years to determine if summer bridge student's adjustment scores are different.

Implications for Future Practice, Research, and Policy

The findings of this research have implications for future professional practice, research investigations, and policy formulation. In relation to future practice of SBPs of any focus the findings discussed herein can be used to inform practice and decision making for a number of constituencies, including those who manage SBPs, directors of summer support programs, and

deans in higher education. However, these findings are particularly relevant for managers of engineering SBP at Research 1 institutions to plan activities that will be effective in preparing and training students for rigorous engineering programs. In so doing, they will assist students in their academic, social, and personal-emotional and goal commitment/institutional adjustment. In particular, SBP managers may want to present more varied activities or workshops that that will prepare students for the goal commitment/institutional adjustment to college, since GCIA was not ranked on the SBI. This could include, for example, workshops related to navigating college—possibly involving panels of upper-class students discussing their experience on being successful in college. The workshops presenter should be clear and concise on it purpose if it is about time management and study skills.

Higher education policymakers and administrators could also utilize this study, since it provides important information about the different types of students at Research 1 institutions who could benefit from participating in engineering SBPs. The qualitative data about the engineering students in this investigation and the rich comments about their SBP experiences could also enhance the ability of program managers to design more effective activities and services. Clearly, the goal of a SBP is to increase persistence among engineering students. Thus, in addition to designing and implementing new programs, the findings discussed herein may also assist SBP managers to improve existing programs.

This study also has implications with respect to gender differences of students at Research I institutions. Since the results described herein revealed that women who participated in the study reported lower personal-emotional adjustment scores than men, SBP managers should consider providing specialized opportunities/activities for women to help increase self perception, self-esteem, physical, and personal well-being.

Summer bridge managers at Research I institutions should also consider reevaluating their programs to make sure they align with the factors discussed in the SACQ (academic, social,

personal-emotional, and goal commitment/institutional adjustment). In so doing, a more holistic approach could be used to prepare students for college success—and especially those enrolled in programs of engineering.

Directors of support programs and deans may use the data for expanding the pool of engineering students at Research I institution. Moreover, since the results from this research provided information from a variety of engineering students about their academic, social, personal-emotional, and goal commitment/institutional adjustment to the college environment, engineering directors and deans may also be interested in the results of this study. Deans could use the data to create programs to help faculty and others understand the various adjustment issues engineering students may face during college, and especially as freshmen. Given the participants' stated need for interacting with peers, faculty and staff, more opportunities for such interactions to occur (i.e., mentoring and workshops) could be facilitated by deans and administrators. Assessments could also be routinely conducted to identify any adjustment issues so that they could be addressed in a timely fashion. Ultimately, it is hoped that the findings from this investigation could be used by SBP faculty, staff, and administrators to increase enrollment and retention numbers in colleges and programs of engineering.

This research study also has implications for policy at the institutional, state and federal levels. Administrators at the institutional level may use the results to reevaluate policy and procedures about SBPs that target engineering students at Research I institutions. The outcomes from this investigation could reinforce the need for these types of SBPs so that they become more prevalent on college campuses, not just at larger R1 PWIs.

At the state level, policymakers can use these results to create policies to increase the participation of college students in engineering SBPs. Specifically, state policymakers can reassess levels of support for these programs and augment current levels and/or create other funding opportunities so that more students can learn important academic, social, personal-

emotional, and goal commitment/institutional adjustment skills that will increase their likelihood of their college success at Research I institutions.

Finally, policymakers at the federal level can use the findings described herein to increase their awareness of the adjustment issues of engineering students at Research I institutions. The federal government has a history of creating programs that have increased access to higher education, as well as others that have improved retention rates. For example, Noel, Levitz, Saluri et al. (1985) reported how the federal government forced states and institutions of higher education to deal with the influx of African American students entering colleges in late 1960s. Therefore, federal policymakers might use the findings associated with SBPs to encourage state institutions of higher education to implement these programs so that more students might be successful in college.

Personal Reflections

It was through this dissertation process that I really came to believe that I had the talent and the capability to become a researcher and an educator. Although initially I had so many ideas for a dissertation topic, I found my passion for research (and my Ph.D. topic) through my graduate assistantship (GTA) with the SBP. I thought I had a good idea of what a SBP was all about, but I soon learned that I had more questions than answers—some of which were pretty basic. For example,

1. What is a summer bridge program?
2. Why they are typically held?
3. Who do they serve?

Research starts with a question, and the questions mentioned above led me to discover that there was no single answer to any of them. Certainly, there were commonalities. For example, researching this topic taught me that SBPs are among the oldest strategies used to improve

college retention (Garcia, 1991). Surprisingly, even though conference proceedings and a number of studies have acknowledged that SBPs are generally advantageous for their target populations, there has been very little empirical evidence assessing their effectiveness (Ackerman, 1990; Gandara & Maxwell-Jolly, 1999; Garcia, 1991; Kluepfel, 1994; Pascarella & Terenzini, 2005; Rita & Bacote, 1997). Thus, given the number of institutions of higher education that provide SBPs of this sort, it was vital to investigate just how effective they actually were using both quantitative and qualitative techniques. Clearly, to make it a manageable study, it had to be targeted. Thus, this research was about engineering students and their academic, social, personal-emotional and goal commitment/institutional adjustment. Through their stories and the surveys described earlier, they were able to reveal the adjustment issues they faced as college freshmen.

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APPENDICES

Appendix A: Summer Bridge 2007 Activity Schedule

Academic Analysis: Students will participate in Academic Analysis once each week for 15 minutes. Each student will meet individually with an Academic Advisor to review your academic performance. See form in the binder for your advisor.

Gym(s): Students will have access to the gym from June 25-July 28. You will need to have your id to enter the facilities.

Residence Hall Activities: The Residence Hall Advisors will plan activities during the week.

Week & Date	Activity	Coordinator	Time	Location & Other Notes
WEEK I: JUNE 24-30				
Sun., June 24	Individual Pictures	TBA	TBA	Residence Hall
	Introduction Meeting	TBA	TBA	Student Center
	Group Picture	TBA	TBA	Student Center
	Schedule Overview	TBA	TBA	Student Center
	Campus Tour	TBA	TBA	Finding classes and campus highlights
	Floor Meeting	TBA	TBA	Residence Hall
Mon., June 25	Pickup Student ID	TBA	TBA	Don't green card, driver's license and/or social security card
Tues., June 26	Registration & Class Sign up information for each student	TBA	TBA	Chemistry Building
Tues., June 26	Orientation Meeting with Dean	TBA	TBA	Chemistry Building
Fri., June 29	Seminar	TBA	TBA	Chemistry Building "What's New with Technology?"
Fri., June 29	Evening Out!	TBA	TBA	Student Center
Sat., June 30	Skating	TBA	TBA	Bus will be outside Residence Hall at 12:45 PM

WEEK II: July 1 - 7		TBA	TBA	
Sun., July 1	Trip to Mall (1 bus-sign up sheet)	TBA	TBA	Bus leaving at 1:15 PM
Tues., July 3	Orientation Meeting with Dean	TBA	TBA	Chemistry Building
Wed., July 4	4th of July Cookout & Fun	TBA	TBA	Pavilion
Fri., July 6	Seminar	TBA	TBA	Chemistry Building- **Bring your resume**
Sat./Sun., July 7 & 8	Ropes Course	TBA	TBA	Meet at buses at 8:15 a.m.
Week & Date	**Activity**	**Coordinator**	**Time**	**Location & Other Notes**
WEEK III: July 8 – 14		TBA	TBA	
Sat./Sun., July 7 & 8	Ropes Course	TBA	TBA	Meet at buses at 8:15 a.m.
Mon., July 9	Work on Updating Your Resumes	TBA	TBA	Meet with your assigned RHAs for assistance
Tues., July 10	Orientation Meeting	TBA	TBA	Chemistry Building
Wed., July 11	Lab Tour	TBA	TBA	TBA
Fri., July 13	Seminar	TBA	TBA	Chemistry Building
Fri., July 13	Etiquette Dinner	TBA	TBA	Banquet Room; **professional dress**…see your RHA if you have questions
Sat., July 14	Fortune 500 Company Teambuilding Activities	TBA	TBA	TBA
WEEK IV: July 15 – 21		TBA	TBA	
Mon., July 16	Updated Resume Due	TBA	TBA	Email updated resume to director
Tues., July 17	Orientation Meeting with Dean	TBA	TBA	Chemistry Building
Wed., July 18	Lab Tour	TBA	TBA	TBA
Thurs., July 19	Move-Out Meeting	TBA	TBA	TBA

Fri., July 20	Seminar Sponsored by Fortune 500 Company	TBA	TBA	Chemistry Building "What Do I Want To Do With My Life?"
Sat., July 21	Fortune 500 Company Visit	TBA	TBA	TBA
WEEK V: July 22 – 28		TBA	TBA	
Sun., July 22	Student Panel	TBA	TBA	TBA
Tues., July 24	On-line Survey	TBA	TBA	On-line survey must be completed by 5 p.m.
Tues., July 24	Orientation Meeting with Dean	TBA	TBA	Chemistry Building
Thurs. & Fri. July 26 & 27	University Freshmen Orientation!	TBA	TBA	Attendance is required for all activities. Contact STEP Staff if you have questions
Fri., July 27	Check-in Laptops	TBA	TBA	1:00 PM Group A 1:30 PM Group B 2:00 PM Group C
Sat., July 28	Move-Out	TBA	TBA	Residence Hall – move out must be completed by 10:30
Sat., July 28	Closing Ceremony	TBA	TBA	TBA

Appendix B: Group A Schedule

Group A Schedule (for a summer engineering bridge program being studied)					
	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM	Chemistry Lecture	Chemistry Lecture	Section 1 and 2	Chemistry Lecture	Chemistry Lecture
8:15 AM					
8:30 AM					
8:45 AM			Chemistry Lab		
9:00 AM					
9:15 AM					
9:30 AM					
9:45 AM	**Math**	**Math**		**Math**	**Math**
10:00 AM			Section 3 and 4		
10:15 AM					
10:30 AM					
10:45 AM			Chemistry Lab		
11:00 AM					
11:15 AM					
11:30 AM					
11:45 AM					
12:00 PM					
12:15 PM					
12:30 PM	lunch	lunch	lunch	lunch	lunch
12:45 PM					
1:00 PM					
1:15 PM					
1:30 PM					
1:45 PM					
2:00 PM	**Engineering Class**	**Academic Analysis** Meeting Times with Academic Advisor	**Engineering Class**	**Academic Analysis** Meeting Times with Academic Advisor	**Seminar** (Personal or Professional
2:15 PM					
2:30 PM					
2:45 PM					
3:00 PM					
3:15 PM					
3:30 PM					
3:45 PM					

(Note: This summer bridge program had 3 schedules (Group A, B, C) due to the large participation in the program. The Director of the office that offers the program wanted to keep the classroom size small (approximately 33 students in each class) in order for the participants to engage in classroom conversation and activities/projects.)

Appendix C: SACQ Survey

Student Adaptation to College Questionnaire

Please provide the identifying information below.

Student ID #: **Age :**
Race:

Sex:

Directions: The 67 statements on this form describe college experiences. Read each one and decide how well it applies to you at the present time (within the past few days). For each statement, select the circle at the point in the continuum that best represents how closely the statement applies to you. Select only one circle for each statement.

		Applies very closely to me ←								Doesn't apply to me at all →
1.	I feel that I fit in well as part of the college environment.	O	O	O	O	O	O	O	O	O
2.	I have been feeling tense or nervous lately.	O	O	O	O	O	O	O	O	O
3.	I have been keeping up to date on my academic work.	O	O	O	O	O	O	O	O	O
4.	I am meeting as many people, and making as many friends as I would like at college.	O	O	O	O	O	O	O	O	O
5.	I know why I'm in college and what I want out of it.	O	O	O	O	O	O	O	O	O
6.	I am finding academic work at college difficult.	O	O	O	O	O	O	O	O	O
7.	Lately, I have been feeling blue and moody a lot.	O	O	O	O	O	O	O	O	O
8.	I am very involved with social activities in college.	O	O	O	O	O	O	O	O	O
9.	I am adjusting well to college.	O	O	O	O	O	O	O	O	O
10.	I have not been functioning well during examinations.	O	O	O	O	O	O	O	O	O
11.	I have felt tired much of the time lately.	O	O	O	O	O	O	O	O	O
12.	Begin on my own, taking responsibility for myself, has not been easy.	O	O	O	O	O	O	O	O	O
13.	I am satisfied with the level at which I am performing academically.	O	O	O	O	O	O	O	O	O
14.	I have had informal, personal contacts with college professors.	O	O	O	O	O	O	O	O	O
15.	I am pleased now about my decision about my decision to go to college.	O	O	O	O	O	O	O	O	O

	Applies very closely to me ⬅							➡ Doesn't apply to me at all	
16. I am pleased now about my decision to attend this college in particular.	O	O	O	O	O	O	O	O	O
17. I'm not working as hard as I should at my course work.	O	O	O	O	O	O	O	O	O
18. I have several close social ties at college.	O	O	O	O	O	O	O	O	O
19. My academic goals and purposes are well defined.	O	O	O	O	O	O	O	O	O
20. I haven't been able to control my emotions very well lately.	O	O	O	O	O	O	O	O	O
21. I'm not really smart enough for academic work I am expected to be doing now.	O	O	O	O	O	O	O	O	O
22. Lonesomeness for home is a source is of difficulty for me now.	O	O	O	O	O	O	O	O	O
23. Getting a college degree is very important for me.	O	O	O	O	O	O	O	O	O
24. My appetite has been good lately.	O	O	O	O	O	O	O	O	O
25. I haven't been very efficient in the use of study time lately.	O	O	O	O	O	O	O	O	O
26. I enjoy living in a college dormitory. (Please omit if you do not live in a dormitory; any university housing should be regarded as a dormitory.)	O	O	O	O	O	O	O	O	O
27. I enjoy writing papers for courses.	O	O	O	O	O	O	O	O	O
28. I have been having a lot of headaches lately.	O	O	O	O	O	O	O	O	O
29. I really haven't had much motivation for studying lately.	O	O	O	O	O	O	O	O	O
30. I am satisfied with the extracurricular activities available at college.	O	O	O	O	O	O	O	O	O
31. I've given a lot of thought lately to whether I should ask for help form the Psychological/Counseling Services Center or from a psychotherapist outside of college.	O	O	O	O	O	O	O	O	O
32. Lately, I have been having doubts regarding the value of a college education.	O	O	O	O	O	O	O	O	O
33. I am getting along very well with my roommates(s) at college. (Please omit if you do not have a roommate.)	O	O	O	O	O	O	O	O	O
34. I wish I were at another college or university.	O	O	O	O	O	O	O	O	O
35. I've put on (or lost) too much weight recently.	O	O	O	O	O	O	O	O	O
36. I am satisfied with the number and variety of courses available at college.	O	O	O	O	O	O	O	O	O
37. I feel that I have enough social skills to get along well in the college setting.	O	O	O	O	O	O	O	O	O
38. I have been getting angry too easily lately.	O	O	O	O	O	O	O	O	O
39. Recently I have had trouble concentrating when I try to study.	O	O	O	O	O	O	O	O	O
40. I haven't been sleeping very well.	O	O	O	O	O	O	O	O	O
41. I'm not doing well enough academically for the amount of work I put in.	O	O	O	O	O	O	O	O	O
42. I am having difficulty feeling at ease with other people at college.	O	O	O	O	O	O	O	O	O

	Applies very closely to me ←								Doesn't apply to me at all →
43. I am satisfied with the quality or the caliber of courses available at college.	O	O	O	O	O	O	O	O	O
44. I am attending classes regularly.	O	O	O	O	O	O	O	O	O
45. Sometimes my thinking gets muddled up too easily.	O	O	O	O	O	O	O	O	O
46. I am satisfied with the extent to which I am participating in social activities at college.	O	O	O	O	O	O	O	O	O
47. I expect to stay at this college for a bachelor's degree.	O	O	O	O	O	O	O	O	O
48. I haven't been mixing too well with the opposite sex lately.	O	O	O	O	O	O	O	O	O
49. I worry a lot about my college expenses.	O	O	O	O	O	O	O	O	O
50. I am enjoying my academic work at college.	O	O	O	O	O	O	O	O	O
51. I have been feeling lonely a lot at college lately.	O	O	O	O	O	O	O	O	O
52. I am having a lot trouble getting started on homework assignments.	O	O	O	O	O	O	O	O	O
53. I feel I have good control over my life situation at college.	O	O	O	O	O	O	O	O	O
54. I am satisfied with my program of courses for this semester/quarter.	O	O	O	O	O	O	O	O	O
55. I have been feeling in good health lately.	O	O	O	O	O	O	O	O	O
56. I feel I am very different from other students at college in ways that I don't like.	O	O	O	O	O	O	O	O	O
57. On balance, I would rather be home than here.	O	O	O	O	O	O	O	O	O
58. Most of the things I am interested in are not related to any of my course work at college.	O	O	O	O	O	O	O	O	O
59. Lately I have been giving a lot of thought to transferring to another college.	O	O	O	O	O	O	O	O	O
60. Lately I have been giving a lot thought to dropping out of college altogether and for good.	O	O	O	O	O	O	O	O	O
61. I find myself giving considerable thought to taking time off from college and finishing later.	O	O	O	O	O	O	O	O	O
62. I am very satisfied with the professors I have now in my courses.	O	O	O	O	O	O	O	O	O
63. I have some good friends or acquaintances at college with whom I can talk about any problems I may have.	O	O	O	O	O	O	O	O	O
64. I am experiencing a lot of difficulty coping with the stresses imposed upon me in college.	O	O	O	O	O	O	O	O	O
65. I am quite satisfied with my social life at college.	O	O	O	O	O	O	O	O	O
66. I'm quite satisfied with my academic situation at college	O	O	O	O	O	O	O	O	O
67. I feel confident that I will be able to deal in a satisfactory manner with future challenges here at college.	O	O	O	O	O	O	O	O	O

Appendix D: Supplementary Table 4.0

Table 4.0. Demographic Characteristics of the Sample (N=134)

Question	Summer Participants (n=67)	Non-summer Participants (n=67)
1. What is your gender?		
Male	59.7% (40)	58.2% (39)
Female	40.3% (27)	41.8% (28)
2. What is your age?		
16	0	3.0% (2)
17	6.0% (4)	0
18	77.6% (52)	79.1% (53)
19	16.4% (11)	17.9% (12)
3. What is your racial or ethnic identification?		
Asian or Pacific Islander	4.5% (3)	6% (4)
American Indian or other Native American	0	6.0% (4)
African-American or African American	28.4% (19)	10.4% (7)
Caucasian (other than Hispanic)	52.2.% (35)	59.7% (40)
Puerto Rican	3.0% (2)	7.5 % (5)
Hispanic	7.5 % (5)	6.0% (4)
Other	4.5% (3)	4.5% (3)

4. Did either of your parents graduate from college?		
yes, both parents	53.7% (36)	55.2% (37)
yes, father only	11.9% (8)	19.4% (13)
yes, mother only	10.4% (7)	13.4% (9)
don't know	3.0 (2)	1.5% (1)
no	20.9% (14)	10.4% (7)
5. In your last two years of high school, how many hours a week did you study outside of school time?		
5 or less	59.7% (40)	49.3% (33)
6-10	31.3% (21)	22.4% (15)
11-15	4.5% (3)	19.4% (13)
16-20	1.5% (1)	3.0% (2)
21-25	3.0% (2)	4.5% (3)
26 or more	0	1.4% (1)
6. Here at your college, how many hours did you study outside of class time?		
5 or less	6.0% (4)	9.0% (6)
6-10	23.9% (16)	16.4% (11)
11-15	41.8% (28)	35.8% (24)
16-20	16.4% (11)	26.9% (18)
21-25	7.5% (5)	9.0% (6)
26 or more	4.5% (3)	3.0%(2)

7. How many credit hours are you taking this fall?		
6 or less	1.5% (1)	0
7-10	0	0
12-14	28.4% (19)	37.3% (25)
15-16	35.8% (24)	43.3% (29)
17 or more	34.3% (23)	19.4% (13)
8. Which of the following field of engineering do you expect to major in?		
Aerospace and Ocean Engineering	13.4% (9)	14.9% (10)
Biological Systems Engineering	1.5% (1)	3.0% (2)
Chemical Engineering	7.5% (5)	6.0% (4)
Civil and Environmental Engineering	6.0% (4)	11.9% (8)
Computer Science	9.0% (6)	3.0% (2)
Electrical and Computer Engineering	19.4% (13)	10.4% (7)
Engineering Education	0	0
Engineering Science and Mechanics	3.0% (2)	3.0% (2)
Industrial and Systems Engineering	4.5% (3)	11.9% (8)
Materials Science and Engineering	1.5% (1)	4.5% (3)
Mechanical Engineering	26.9% (18)	25.4% (17)
Mining and Minerals Engineering	3.0% (2)	3.0% (2)
Transferring out of Engineering	4.5% (3)	3.0% (2)
	0	0

9. About how much of your college expenses this year will be provided by your parents or family (including your own contribution).		
all or nearly all	47.8% (32)	56.7% (38)
more than half	13.4% (9)	14.9% (10)
less than half	26.9% (18)	19.4% (13)
none or very little	11.9% (8)	9.0% (6)
10. What do you expect your college grade point average to be at the end of your first term?		
A (4.0)	4.5% (3)	3.0% (2)
A- (3.7)	19.4% (13)	16.4% (11)
B+ (3.3)	17.9% (12)	32.8% (22)
B (3.0)	13.4% (9)	16.4% (11)
B- (2.7)	40.3% (27)	20.9% (14)
C+ (2.3)	0	3.0% (2)
C (2.0)	4.5% (3)	7.5% (5)
C- (1.7 or lower)	0	0

Appendix E: Summer Bridge Inventory

Purpose

The Summer Bridge Inventory (SBI) was developed to complement the use of the Student Adjustment College Questionnaire (SACQ), which was designed to assess a student's adjustment to college. Baker and Siryk (1999) subscale and cluster definitions are useful in providing a conceptual framework to explore the effectiveness for a summer bridge program activities. The subscale and cluster definitions are great tool to use to assess the various activities provide in a summer bridge program. Therefore, the SBI builds on the SACQ model to provide a more comprehensive assessment of the various types of activities that are offered in a Summer Bridge Program (SBP) for incoming freshmen in college. The use of the SBI will permit students to provide richer, more descriptive data to the research on how they adjusted to college, and their views of the activities and programmatic interventions that they found the most and least effective. The SBI will also enable the program director to better interpret the effectiveness of the Summer Bridge Program.

The SBI has both qualitative and quantitative components, and consists of a questionnaire as well as one-on-one and focus group interviews. The SBI, which will be administered to the director of engineering support program (i.e. chief administrator for the SBP) and program participants, consists of seven sections. The first six sections will have twenty-nine items in each section, while the last part will consist of focus group questions. Participants will be asked to identify on sections 1-4, on a scale of one to five, how the activity relates to the clusters of each subscale from the SACQ. In section 5, participants will be asked to rank the thirty activities

from most important to least important. In addition, participants will be asked to indicate the dominate subscale for each activity. The SBI will be administered via a two-phase process.

During Phase 1, the Director of Engineer Support Programs will complete the SBI questionnaire, after which, I will conduct a one-on-one semi-structured interview with the director.

During Phase 2, participants of the SBP will complete the Summer Bridge Inventory. Once those data are collected, the researcher will conduct semi-structured focus groups with participants from the SBP.

The results of the SBI will be used to increase both the director's and students' awareness of their own expectations in the SBP. Research outcomes will also be used to assist institutional administrators of summer bridge programs on how to better serve participants with respect to college adjustment.

Would you like to participate in a focus group? _____

Below are the subscales and corresponding clusters along with definitions for each word.

Subscales and Definitions	Clusters and Definitions
Academic Adjustment (AA)-associated with higher education learning experiences	• ***Motivation***- a student's feelings concerning educational goal setting and being in college • ***Application***- the initiative that a student takes in achieving academic goals • ***Performance-*** effectiveness of a student's academic performance • ***Academic Environment***- the institutional environment in which a student performs and what that environment has to offer the student
Social Adjustment (SA)- the social aspects of a higher education environment	• ***General-*** the ease with which students engage in social activities • ***Other People***- whether or not students develop relationships with other individuals within the university setting • ***Nostalgia-*** the social rearrangement of a student's surroundings and how well he or she adjusts to being away from home • ***Social Environment***- the fulfillment a student feels with the college experience
Personal-Emotional Adjustment (PEA)- the psychological and physical aspects of students	• ***Psychological***-signifies the student's welfare and comfort or degree of distress • ***Physical***-corresponds to bodily responses
Goal Commitment/Institutional Adjustment (GCIA)- corresponds to a student's dedication to his/her educational goals and connection to the institution	• ***General***- overall satisfaction of being in college • ***This College***- emotions that students have about the college they are attending

Please use the definitions above in identifying a number that relates to the activity designated for each subscale below under each cluster. This inventory can be administered individually or in a group setting and the instructions are clearly written on each section following this page.

Section 1

The director and participants will be asked to identify, on a scale of 1 to 5, how the activity relates to the clusters of the ***Academic Adjustment*** (associated with higher education learning experiences) subscale (1 = does not relate at all, 5= relates well).

Academic Adjustment				
Activities	Motivation	Application	Performance	Academic Environment
Individual and Group Pictures				
Introduction Meeting				
Chemistry Class				
Chemistry Lab Class				
Engineering Class				
Math Class				
Campus Tour				
STEP Schedule Overview				
Floor Meeting				
Student ID Pickup				
Registration & Class Sign Up and information for fall term				
Orientation Meetings with Associate Dean of Engineering				
Friday Seminars				
Evening Out-Bowling				
Skating				
Trip to Mall				
4th of July Cookout				
Ropes Course				
Updating Your Resumes				
Lab Tours				
Etiquette Dinner				
Fortune 500 Company Teambuilding Activities				
Seminar Sponsored by Fortune 500 Company				
Move-out Meeting				
Student Panel				
On-line Survey				
University Freshmen Orientation				
Move-Out				
Closing Ceremony				

Section 2

Participants will be asked to identify, on a scale of 1 to 5, how the activity relates to the clusters of the ***Social Adjustment*** (the social aspects of a higher education environment) subscale (1 = does not relate at all, 5= relates well).

	Social Adjustment			
Activities	**General**	**Other People**	**Nostalgia**	**Social Environment**
Individual & Group Pictures				
Introduction Meeting				
Chemistry Class				
Chemistry Lab Class				
Engineering Class				
Math Class				
Campus Tour				
STEP Schedule Overview				
Floor Meeting				
Student ID Pickup				
Registration & Class Sign Up and information for fall term				
Meetings with Associate Dean of Engineering				
Friday Seminars				
Evening Out-Bowling				
Skating				
Trip to Mall				
4th of July Cookout				
Ropes Course				
Updating Your Resumes				
Lab Tours				
Etiquette Dinner				
Fortune 500 Company Teambuilding Activities				
Move-out Meeting				
Seminar Sponsored by Fortune 500 Company				
Student Panel				
On-line Survey				
University Freshmen Orientation				
Move-Out				
Closing Ceremony				

Section 3

The director and participants will be asked to identify, on a scale of 1 to 5, how the activity listed relates to the clusters of ***Personal-Emotional Adjustment*** (the psychological and physical aspects of students) subscale (1 1 = does not relate at all, 5= relates well).

	Personal-Emotional Adjustment	
Activities	**Psychological**	**Physical**
Individual and Group Pictures		
Introduction Meeting		
Chemistry Class		
Chemistry Lab Class		
Engineering Class		
Math Class		
Campus Tour		
STEP Schedule Overview		
Floor Meeting		
Student ID Pickup		
Registration & Class Sign Up and information for fall term		
Meetings with Associate Dean of Engineering		
Friday Seminars		
Evening Out-Bowling		
Skating		
Trip to Mall		
4th of July Cookout		
Ropes Course		
Updating Your Resumes		
Lab Tours		
Etiquette Dinner		
Fortune 500 Company Teambuilding Activities		
Move-out Meeting		
Seminar Sponsored by Fortune 500 Company		
Student Panel		
On-line Survey		
University Freshmen Orientation		
Move-Out		
Closing Ceremony		

Section 4

The director and participants will be asked to identify, on a scale of 1 to 5, how the activity listed relates to the clusters of ***Goal Commitment Institutional Adjustment*** (corresponds to a student's dedication to his/her educational goals and connection to the institution) subscale (1 = does not relate at all, 5= relates well).

	Goal Commitment Institutional Adjustment	
Activities	**General**	**This College**
Individual and Group Pictures		
Introduction Meeting		
Chemistry Class		
Chemistry Lab Class		
Engineering Class		
Math Class		
Campus Tour		
STEP Schedule Overview		
Floor Meeting		
Student ID Pickup		
Registration & Class Sign Up and information for fall term		
Orientation Meetings with Associate Dean of Engineering		
Friday Seminars		
Evening Out-Bowling		
Skating		
Trip to Mall		
4th of July Cookout		
Ropes Course		
Updating Your Resumes		
Lab Tours		
Etiquette Dinner		
Fortune 500 Company Teambuilding Activities		
Move-Out Meeting		
Seminar Sponsored by Fortune 500 Company		
Student Panel		
On-line Survey		
University Freshmen Orientation		
Move-Out		
Closing Ceremony		

Section 5

Participants will rank the following STEP activities from 1 to 29 (in order of their importance) (1 = least important, 29 = most important).

Activities	Rank
Individual and Group Pictures	
Introduction Meeting	
Chemistry Class	
Chemistry Lab Class	
Engineering Class	
Math Class	
Campus Tour	
STEP Schedule Overview	
Floor Meeting	
Student ID Pickup	
Registration & Class Sign Up information for fall term	
Orientation Meeting with Associate Dean of Engineering	
Friday Seminars	
Evening Out-Bowling	
Skating	
Trip to Mall	
4th of July Cookout	
Ropes Course	
Updating Your Resumes	
Lab Tours	
Etiquette Dinner	
Fortune 500 Company Teambuilding Activities	
Move-Out Meeting	
Seminar Sponsored by Fortune 500 Company	
Student Panel	
On-line Survey	
University Freshmen Orientation	
Move-Out	
Closing Ceremony	

Section 6

Participants will indicate the dominate subscale for each activity listed. Please place the appropriate number (see below) beside the activity underneath the column marked Subscale Number. The subscales and assigned numbers are the following:

Academic Adjustment = 1 **Social Adjustment = 2**
Personal-Emotional Adjustment = 3 **Goal Commitment/Institutional Adjustment = 4**

Activities	Subscale Number
Individual and Group Pictures	
Introduction Meeting	
Chemistry Class	
Chemistry Lab Class	
Engineering Class	
Math Class	
Campus Tour	
STEP Schedule Overview	
Floor Meeting	
Student ID Pickup	
Registration & Class Sign Up and information for fall term	
Orientation Meetings with Associate Dean of Engineering	
Friday Seminars	
Evening Out-Bowling	
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Move-Out Meeting	
Seminar Sponsored by Fortune 500 Company	
Student Panel	
On-line Survey	
University Freshmen Orientation	
Move-Out	
Closing Ceremony	

Questions for Director

- How do you feel the STEP activities assist students in their overall academic adjustment in their first term of college?
- How do you feel the STEP activities assist students in their overall social adjustment in their first term of college?
- How do you feel the STEP activities assist students in their overall personal and emotional adjustment in their first term of college?
- How do you feel the STEP activities assist students in their overall goal commitment and institutional adjustment in their first term of college?
- What do you hope to learn from the evaluation? Why are these issues important to you?
- How could you use the information provided by participants?
- What do you believe are the strengths of the STEP program?
- What do you believe are the weakness of the STEP program?
- What are the future plans for the program?
- Is there anything else that you would like to add regarding the STEP program that I have not asked you?

Questions for Participants

- How do you feel the STEP activities assisted you in your overall academic adjustment in your first term of college?
- How do you feel the STEP activities assisted you in your overall social adjustment in your first term of college?
- How do you feel the STEP activities assisted you in your overall personal and emotional adjustment in your first term of college?
- How do you feel the STEP activities assisted your overall goal commitment and institutional adjustment in your first term of college?
- What is the general perception of the STEP program?
- What do you perceive as the purpose or guiding philosophy of the STEP program?
- What do you believe are the strengths of the STEP program?
- What do you believe are the weakness of the STEP program?
- How did STEP prepare you for college?

Is there anything else that you would like to add regarding the STEP Program that I have not asked you?

Appendix F: IRB Amendment 1 Approval

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24061
540/231-4991 Fax 540/231-0959
e-mail moored@vt.edu
www.irb.vt.edu

FWA00000572(expires 1/20/2010)
IRB # is IRB00000667

DATE: November 27, 2007

MEMORANDUM

TO: Jeanceleste M. Kampe
Whitney Edmister
Tremayne Waller

FROM: David M. Moore

SUBJECT: **IRB Exempt Approval:** "STEP & CEED Undergraduate Programs Assessment", OSP #208-11-110F-109323-1, IRB # 05-568

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of September 22, 2005.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.

2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File
Department Reviewer:O. Hayden Griffin, Jr.
OSP

Appendix G: SACQ Approval from Western Psychological Services

wps®
Western Psychological Services
A Division of Manson Western Corporation
12031 Wilshire Boulevard
Los Angeles, CA 90025-1251
www.wpspublish.com

January 28, 2008
Tremayne O. Waller
Doctoral Candidate
Virginia Polytechnic Institute and State University
African-Americansburg, VA 24061-0002

Re: *Student Adaptation to College Questionnaire (SACQ)*

Dear Mr. Waller:

WPS is processing your license for a specific web-based application of *SACQ* material. By surface mail, you will soon receive a paid-in-full WPS invoice/receipt, which will serve as your license to use the *SACQ* items and scoring key in a secure on-line environment, permitting adaptation, administration and scoring of the instrument up to four hundred twenty-five (425) times total. This authorization is for sole use in your doctoral research, examining adjustment to college in African-American men at the Virginia Tech College of Engineering — with no authorization for continued or commercial use — subject to the provisions of terms and conditions provided to you earlier today.

With reference to condition (4) of WPS's terms letter from earlier today, this is the copyright notice that must appear in its entirety, on the screen of item presentation, to each reprint/viewing of the *SACQ:*

> **Material from the *SACQ* copyright © 1988, 1999 by Western Psychological Services. Format adapted by T. Waller, Virginia Polytechnic Institute and State University, for specific, limited research use under license of the publisher, WPS, 12031 Wilshire Boulevard, Los Angeles, California 90025, U.S.A. (**www.wpspublish.com**). No additional reproduction, in whole or in part, by any medium or for any purpose, may be made without the prior, written authorization of WPS. All rights reserved.**

On behalf of WPS, I appreciate your continuing interest in the *SACQ*, and look forward to hearing the results of your study.

Sincerely yours,
Susan Dunn Weinberg
Assistant to the President
WPS Rights and Permissions
e-mail: weinberg@wpspublish.com

SDW:se

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Western Psychological Services
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SDW:se

Appendix H: Letter for Participants in the Study

November 2007

Dear Student:

My name is Tremayne Waller and I am a PhD candidate in the School of Education at Virginia Polytechnic Institute and State University, working as a graduate assistant in the College of Engineering's Center for the Enhancement of Engineering Diversity. I am requesting your assistance for my research. The goal of the research is to examine the adjustment of participants versus non-participants in a summer bridge program for first year engineering students. Your assistance is appreciated in filling out the survey.

Students that complete the survey will be entered in a drawing for one of two **$100 dollar** gift certificates to the University bookstore. In order to participate in this study, you will need to complete a consent form. The consent form will be included in the survey and will indicate your understanding of the meaning of informed consent. To participate in the study, please go to the URL: http://tremaynewaller.com using the password is **Step07**.

If the URL does not work, please cut and past it into your web browser. The time required to complete the survey is approximately 15 minutes. All survey responses will be kept confidential. The data from this research will be compiled and analyzed. This information will be reported to my dissertation committee and will not include any individual's information.

I look forward to your participation in this study. I do appreciate your time.

Sincerely,

Tremayne Waller
PhD Candidate
Virginia Polytechnic Institute and State University

Appendix I: Follow Up Email for Participants in Study

November 2007

Dear Student:

Last week an on-line survey was sent to you to seek your opinions about your adjustment about college. Your name was drawn randomly from a list of students in the college of engineering.

If you have already completed the on-line questionnaire, please accept our sincere thanks. If not, please do so today. We are especially grateful for your help because it is only by asking people like you to share your experiences about adjustment to college.

To complete the survey and enter the drawing for one of two **$100 dollar** gift certificates to the University bookstore, you will need to complete a consent form. The consent form will be included in the survey and will indicate your understanding of the meaning of informed consent. To participate in the study, please go to the URL: http://tremaynewaller.com using the password is **Step07**.

If the URL does not work, please cut and past it into your web browser. The time required to complete the survey is approximately 15 minutes. All survey responses will be kept confidential. The data from this research will be compiled and analyzed. This information will be reported to my dissertation committee and will not include any individual's information.

I look forward to your participation in this study. I do appreciate your time.

Sincerely,

Tremayne Waller
PhD Candidate
Virginia Polytechnic Institute and State University

Appendix J: Normal P-Plots for SACQ Scales

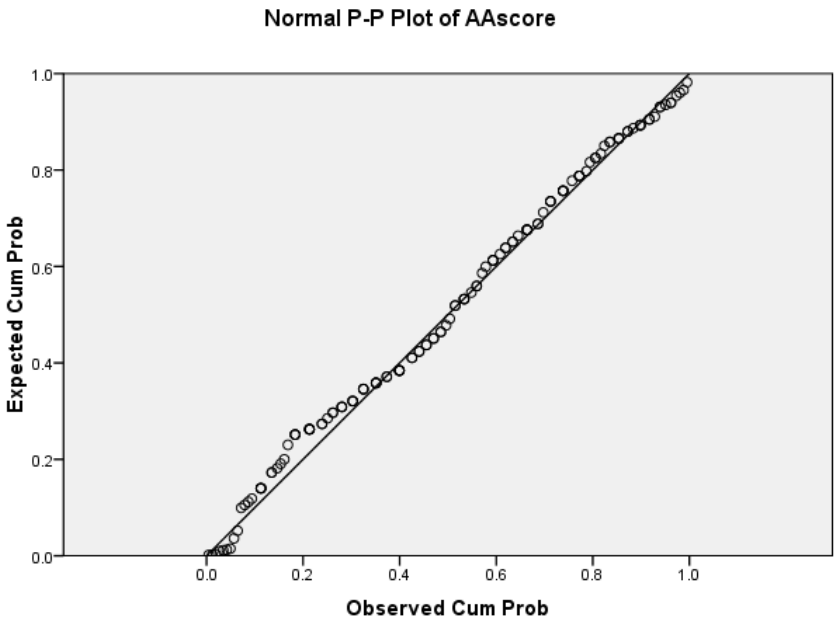

Figure 4.1. Normal Probability Plots of AA Raw Scores

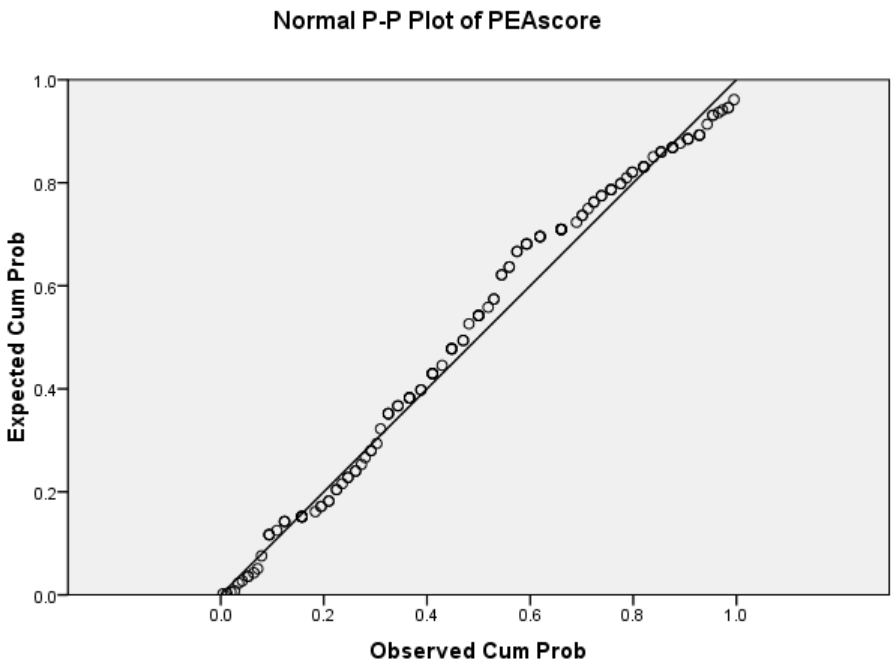

Figure 4.2. Normal Probability Plots of PEA Raw Scores

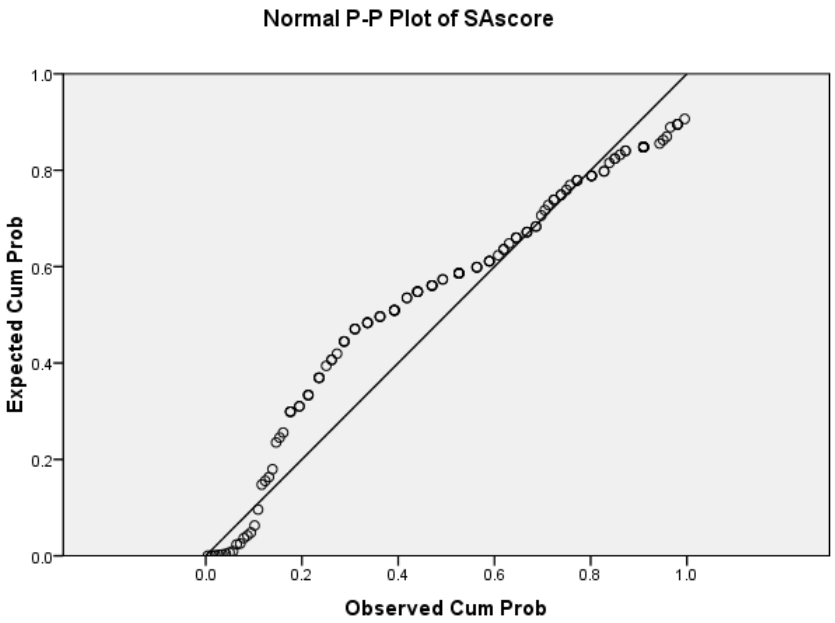

Figure 4.3. Normal Probability Plots of SA Raw Scores

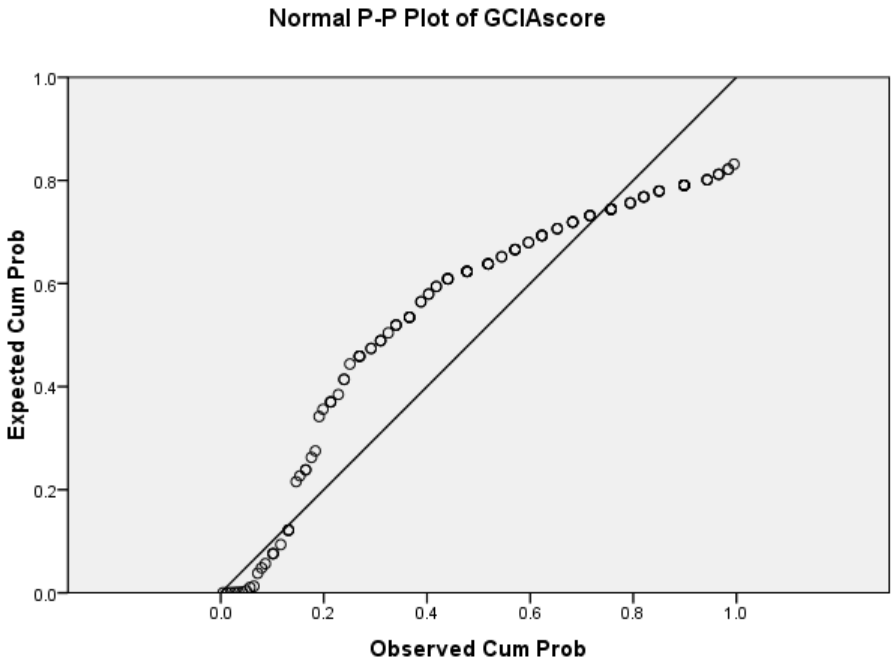

Figure 4.4. Normal Probability Plots CGIA Raw Scores

Appendix K: Supplementary Tables 4.2 to 4.8

Table 4.2. SACQ Academic Adjustment Subscale

Sample Mean, Range, and Standard Deviation on Academic Adjustment (AA) Scale (n = 134)

	SUMMER PARTICIPANTS			NON-SUMMER PARTICIPANTS		
SCALE/CLUSTER/ITEM	MEDIAN	MEAN	ST. DEV.	MEDIAN	MEAN	ST. DEV.
Total for Full Scale	149	7.01	1.55	144	6.94	1.22
Motivation	44.00	6.96	1.76	44.00	7.02	1.48
I know why I'm in college and what I want out of it	9.0	7.37	2.467	9.0	7.69	2.119
My academic goals and purposes are well defined.	8.0	7.25	2.163	8.0	7.49	3.254
Getting a college degree is very important to me.	9.0	7.91	2.551	9.0	8.45	1.853
Lately I have been having doubts regarding the value of a college education.	9.0	7.06	2.984	9.0	7.58	2.69
I am enjoying my academic work at college.	7.0	6.49	2.245	6.0	5.72	2.405
Most of the things I am interested in are not related to any of my course work at college.	7.0	5.72	2.822	5.0	5.22	2.575
Application	26.00	6.0	5.97	26.00	6.38	1.14
I have been keeping up to date on my academic work.	7.00	6.91	2.050	8.00	7.30	1.784
I'm not working as hard as I should at my course work.	4.0	4.36	2.521	5.0	5.03	2.443
I really haven't had much motivation for studying lately.	5.0	4.96	2.370	5.0	5.10	2.487

	Summer Participants			Non-Summer Participants		
Scale/Cluster/Item	**Median**	**Mean**	**St. Dev.**	**Median**	**Mean**	**St. Dev.**
Total for Full Scale	149	7.01	1.55	144	6.94	1.22
I am attending classes regularly.	9.0	7.66	2.027	9.0	8.09	1.649
Performance	46.00	5.15	1.51	42.00	4.80	1.33
I am finding academic work at college difficult.	4.00	3.79	1.996	3.00	3.39	2.037
I have not been functioning well during examinations.	6.0	5.46	2.469	5.0	4.81	2.469
I am satisfied with the level at which I am performing academically.	6.0	6.06	1.984	6.0	5.67	2.149
I'm not really smart enough for the academic work I am expected to be doing now.	8.0	6.55	2.647	7.0	6.31	2.641
I haven't been very efficient in the use of study time lately.	4.0	4.51	2.285	5.0	4.75	2.218
I enjoy writing papers for courses.	4.0	4.04	2.868	4.0	3.82	2.430
Recently I have had trouble concentrating when I try to study.	5.0	4.97	2.540	4.0	4.45	2.363
I'm not doing well enough academically for the amount of work I do.	6.0	5.88	2.717	5.0	4.66	2.761
I am having a lot of trouble getting started on homework assignments.	5.0	5.09	2.789	6.0	5.40	2.758

	Summer Participants			Non-Summer Participants		
Scale/Cluster/Item	**Median**	**Mean**	**St. Dev.**	**Median**	**Mean**	**St. Dev.**
Total for Full Scale	149	7.01	1.55	144	6.94	1.22
Academic Environment	38.00	7.05	1.73	36.00	7.0	1.52
I am satisfied with the number and variety of courses available at college.*	9.00	7.55	2.105	8.00	7.67	1.718
I am satisfied with the quality or the caliber of courses available at college.	8.0	7.27	2.213	8.0	7.45	1.995
I am satisfied with my program of courses for this term/quarter.	8.0	7.40	2.182	7.0	7.19	1.948
I am very satisfied with the professors I have now in my courses.	7.0	6.39	2.263	7.0	6.43	1.811
I'm quite satisfied with my academic situation at college.	7.0	6.66	2.346	7.0	6.25	2.305

*This item also appears on the GCIA subscale.

Table 4.3. SACQ Social Adjustment Subscale

Sample Mean, Range, and Standard Deviation on Social Adjustment (SA) Scale (n=134)

	SUMMER PARTICIPANTS			NON-SUMMER PARTICIPANTS		
SCALE/CLUSTER/ITEM	MEDIAN	MEAN	ST. DEV.	MEDIAN	MEAN	ST. DEV.
Total for Full Scale	146.0	6.97	1.63	141.00	6.75	1.45
General	54.0	7.20	1.81	51.0	6.92	1.66
I feel that I fit in well as part of the college environment.*	8.0	7.34	2.384	8.0	7.60	1.923
I'm very involved with social activities in college.	7.0	6.54	1.933	6.0	5.81	2.3520
I am adjusting well to college.	8.0	7.25	2.218	7.0	7.18	1.938
I have several close social ties at college.	8.0	7.42	2.394	8.0	7.04	2.198
I feel that I have enough social skills to get along well in the college setting.	9.0	7.63	2.159	9.0	7.78	1.913
I'm satisfied with the extent to which I am participating in social activities at college.	7.0	6.84	2.326	7.0	6.24	2.425
I'm quite satisfied with my social life at college.*	8.0	7.40	2.175	7.0	6.84	2.326

*This item also appears on the GCIA subscale.

	Summer Participants			Non-Summer Participants		
Scale/Cluster/Item	**Median**	**Mean**	**St. Dev.**	**Median**	**Mean**	**St. Dev.**
Total for Full Scale	146.0	6.97	1.63	141.00	6.75	1.45
Other People	51.00	6.86	1.56	49.00	6.57	1.63
I am meeting as many people, and making as many friends as I would like at college.*	8.0	7.09	2.193	7.0	6.76	2.264
I've had informal, personal contacts with college professors.	6.0	5.58	2.457	5.0	5.31	2.356
I am getting along very well with my roommate(s) at college.	9.0	7.15	2.530	9.0	7.03	2.736
I'm having difficulty feeling at ease with other people at college.*	8.0	7.13	2.455	8.0	6.67	2.688
I haven't been mixing too well with the opposite sex lately.	9.0	6.97	2.855	8.0	6.25	2.966
I feel I am very different from other students at college in ways that I don't like.*	7.0	6.43	2.862	8.0	6.61	2.640
I have some good friends or acquaintances at college with whom I can talk about any problems I may have.	9.0	7.67	2.415	8.0	7.37	2.248

*This item also appears on the GCIA subscale.

Nostalgia	21.00	6.45	3.60	20.00	6.07	2.31

	Summer Participants			Non-Summer Participants		
Scale/Cluster/Item	**Median**	**Mean**	**St. Dev.**	**Median**	**Mean**	**St. Dev.**
Total for Full Scale	146.0	6.97	1.63	141.00	6.75	1.45
Lonesomeness from home is a source of difficulty for me now.	7.00	6.28	2.901	7.00	6.30	2.791
I have been feeling lonely a lot at college lately.	8.0	6.54	2.920	7.0	5.75	2.776
On balance, I would rather be home than here.*	8.0	6.54	2.920	7.0	6.18	2.785
Social Environment	24.0	7.21	2.10	24.0	7.46	1.61
I am pleased now about my decision to attend this college in particular.	9.0	7.60	2.468	9.0	8.16	1.959
I enjoy living in a college dormitory.(Please omit if you do not live in a dormitory; any university housing should be regarded as dormitory.)*	7.0	6.75	2.452	7.0	6.63	2.341
I am satisfied with the extracurricular activities available at college.	8.0	7.28	2.366	8.0	7.61	1.749

*This item also appears on the GCIA subscale.

Table 4.4. SACQ Personal-Emotional Adjustment Subscale

Sample Mean, Range, and Standard Deviation on Personal-Emotional Adjustment (PEA) Scale (n=134)

	SUMMER PARTICIPANTS			NON-SUMMER PARTICIPANTS		
SCALE/CLUSTER/ITEM	MEDIAN	MEAN	ST. DEV.	MEDIAN	MEAN	ST. DEV.
Total for Full Scale	94.0	6.11	1.74	94.0	6.06	1.55
Psychological	56.0	5.96	1.87	57.0	6.01	1.61
I've been feeling tense or nervous lately.	5.0	4.96	2.694	5.0	4.73	2.550
Lately, I have been feeling blue and moody a lot.	7.0	6.07	2.560	7.0	6.24	2.577
Being on my own, taking responsibility for myself, has not been easy.	7.0	6.10	2.840	7.0	6.78	2.373
I haven't been able to control my emotions very well lately.	8.0	6.43	2.803	7.0	6.33	2.659
I've given a lot of thought lately to whether I should ask for help from the Psychological/Counseling Services Center or from a psychotherapist outside of college.	9.0	7.45	2.770	9.0	7.82	2.393
I've been getting angry too easily lately.	8.0	6.64	2.655	8.0	6.67	2.567
Sometimes, my thinking gets muddled up to easily.	5.0	5.21	2.484	5.0	4.93	2.825
I worry a lot about my college expenses.	5.0	4.82	3.070	5.0	4.81	2.924
I'm experiencing a lot of difficulty coping with the stresses imposed upon me in college.	7.0	5.99	2.847	7.0	5.84	2.435

	Summer Participants			Non-Summer Participants		
Scale/Cluster/Item	**Median**	**Mean**	**St. Dev.**	**Median**	**Mean**	**St. Dev.**
Total for Full Scale	94.0	6.11	1.74	94.0	6.06	1.55
Physical	40.0	6.35	1.81	37.0	6.14	1.64
I have felt tired much of the time lately.	3.0	4.31	2.595	4.0	4.48	2.331
My appetite has been good lately.	9.0	7.10	2.541	8.0	7.24	2.209
I have been having a lot of headaches lately.	8.0	6.52	2.841	8.0	6.42	2.781
I put on (or lost) too much weight recently.	8.0	6.79	2.733	6.0	6.01	2.852
I haven't been sleeping very well.	7.0	5.97	2.801	7.0	5.76	2.850
I have been feeling in good health lately.	8.0	7.42	2.291	7.0	6.93	2.169

Table 4.5. SACQ Goal Commitment/Institutional Adjustment Subscale

Sample Mean, Range, and Standard Deviation on Goal Commitment/Institutional Adjustment (GCIA) Scale (n=134)

	Summer Participants			Non-Summer Participants		
Scale/Cluster/Item	**Median**	**Mean**	**St. Dev.**	**Median**	**Mean**	**St. Dev.**
Total for Full Scale	120.0	7.26	186	117.0	7.34	1.64
General	27.0	7.78	2.42	27.0	7.98	2.13
I'm pleased now about my decision to go to college.	9.0	7.81	2.500	9.0	8.34	1.788
Lately, I have been giving a lot of thought to dropping out of college altogether and for good.	9.0	7.85	2.715	9.0	7.97	2.534
I find myself giving considerable thought to taking time off from college and finishing later.	9.0	7.69	2.819	9.0	7.64	2.678
This College	36.0	7.43	2.41	34.0	7.80	1.98
I'm pleased now about my decision to attend this college in particular.*	9.0	7.60	2.468	9.0	8.16	1.959
I wish I were at another college or university.	9.0	7.12	2.853	9.0	7.40	2.517
I expect to stay at this college for a Bachelor's degree.	9.0	7.60	2.612	9.0	8.12	1.973
Lately, I have been giving a lot of thought to transferring to another college.	9.0	7.40	2.866	9.0	7.54	2.642

*This item also appears on the SA subscale.

Appendix L: Supplementary Tables 4.9 to 4.22

Table 4.9. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Academic Adjustment: Application Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.28(.009*)	.10(.15)
Introduction Meeting	42	.40(.50)	.81(.82)
Chemistry Class	42	.38(.01*)	.11(.20)
Chemistry Lab Class	42	.31(.19)	.04(.05)
Engineering Class	42	.06(.04*)	.83(.83)
Math Class	42	.01(.01*)	.90(.90)
Campus Tour	42	.06(.03*)	.72(.72)
STEP Schedule Overview	42	.88(.88)	.15(.27)
Floor Meeting	42	.70(.85)	.92(.92)
Student ID Pickup	42	.45(.21)	.20(.22)
Registration & Class Sign Up and information for fall term	42	.45(.64)	.36(.37)
Meetings with Ass. Dean of Eng.	42	.09(.05)	.76(.76)
Friday Seminars	42	.62(.76)	.31(.32)
Evening Out-Bowling	42	.38(.53)	.49(.62)
Skating	42	.28(.44)	.15(.21)
Trip to Mall	42	.48(.63)	.16(.23)
4th of July Cookout	42	.43(.37)	.84(.84)
Ropes Course	42	.67(.83)	.32(.46)
Updating Your Resumes	42	.86(.93)	.66(.68)
Lab Tours	42	.54(.67)	.08(.10)
Etiquette Dinner	42	.80(.91)	.03(.04*)
Fortune 500 Company Teambuilding Activities	42	.48(.58)	.06(.08)
Move-out Meeting	42	.55(.66)	.38(.39)
Seminar Sponsored by Fortune 500 Company	42	.14(.003*)	.65(.72)
Student Panel	42	.22(.15)	.24(.26)
On-line Survey	42	.04(.02*)	.56(.57)
University Freshmen Orientation	42	.36(.17)	.22(.31)
Move-Out	42	.66(.63)	.42(.48)
Closing Ceremony	42	.49(.62)	.04(.06)

P-values are in parentheses. Significant differences are denoted with an asterisk (*)

Table 4.10. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Academic Adjustment: Motivation Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.001(.0004*)	.33(.39)
Introduction Meeting	42	.52(.62)	.87(.87)
Chemistry Class	42	.50(.62)	.28(.38)
Chemistry Lab Class	42	.47(.47)	.49(.62)
Engineering Class	42	.60(.58)	.37(.51)
Math Class	42	.58(.65)	.54(.68)
Campus Tour	42	.16(.08)	.70(.71)
STEP Schedule Overview	42	.35(.46)	.78(.79)
Floor Meeting	42	.11(.25)	.02(.03*)
Student ID Pickup	42	.53(.64)	.75(.76)
Registration & Class Sign Up and information for fall term	42	.85(78)	.61(.75)
Meetings with Associate Dean of Engineering	42	.31(.23)	.05(.09)
Friday Seminars	42	.09(.18)	.53(.54)
Evening Out-Bowling	42	.50(.62)	.46(.48)
Skating	42	.05(.01*)	.57(.64)
Trip to Mall	41	.58(.71)	.54(.67)
4th of July Cookout	42	.45(.58)	.53(.54)
Ropes Course	42	.20(.34)	.91(.91)
Updating Your Resumes	42	.85(.93)	.34(.44)
Lab Tours	41	.01(.0004*)	.90(.91)
Etiquette Dinner	42	.51(.57)	.04(.06)
Fortune 500 Company Teambuilding Activities	42	.25(.54)	.62(.64)
Move-out Meeting	42	.54(.71)	.11(.21)
Seminar Sponsored by Fortune 500 Company	42	.17(.41)	.51(.53)
Student Panel	42	.12(.11)	.10(.11)
On-line Survey	42	.02(.04*)	.67(.68)
University Freshmen Orientation	42	.93(.95)	.60(.62)
Move-Out	42	.51(.51)	.92(.92)
Closing Ceremony	42	.10(.13)	.72(.73)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.11. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Academic Adjustment: Environment Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.49(.60)	.78(.79)
Introduction Meeting	42	.29(.29)	.87(.88)
Chemistry Class	42	.20(.27)	.14(.23)
Chemistry Lab Class	42	.05(.02*)	.03(.06)
Engineering Class	42	.17(.15)	.36(.49)
Math Class	42	.19(.23)	.23(.36)
Campus Tour	42	.46(.70)	.06(.13)
STEP Schedule Overview	42	.28(.45)	.65(.66)
Floor Meeting	42	.12(.21)	.37(.39)
Student ID Pickup	42	.12(.12)	.53(.55)
Registration & Class Sign Up and information for fall term	42	.75(.67)	.01(.02*)
Meetings with Associate Dean of Engineering	42	.21(.25)	.69(.70)
Friday Seminars	42	.72(.86)	.99(.99)
Evening Out-Bowling	42	.64(.85)	.53(.54)
Skating	42	.42(.63)	.93(.94)
Trip to Mall	41	.69(.85)	.70(.71)
4th of July Cookout	42	.92(.96)	.09(.17)
Ropes Course	42	.32(.22)	.31(.36)
Updating Your Resumes	42	.05(.12)	.44(46)
Lab Tours	42	.02(.06)	.48(.51)
Etiquette Dinner	42	.41(.58)	.09(.11)
Fortune 500 Company Teambuilding Activities	42	.10(.05)	.83(.84)
Move-out Meeting	42	.09(.14)	.10(.13)
Seminar Sponsored by Fortune 500 Company	42	.10(.05)	.71(.72)
Student Panel	42	.56(.64)	.84(.85)
On-line Survey	42	.31(.34)	.15(.17)
University Freshmen Orientation	42	.46(.67)	.95(.95)
Move-Out	42	.59(.63)	.45(.52)
Closing Ceremony	42	.38(.55)	.79(.80)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.12. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Academic Adjustment: Performance Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	41	.28(.28)	.91(.91)
Introduction Meeting	41	.37(.45)	.72(.73)
Chemistry Class	41	.50(.57)	.04(.06)
Chemistry Lab Class	41	.86(.96)	.12(.18)
Engineering Class	41	.75(.89)	.27(.28)
Math Class	41	.20(.32)	.23(.29)
Campus Tour	41	.33(.56)	.07(.09)
STEP Schedule Overview	41	.92(.98)	.20(.31)
Floor Meeting	41	.07(.09)	.35(.45)
Student ID Pickup	41	.33(.42)	.05(.14)
Registration & Class Sign Up and information for fall term	41	.72(.74)	.34(.36)
Meetings with Associate Dean of Engineering	41	.26(.43)	.65(.72)
Friday Seminars	41	.18(.42)	.83(.84)
Evening Out-Bowling	41	.35(.44)	.23(.35)
Skating	41	.33(.44)	.48(.61)
Trip to Mall	40	.46(.47)	.39(.51)
4th of July Cookout	41	.76(.78)	.30(.45)
Ropes Course	41	.06(.14)	.48(.50)
Updating Your Resumes	41	.09(.24)	.50(.51)
Lab Tours	40	.04(.05)	.49(.52)
Etiquette Dinner	41	.89(95)	.05(.06)
Fortune 500 Company Teambuilding Activities	41	.22(.38)	.21(.23)
Move-out Meeting	41	.48(.44)	.21(.33)
Seminar Sponsored by Fortune 500 Company	41	.28(.58)	.07(.09)
Student Panel	41	.07(.15)	.16(.19)
On-line Survey	41	.01(.02*)	.23(.26)
University Freshmen Orientation	41	.82(.82)	.62(.70)
Move-Out	41	.29(.21)	.44(.51)
Closing Ceremony	41	.46(.59)	.84(.85)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.13. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Social Adjustment: Environment Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.76(.81)	.59(.62)
Introduction Meeting	42	.38(.33)	.03(.07)
Chemistry Class	42	.80(.81)	.16(.25)
Chemistry Lab Class	42	.86(.89)	.22(.30)
Engineering Class	42	.72(.82)	.27(.30)
Math Class	42	.48(.60)	.20(.22)
Campus Tour	42	.84(.90)	.95(.95)
STEP Schedule Overview	42	.20(.11)	.32(.33)
Floor Meeting	42	.44(.58)	.01(.05)
Student ID Pickup	42	.19(.23)	.78(.79)
Registration & Class Sign Up and information for fall term	42	.22(.31)	.74(.75)
Meetings with Associate Dean of Engineering	42	.36(.11)	.04(.10)
Friday Seminars	42	.24(.22)	.86(.86)
Evening Out-Bowling	42	.62(.61)	.04(.09)
Skating	42	.65(.61)	.05(.09)
Trip to Mall	40	.81(.93)	.41(.47)
4th of July Cookout	42	.81(.82)	.44(.56)
Ropes Course	42	.11(.17)	.11(.15)
Updating Your Resumes	42	.35(.58)	.22(.24)
Lab Tours	42	.23(.36)	.24(.28)
Etiquette Dinner	42	.28(.39)	.33(.35)
Fortune 500 Company Teambuilding Activities	42	.11(.09)	.79(.80)
Move-out Meeting	42	.82(.90)	.004(.02*)
Seminar Sponsored by Fortune 500 Company	42	.14(.10)	.19(.23)
Student Panel	42	.77(.89)	.49(.51)
On-line Survey	42	.03(.02)	.95(.96)
University Freshmen Orientation	42	.009(.01*)	.15(.17)
Move-Out	42	.37(.58)	.78(.78)
Closing Ceremony	42	.42(.35)	.62(.63)

P-values are in parentheses. Significant differences are denoted with an asterisk (*)

Table 4.14. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Social Adjustment: General Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.76(.81)	.59(.62)
Introduction Meeting	42	.48(.67)	.001(.006*)
Chemistry Class	42	.27(.45)	.36(.41)
Chemistry Lab Class	42	.15(.31)	.88(.89)
Engineering Class	42	.39(.51)	.49(.51)
Math Class	42	.40(.63)	.31(.35)
Campus Tour	42	.17(.23)	.62(.63)
STEP Schedule Overview	42	.19(.36)	.07(.10)
Floor Meeting	42	.37(.56)	.72(.79)
Student ID Pickup	42	.32(.31)	.70(.71)
Registration & Class Sign Up and information for fall term	42	.55(.66)	.49(.51)
Meetings with Associate Dean of Engineering	42	.17(.20)	.08(.10)
Friday Seminars	42	.24(.27)	.39(.43)
Evening Out-Bowling	42	.85(91)	.38(.46)
Skating	42	.91(.96)	.44(.55)
Trip to Mall	42	.74(.91)	.28(.42)
4th of July Cookout	42	.02(.0006*)	.04(.08)
Ropes Course	42	.44(.06)	.42(.56)
Updating Your Resumes	42	.52(.62)	.24(.41)
Lab Tours	42	.06(.06)	.29(.31)
Etiquette Dinner	42	.59(.59)	.07(.14)
Fortune 500 Company Teambuilding Activities	42	.08(.27)	.31(.33)
Move-out Meeting	42	.04 (.12)	.95(.95)
Seminar Sponsored by Fortune 500 Company	42	.79(.89)	.45(.47)
Student Panel	42	.37(.60)	.02(.03*)
On-line Survey	41	.12(.12)	.81(.81)
University Freshmen Orientation	42	.01(.04*)	.15(.17)
Move-Out	42	.21(.23)	.02(.08)
Closing Ceremony	42	.42(.46)	.43(.45)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.15. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Social Adjustment: Nostalgia Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.37(.45)	.02(.06)
Introduction Meeting	42	.63(.82)	.81(.82)
Chemistry Class	42	.10(.24)	.97(.97)
Chemistry Lab Class	41	.01(.07)	.82(.82)
Engineering Class	42	.03(.12)	.58(.60)
Math Class	42	.05(.18)	.83(.84)
Campus Tour	42	.26(.41)	.01(.04*)
STEP Schedule Overview	42	.42(.59)	.14(.25)
Floor Meeting	42	.007(.02*)	.09(.17)
Student ID Pickup	42	.35(.43)	.48(.48)
Registration & Class Sign Up and information for fall term	42	.46(.59)	.46(.47)
Meetings with Associate Dean of Engineering	42	.46(.59)	.30(.32)
Friday Seminars	42	.005(.01*)	.69(.70)
Evening Out-Bowling	42	.68(.62)	.06(.16)
Skating	42	.66(.56)	.07(.16)
Trip to Mall	40	.24(.03*)	.59(.67)
4th of July Cookout	42	.69(.80)	.99(.99)
Ropes Course	42	.59(.70)	.60(.67)
Updating Your Resumes	42	.16(.24)	.07(.10)
Lab Tours	42	.03(.10)	.88(.88)
Etiquette Dinner	42	.09(.12)	.61(.62)
Fortune 500 Company Teambuilding Activities	42	.04(.07)	.19(.22)
Move-out Meeting	42	.02(.07)	.81(.81)
Seminar Sponsored by Fortune 500 Company	42	.05(.16)	.53(.55)
Student Panel	42	.44(.59)	.09(.10)
On-line Survey	42	.45(.51)	.58(.71)
University Freshmen Orientation	42	.15(.23)	.16(.19)
Move-Out	42	.65(.79)	.58(.58)
Closing Ceremony	42	.24(.45)	.22(24)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.16. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Social Adjustment: Other People Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.69(.76)	.89(.89)
Introduction Meeting	42	.28(.38)	.75(.76)
Chemistry Class	42	.35(.55)	.94(.94)
Chemistry Lab Class	42	.70(.87)	.78(.79)
Engineering Class	42	.74(.87)	.55(.56)
Math Class	42	.19(.34)	.59(.60)
Campus Tour	42	.17(.32)	.47(.49)
STEP Schedule Overview	42	.65(.73)	.33(.35)
Floor Meeting	42	.50(.49)	.26(.39)
Student ID Pickup	42	.26(.46)	.57(.58)
Registration & Class Sign Up and information for fall term	42	.74(.84)	.19(.34)
Meetings with Associate Dean of Engineering	42	.86(.94)	.26(.28)
Friday Seminars	42	.23(.25)	.11(.15)
Evening Out-Bowling	42	.40(.61)	.20(.30)
Skating	42	.88(.92)	.46(.55)
Trip to Mall	40	.85(.94)	.89(.89)
4th of July Cookout	42	.58(.68)	.46(.56)
Ropes Course	42	.18(.22)	.77(.77)
Updating Your Resumes	42	.44(74)	.42(.54)
Lab Tours	42	.30(.51)	.86(.86)
Etiquette Dinner	42	.85(.92)	.76(.84)
Fortune 500 Company Teambuilding Activities	42	.15(.30)	.29(.31)
Move-out Meeting	42	.01(.01*)	.29(.31)
Seminar Sponsored by Fortune 500 Company	42	.66(.72)	.35(.37)
Student Panel	42	.12(.23)	.62(.63)
On-line Survey	42	.37(.36)	.50(.63)
University Freshmen Orientation	42	.41(.51)	94(.94)
Move-Out	42	.38(.47)	.21(.24)
Closing Ceremony	41	.55(.69)	.08(.10)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.17. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Personal-Emotional Adjustment: Physical Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.74(.85)	.13(.20)
Introduction Meeting	42	.48(.60)	.13(.24)
Chemistry Class	42	.83(.92)	.54(.56)
Chemistry Lab Class	42	.54(.52)	.41(.42)
Engineering Class	42	.50(.73)	.72(.79)
Math Class	42	.36(.53)	.30(.45)
Campus Tour	42	.50(.67)	.41(.42)
STEP Schedule Overview	42	.69(.71)	.61(.68)
Floor Meeting	42	.31(.31)	.50(.51)
Student ID Pickup	42	.20(.33)	.15(.16)
Registration & Class Sign Up and information for fall term	42	.38(.46)	.35(.41)
Meetings with Associate Dean of Engineering	42	.35(.42)	.47(.49)
Friday Seminars	42	.49(.39)	.73(.74
Evening Out-Bowling	42	.51(.49)	.99(.99)
Skating	42	.57(.76)	.17(.21)
Trip to Mall	40	.43(.65)	.80(.80)
4th of July Cookout	42	.57(.69)	.72(.72)
Ropes Course	42	.51(.63)	.04(.12)
Updating Your Resumes	42	.71(.75)	.91(.91)
Lab Tours	42	.23(.07)	.71(.78)
Etiquette Dinner	42	.65(.78)	.06(.08)
Fortune 500 Company Teambuilding Activities	42	.16(.10)	.43(.44)
Move-out Meeting	42	.48(.59)	.58(.59)
Seminar Sponsored by Fortune 500 Company	42	.75(.68)	.42(.54)
Student Panel	42	.78(.80)	.70(.77)
On-line Survey	42	.77(.84)	.73(.80)
University Freshmen Orientation	42	.90(.94)	.58(.59)
Move-Out	42	.80(.90)	.15(.17)
Closing Ceremony	42	.36(.50)	.78(.75)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.18. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Personal-Emotional Adjustment: Psychological Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.60(.73)	.61(.62)
Introduction Meeting	42	.52(.71)	.36(.47)
Chemistry Class	42	.75(.86)	.25(.30)
Chemistry Lab Class	42	.53(.21)	.27(.36)
Engineering Class	42	.23(.30)	.98(.98)
Math Class	42	.63(.80)	.32(.37)
Campus Tour	42	.43(.54)	.98(.98)
STEP Schedule Overview	42	.82(.89)	.50(.52)
Floor Meeting	42	.56(.66)	.97(.97)
Student ID Pickup	42	.20(.41)	.88(.88)
Registration & Class Sign Up and information for fall term	42	.09(.24)	.51(.54)
Meetings with Associate Dean of Engineering	42	.04(.06)	.66(.69)
Friday Seminars	42	.43(.62)	.91(.91)
Evening Out-Bowling	42	.34(.35)	.30(.33)
Skating	42	.35(.32)	.03(.07)
Trip to Mall	40	.24(.22)	.01(.05)
4th of July Cookout	42	.24(.09)	.007(.03*)
Ropes Course	42	.69(.82)	.35(.46)
Updating Your Resumes	42	.01(.006*)	.18(.19)
Lab Tours	42	.18(.18)	.98(.98)
Etiquette Dinner	42	.17(.31)	.40(.43)
Fortune 500 Company Teambuilding Activities	42	.04(.16)	.44(.46)
Move-out Meeting	42	.70(.74)	.38(.55)
Seminar Sponsored by Fortune 500 Company	42	.03(.12)	.96(.96)
Student Panel	42	.81(.91)	.49(.51)
On-line Survey	42	.70(.78)	.88(.88)
University Freshmen Orientation	42	.76(.85)	.14(.17)
Move-Out	42	.17(.26)	.30(.33)
Closing Ceremony	42	.64(.66)	.64(.65)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.19. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Goal Commitment/Institutional Commitment Adjustment: General Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.92(.97)	.60(.63)
Introduction Meeting	42	.70(.79)	.79(.79)
Chemistry Class	42	.57(.75)	.53(.55)
Chemistry Lab Class	42	.69(.85)	.69(.77)
Engineering Class	42	.51(.79)	.34(.50)
Math Class	42	.39(.72)	.27(.37)
Campus Tour	42	.76(.91)	.04(.12)
STEP Schedule Overview	42	.29(.57)	.57(.58)
Floor Meeting	42	.52(.53)	.12(.14)
Student ID Pickup	42	.47(.64)	.05(.09)
Registration & Class Sign Up and information for fall term	42	.85(.95)	.44(.44)
Meetings with Associate Dean of Engineering	42	.82(.91)	.89(.90)
Friday Seminars	42	.06(.12)	.69(.70)
Evening Out-Bowling	42	.43(.57)	.46(.49)
Skating	42	.36(.35)	.25(.34)
Trip to Mall	42	.37(.50)	.04(.11)
4th of July Cookout	42	.30(.40)	.33(.37)
Ropes Course	42	.65(.67)	.17(.26)
Updating Your Resumes	42	.16(.27)	.65(.66)
Lab Tours	42	.06(.06)	.90(.90)
Etiquette Dinner	42	.34(.35)	.42(.54)
Fortune 500 Company Teambuilding Activities	42	.12(.23)	.81(.82)
Move-out Meeting	42	.12(.22)	.34(.36)
Seminar Sponsored by Fortune 500 Company	42	.26(.31)	.42(.54)
Student Panel	42	.38(.39)	.45(.46)
On-line Survey	42	.22(.21)	.44(.52)
University Freshmen Orientation	42	.71(.79)	.01(.04*)
Move-Out	42	.03(.05)	.37(.40)
Closing Ceremony	42	.53(.67)	.81(.82)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.20. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Goal Commitment/Institutional Commitment Adjustment: This College Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.27(.41)	.55(.56)
Introduction Meeting	42	.63(.82)	.10(.13)
Chemistry Class	42	.58(.75)	.44(.51)
Chemistry Lab Class	42	.79(.93)	.30(.45)
Engineering Class	42	.84(.95)	.42(.54)
Math Class	42	.26(.55)	.74(.74)
Campus Tour	42	.67(.77)	.06(.16)
STEP Schedule Overview	42	.02(.09)	.72(.72)
Floor Meeting	42	.27(.32)	.96(.96)
Student ID Pickup	42	.53(.81)	.82(.82)
Registration & Class Sign Up and information for fall term	42	.66(.88)	.70(.71)
Meetings with Associate Dean of Engineering	42	.24(.33)	.10(.20)
Friday Seminars	42	.10(.15)	.58(.59)
Evening Out-Bowling	42	.32(.58)	.44(.45)
Skating	42	.33(.44)	.03(.06)
Trip to Mall	40	.40(.52)	.01(.03*)
4th of July Cookout	42	.10(.21)	.11(.21)
Ropes Course	42	.69(.79)	.01(.05)
Updating Your Resumes	42	.64(.76)	.21(.23)
Lab Tours	42	.19(.37)	.89(.89)
Etiquette Dinner	41	.46(.71)	.28(.31)
Fortune 500 Company Teambuilding Activities	42	.02(.06)	.44(.45)
Move-out Meeting	42	.05(.10)	.66(.67)
Seminar Sponsored by Fortune 500 Company	42	.22(.88)	.22(.27)
Student Panel	42	.39(.46)	.08(.11)
On-line Survey	42	.04(.05)	.51(.64)
University Freshmen Orientation	42	.38(.52)	.005(.01*)
Move-Out	42	.27(.34)	.42(.49)
Closing Ceremony	42	.33(.60)	.33(.35)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.21. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Rank Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.85(.56)	.22(.56)
Introduction Meeting	42	.89(.29)	.21(.52)
Chemistry Class	42	.72(.58)	.03(.17)
Chemistry Lab Class	42	.88(.86)	.06(.31)
Engineering Class	42	.97(.89)	.15(.44)
Math Class	42	.97(.87)	.008(.06)
Campus Tour	42	.95(.55)	.01(.15)
STEP Schedule Overview	42	.82(.43)	.03(.21)
Floor Meeting	41	.40(.05)	.11(.37)
Student ID Pickup	42	.93(.49)	.06(.34)
Registration & Class Sign Up and information for fall term	42	.71(.49)	.10(.31)
Meetings with Associate Dean of Engineering	42	.87(.33)	.54(.77)
Friday Seminars	42	.80(.09)	.27(.62)
Evening Out-Bowling	42	.78(.11)	.06(.28)
Skating	42	.96(.50)	.005(.10)
Trip to Mall	42	.64(.26)	.10(.40)
4th of July Cookout	42	.93(.44)	.04(.25)
Ropes Course	42	.92(.80)	.62(.86)
Updating Your Resumes	42	.77(.07)	.16(.49)
Lab Tours	42	.81(.49)	.01(.16)
Etiquette Dinner	42	.93(.82)	.02(.19)
Fortune 500 Company Teambuilding Activities	42	.76(.78)	.37(.68)
Move-out Meeting	42	.82(.66)	.04(.18)
Seminar Sponsored by Fortune 500 Company	42	.81(.41)	.26(.56)
Student Panel	42	.90(.60)	.18(.48)
On-line Survey	42	.67(.55)	.32(.56)
University Freshmen Orientation	42	.88(.47)	.04(.15)
Move-Out	42	.80(.57)	.16(.36)
Closing Ceremony	42	.75(.13)	.01(.13)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Table 4.22. Likelihood Ratio and Pearson Significance Tests on Summer Bridge Inventory Subscale Raw Scores

Activities	N	Likelihood Ratio/Pearson (P Value for Race)	Likelihood Ratio/Pearson (P Value for Gender)
Individual and Group Pictures	42	.36(.41)	.02(.04*)
Introduction Meeting	42	.24(.17)	.55(.55)
Chemistry Class	42	.82(.90)	.25(.33)
Chemistry Lab Class	42	.82(.90)	.25(.33)
Engineering Class	42	.82(.90)	.25(.33)
Math Class	42	.82(.90)	.25(.33)
Campus Tour	42	.34(.38)	.22(.24)
STEP Schedule Overview	42	.24(.45)	.27(.28)
Floor Meeting	42	.78(.83)	.007(.02*)
Student ID Pickup	42	.30(.31)	.22(.36)
Registration & Class Sign Up and information for fall term	42	.09(.16)	.18(.22)
Meetings with Associate Dean of Engineering	42	.12(.02*)	.63(.72)
Friday Seminars	42	.01(.01*)	.17(.20)
Evening Out-Bowling	42	.43(.27)	.60(.60)
Skating	42	.29(.10)	.94(.94)
Trip to Mall	42	.48(.30)	.21(.31)
4th of July Cookout	42	.29(.10)	.94(.94)
Ropes Course	42	.80(.87)	.37(.51)
Updating Your Resumes	42	.93(.93)	.30(.31)
Lab Tours	42	.41(.43)	.81(.82)
Etiquette Dinner	42	.75(.87)	.45(.53)
Fortune 500 Company Teambuilding Activities	42	.28(.30)	.41(.42)
Move-out Meeting	42	.70(.74)	.53(.61)
Seminar Sponsored by Fortune 500 Company	42	.45(.34)	.42(.44)
Student Panel	42	.80(.91)	.47(.47)
On-line Survey	42	.72(.81)	.86(.86)
University Freshmen Orientation	42	.61(.76)	.12(.17)
Move-Out	42	.33(.42)	.44(.51)
Closing Ceremony	42	.40(.56)	.29(.34)

P-values are in parentheses. Significant differences are denoted with an asterisk (*).

Appendix M: Supplementary Table 4.23

Table 4.23. Mean and Standard Deviations for Rankings for the 29 Activities of the SBI

Activities	**N**	**Mean**	**SD**
Engineering Class	42	25.40	4.72
Math Class	42	22.93	5.54
Chemistry Lab Class	42	22.21	6.25
Chemistry Class	42	22.00	6.81
Registration & Class Sign Up and information for fall term	42	21.19	5.64
Ropes Course	42	20.38	7.81
4th of July Cookout	42	18.71	7.11
Campus Tour	42	17.90	6.35
Updating Your Resumes	42	17.38	6.25
Etiquette Dinner	42	17.33	7.59
Evening Out-Bowling	42	17.02	6.64
Orientation Meetings with Associate Dean of Engineering	42	16.98	5.95
Introduction Meeting	42	16.26	6.68
Skating	42	15.90	7.75
Student ID Pickup	42	14.81	7.56
Lab Tours	42	14.40	6.94
Trip to Mall	42	13.76	8.30
STEP Schedule Overview	42	13.31	6.23
Floor Meeting	41	13.20	6.44
Closing Ceremony	42	13.14	8.53
Individual and Group Pictures	42	12.36	7.72
Friday Seminars	42	11.64	6.33
Fortune 500 Company Teambuilding Activities	42	11.60	6.75
Move-out Meeting	42	11.14	6.91
Student Panel	42	10.50	6.82
Seminar Sponsored by Fortune 500 Company	42	7.48	4.94
Move-Out	42	7.17	5.13
University Freshmen Orientation	42	5.19	6.33
On-line Survey	42	4.57	3.34

Appendix N: Supplementary Table 4.24

Table 4.24. Mean Ranks for Activities Based on SBI Scales

(1 =Academic, 2 = Social, 3 Personal-Emotional, and 4=Goal Commitment and Institutional Adjustment)

Activities	N	Subscale Mean	SBI Scale
Engineering Class	42	1.07	Academic
Math Class	42	1.07	Academic
Chemistry Lab Class	42	1.07	Academic
Chemistry Class	42	1.07	Academic
4th of July Cookout	42	2.04	Social
Skating	42	2.04	Social
Evening Out-Bowling	42	2.07	Social
Trip to Mall	42	2.19	Social
Individual and Group Pictures	42	2.35	Social
Registration & Class Sign Up and information for fall term	42	2.4	Social
Etiquette Dinner	42	2.4	Social
Student Panel	42	2.42	Social
Friday Seminars	42	2.5	Social
Floor Meeting	42	2.52	Social
Introduction Meeting	42	2.54	Social
Updating Your Resumes	42	2.69	Social
Closing Ceremony	42	2.73	Social
Ropes Course	42	2.76	Social
Orientation Meetings with Associate Dean of Engineering	42	2.78	Social
Seminar Sponsored by Fortune 500 Company	42	2.83	Social
Move-Out	42	2.85	Social
University Freshmen Orientation	42	2.9	Social
STEP Schedule Overview	42	2.92	Social
Fortune 500 Company Teambuilding Activities	42	2.92	Social
Move-out Meeting	42	2.95	Social
Lab Tours	42	3.04	Personal Emotional
Student ID Pickup	42	3.23	Personal Emotional
Campus Tour	42	3.4	Personal Emotional
On-line Survey	42	3.42	Personal Emotional

The range is the following: 1-1.99 (Academic), 2.0-2.99 (Social), 3.0-3.99 (Personal-Emotional),and 4.0-4.99 (Goal Commitment/Institutional

Appendix O: Supplementary Tables 4.26 to 4.36

Table 4.25. Activity Means and Standard Deviation from the Summer Bridge Inventory for Academic Adjustment: Motivation Subscale

Activity	**N**	**Mean**	**SD**
Engineering Class	42	4.64	0.66
Registration & Class Sign Up and information for fall term	42	4.60	0.89
Math Class	42	4.45	0.92
Orientation Meetings with Associate Dean of Engineering	42	4.45	0.92
Chemistry Class	42	4.43	0.89
Chemistry Lab Class	42	4.40	0.91
Updating Your Resumes	42	4.10	1.16
Lab Tours	41	3.76	1.43
Campus Tour	42	3.64	1.38
Fortune 500 Company Teambuilding Activities	42	3.26	1.43
Introduction Meeting	42	3.21	1.32
Student Panel	42	3.21	1.41
Seminar Sponsored by Fortune 500 Company	42	3.19	1.42
Floor Meeting	42	3.19	1.23
Closing Ceremony	42	3.19	1.63
Friday Seminars	42	3.07	1.40
Student ID Pickup	42	3.05	1.58
Ropes Course	42	3.00	1.40
STEP Schedule Overview	42	2.98	1.39
4th of July Cookout	42	2.88	1.43
Etiquette Dinner	42	2.71	1.37
Evening Out-Bowling	42	2.57	1.40
On-line Survey	42	2.43	1.43
Skating	42	2.40	1.19
University Freshmen Orientation	42	2.36	1.34
Move-Out	42	2.33	1.44
Trip to Mall	41	2.24	1.26
Individual and Group Pictures	42	2.17	1.23
Move-out Meeting	42	2.05	1.13

Table 4.26. Activity Means and Standard Deviation from the Summer Bridge Inventory for Academic Adjustment: Application Subscale

Activities	**N**	**Mean**	**SD**
Engineering Class	42	4.64	0.62
Chemistry Lab Class	42	4.52	0.74
Chemistry Class	42	4.45	0.89
Math Class	42	4.33	1.03
Registration & Class Sign Up and information for fall term	42	4.14	1.24
Meetings with Associate Dean of Engineering	42	4.02	1.20
Updating Your Resumes	42	3.98	1.33
Lab Tours	41	3.20	1.29
Friday Seminars	42	2.93	1.40
Fortune 500 Company Teambuilding Activities	42	2.90	1.43
Ropes Course	42	2.86	1.52
Move-out Meeting	42	2.86	1.39
STEP Schedule Overview	42	2.86	1.35
Campus Tour	42	2.79	1.44
Student Panel	42	2.69	1.20
Introduction Meeting	42	2.64	1.43
Closing Ceremony	42	2.50	1.49
Etiquette Dinner	42	2.36	1.45
On-line Survey	42	2.29	1.24
University Freshmen Orientation	42	2.26	1.31
Floor Meeting	42	2.26	1.17
4th of July Cookout	42	2.10	1.28
Student ID Pickup	42	2.10	1.28
Seminar Sponsored by Fortune 500 Company	42	1.88	1.13
Evening Out-Bowling	42	1.83	0.99
Skating	42	1.79	0.92
Move-Out	42	1.74	1.13
Individual and Group Pictures	42	1.74	0.96
Trip to Mall	41	1.59	0.92

Table 4.27. Activity Means and Standard Deviation from the Summer Bridge Inventory for Academic Adjustment: Performance Subscale

Activities	**N**	**Mean**	**SD**
Chemistry Lab Class	41	4.66	0.66
Engineering Class	41	4.59	0.59
Chemistry Class	41	4.56	0.67
Math Class	41	4.46	0.87
Meetings with Associate Dean of Engineering	41	3.85	1.33
Registration & Class Sign Up and information for fall term	41	3.46	1.66
Updating Your Resumes	41	3.44	1.43
Fortune 500 Company Teambuilding Activities	41	3.00	1.48
Move-out Meeting	41	2.80	1.42
Lab Tours	40	2.80	1.44
Friday Seminars	41	2.73	1.47
STEP Schedule Overview	41	2.66	1.35
Student Panel	41	2.63	1.24
Ropes Course	41	2.54	1.50
Campus Tour	41	2.49	1.42
Introduction Meeting	41	2.46	1.32
Closing Ceremony	41	2.39	1.61
Etiquette Dinner	41	2.22	1.39
Floor Meeting	41	2.15	1.28
4th of July Cookout	41	2.02	1.29
On-line Survey	41	2.00	1.14
Student ID Pickup	41	1.88	1.23
University Freshmen Orientation	41	1.85	1.15
Evening Out-Bowling	41	1.78	1.13
Skating	41	1.61	0.97
Seminar Sponsored by Fortune 500 Company	41	1.61	1.09
Trip to Mall	40	1.53	0.99
Individual and Group Pictures	41	1.44	0.81
Move-Out	41	1.39	0.83

Table 4.28. Activity Means and Standard Deviation from the Summer Bridge Inventory for Academic Adjustment: Academic Environment Subscale

Activities	**N**	**Mean**	**SD**
Chemistry Class	42	4.48	0.92
Chemistry Lab Class	42	4.43	1.02
Engineering Class	42	4.38	0.94
Math Class	42	4.31	1.05
Campus Tour	42	3.95	1.25
Meetings with Associate Dean of Engineering	42	3.90	1.30
Registration & Class Sign Up and information for fall term	42	3.64	1.54
Updating Your Resumes	42	3.43	1.52
Lab Tours	42	3.43	1.40
Introduction Meeting	42	3.19	1.35
Floor Meeting	42	3.17	1.32
Friday Seminars	42	3.07	1.42
Student Panel	42	2.93	1.35
Ropes Course	42	2.88	1.52
Evening Out-Bowling	42	2.83	1.56
Seminar Sponsored by Fortune 500 Company	42	2.83	1.58
4th of July Cookout	42	2.81	1.52
Fortune 500 Company Teambuilding Activities	42	2.79	1.54
Etiquette Dinner	42	2.76	1.53
Student ID Pickup	42	2.71	1.49
STEP Schedule Overview	42	2.69	1.37
Closing Ceremony	42	2.64	1.69
Skating	42	2.52	1.47
Individual and Group Pictures	42	2.24	1.46
On-line Survey	42	2.21	1.46
Trip to Mall	41	2.20	1.47
University Freshmen Orientation	42	2.17	1.34
Move-out Meeting	42	1.86	1.12
Move-Out	42	1.64	1.28

Table 4.29. Activity Means and Standard Deviation from the Summer Bridge Inventory for Social Adjustment: General Subscale

Activities	**N**	**Mean**	**SD**
4th of July Cookout	42	4.93	0.26
Evening Out-Bowling	42	4.76	0.58
Skating	42	4.71	0.71
Ropes Course	42	4.71	0.74
Etiquette Dinner	42	4.38	0.94
Trip to Mall	40	4.38	1.23
Floor Meeting	42	3.90	1.08
Introduction Meeting	42	3.86	1.28
Individual and Group Pictures	42	3.79	1.18
Fortune 500 Company Teambuilding Activities	42	3.57	1.36
Closing Ceremony	42	3.52	1.25
Engineering Class	42	3.31	1.26
Chemistry Lab Class	42	3.21	1.30
Campus Tour	42	3.21	1.32
Move-out Meeting	42	3.12	1.38
Math Class	42	3.05	1.31
Chemistry Class	42	2.98	1.28
Student Panel	42	2.98	1.35
Seminar Sponsored by Fortune 500 Company	42	2.93	1.35
University Freshmen Orientation	42	2.93	1.50
Lab Tours	42	2.83	1.29
Move-Out	42	2.81	1.49
Friday Seminars	42	2.71	1.33
Meetings with Associate Dean of Engineering	42	2.64	1.32
Student ID Pickup	42	2.48	1.31
STEP Schedule Overview	42	2.45	1.25
Registration & Class Sign Up and information for fall term	42	2.24	1.19
Updating Your Resumes	42	2.07	1.07
On-line Survey	41	1.49	0.95

Table 4.30. Activity Means and Standard Deviation from the Summer Bridge Inventory for Social Adjustment: Other People Subscale

Activities	**N**	**Mean**	**SD**
4th of July Cookout	42	4.81	0.67
Skating	42	4.81	0.45
Evening Out-Bowling	42	4.79	0.52
Ropes Course	42	4.69	0.60
Trip to Mall	40	4.43	1.13
Etiquette Dinner	42	4.24	1.10
Floor Meeting	42	3.83	1.27
Introduction Meeting	42	3.74	1.29
Engineering Class	42	3.67	1.24
Individual and Group Pictures	42	3.50	1.38
Chemistry Lab Class	42	3.50	1.31
Fortune 500 Company Teambuilding Activities	42	3.48	1.33
Math Class	42	3.43	1.33
Chemistry Class	42	3.38	1.32
Closing Ceremony	41	3.34	1.46
Campus Tour	42	3.24	1.49
University Freshmen Orientation	42	3.05	1.56
Move-out Meeting	42	3.02	1.35
Student Panel	42	3.00	1.31
Lab Tours	42	2.76	1.41
Move-Out	42	2.69	1.51
Meetings with Associate Dean of Engineering	42	2.69	1.33
Seminar Sponsored by Fortune 500 Company	42	2.64	1.38
Friday Seminars	42	2.52	1.35
STEP Schedule Overview	42	2.38	1.32
Student ID Pickup	42	2.19	1.40
Registration & Class Sign Up and information for fall term	42	2.07	1.13
Updating Your Resumes	42	1.93	1.11
On-line Survey	42	1.48	0.97

Table 4.31. Activity Means and Standard Deviation from the Summer Bridge Inventory for Social Adjustment: Nostalgia Subscale

Activities	**N**	**Mean**	**SD**
4th of July Cookout	42	4.48	1.19
Evening Out-Bowling	42	4.43	0.99
Skating	42	4.38	1.13
Ropes Course	42	4.33	1.26
Trip to Mall	40	4.18	1.43
Introduction Meeting	42	3.79	1.18
Floor Meeting	42	3.71	1.31
Etiquette Dinner	42	3.67	1.34
Campus Tour	42	3.48	1.49
Individual and Group Pictures	42	3.43	1.68
Closing Ceremony	42	3.38	1.48
Engineering Class	42	3.24	1.46
Math Class	42	3.14	1.51
Chemistry Lab Class	41	3.12	1.49
Move-Out	42	3.10	1.56
Chemistry Class	42	3.10	1.53
Seminar Sponsored by Fortune 500 Company	42	2.98	1.58
Fortune 500 Company Teambuilding Activities	42	2.90	1.53
University Freshmen Orientation	42	2.81	1.38
Meetings with Associate Dean of Engineering	42	2.76	1.32
STEP Schedule Overview	42	2.76	1.51
Student ID Pickup	42	2.60	1.48
Move-out Meeting	42	2.60	1.52
Student Panel	42	2.57	1.31
Lab Tours	42	2.52	1.44
Friday Seminars	42	2.52	1.25
Registration & Class Sign Up and information for fall term	42	2.52	1.45
Updating Your Resumes	42	2.05	1.19
On-line Survey	42	1.71	1.02

Table 4.32. Activity Means and Standard Deviation from the Summer Bridge Inventory for Social Adjustment: Social Environment Subscale

Activities	N	Mean	SD
4th of July Cookout	42	4.48	1.15
Evening Out-Bowling	42	4.36	1.10
Skating	42	4.31	1.16
Ropes Course	42	4.21	1.44
Trip to Mall	40	3.95	1.54
Chemistry Lab Class	42	3.83	1.27
Engineering Class	42	3.83	1.27
Chemistry Class	42	3.81	1.29
Math Class	42	3.76	1.30
Floor Meeting	42	3.74	1.25
Etiquette Dinner	42	3.71	1.42
Campus Tour	42	3.71	1.27
Closing Ceremony	42	3.50	1.44
Introduction Meeting	42	3.43	1.45
Meetings with Associate Dean of Engineering	42	3.26	1.31
Individual and Group Pictures	42	3.24	1.69
University Freshmen Orientation	42	3.07	1.49
Lab Tours	42	2.93	1.39
Fortune 500 Company Teambuilding Activities	42	2.90	1.49
Registration & Class Sign Up and information for fall term	42	2.88	1.38
Move-Out	42	2.86	1.60
Student ID Pickup	42	2.81	1.49
Seminar Sponsored by Fortune 500 Company	42	2.81	1.45
Student Panel	42	2.67	1.32
Friday Seminars	42	2.67	1.37
Move-out Meeting	42	2.64	1.46
STEP Schedule Overview	42	2.62	1.36
Updating Your Resumes	42	2.57	1.52
On-line Survey	42	1.86	1.22

Table 4.33. Activity Means and Standard Deviation from the Summer Bridge Inventory for Personal-Emotional Adjustment: Psychological Subscale

Activities	**N**	**Mean**	**SD**
Ropes Course	42	4.10	1.27
Chemistry Lab Class	42	3.79	1.12
Engineering Class	42	3.71	1.17
Math Class	42	3.71	1.13
4th of July Cookout	42	3.67	1.54
Skating	42	3.64	1.48
Chemistry Class	42	3.62	1.08
Introduction Meeting	42	3.57	1.29
Evening Out-Bowling	42	3.57	1.52
Trip to Mall	40	3.45	1.55
Meetings with Associate Dean of Engineering	42	3.40	1.31
Individual and Group Pictures	42	3.40	1.56
Registration & Class Sign Up and information for fall term	42	3.38	1.45
Closing Ceremony	42	3.36	1.50
Campus Tour	42	3.33	1.34
Floor Meeting	42	3.19	1.38
Etiquette Dinner	42	3.14	1.51
STEP Schedule Overview	42	3.12	1.31
Updating Your Resumes	42	3.07	1.30
Fortune 500 Company Teambuilding Activities	42	2.90	1.36
Student Panel	42	2.90	1.53
Friday Seminars	42	2.81	1.33
Seminar Sponsored by Fortune 500 Company	42	2.76	1.34
Move-Out	42	2.76	1.56
Lab Tours	42	2.74	1.38
Student ID Pickup	42	2.64	1.54
Move-out Meeting	42	2.50	1.35
On-line Survey	42	2.48	1.44
University Freshmen Orientation	42	2.48	1.27

Table 4.34. Activity Means and Standard Deviation from the Summer Bridge Inventory for Personal-Emotional Adjustment: Physical Subscale

Activities	**N**	**Mean**	**SD**
Ropes Course	42	4.17	1.34
4th of July Cookout	42	3.83	1.25
Evening Out-Bowling	42	3.83	1.31
Skating	42	3.79	1.35
Trip to Mall	40	3.58	1.39
Campus Tour	42	3.24	1.59
Chemistry Class	42	3.05	1.53
Chemistry Lab Class	42	2.81	1.47
Move-Out	42	2.76	1.54
Etiquette Dinner	42	2.67	1.39
Engineering Class	42	2.52	1.50
Math Class	42	2.33	1.49
Lab Tours	42	2.26	1.13
Fortune 500 Company Teambuilding Activities	42	2.24	1.30
Student ID Pickup	42	2.19	1.40
Closing Ceremony	42	2.12	1.29
University Freshmen Orientation	42	2.07	1.31
Individual and Group Pictures	42	2.07	1.52
Meetings with Associate Dean of Engineering	42	2.02	1.41
Friday Seminars	42	1.98	1.28
Floor Meeting	42	1.86	1.32
Introduction Meeting	42	1.81	1.35
Seminar Sponsored by Fortune 500 Company	42	1.79	1.24
Move-out Meeting	42	1.74	1.13
Student Panel	42	1.71	1.22
Registration & Class Sign Up and information for fall term	42	1.69	1.22
STEP Schedule Overview	42	1.64	1.19
Updating Your Resumes	42	1.60	1.19
On-line Survey	42	1.52	1.17

Table 4.35. Activity Means and Standard Deviation from the Summer Bridge Inventory for Goal Commitment/Institutional Adjustment: General Subscale

Activities	**N**	**Mean**	**SD**
Engineering Class	42	4.24	1.03
Math Class	42	4.19	0.99
Chemistry Class	42	4.10	1.03
Chemistry Lab Class	42	4.00	1.10
Registration & Class Sign Up and information for fall term	42	3.86	1.47
4th of July Cookout	42	3.76	1.27
Orientation Meetings with Associate Dean of Engineering	42	3.74	1.31
Campus Tour	42	3.67	1.26
Ropes Course	42	3.57	1.48
Student ID Pickup	42	3.57	1.36
Updating Your Resumes	42	3.50	1.37
Skating	42	3.45	1.25
Introduction Meeting	42	3.40	1.48
Evening Out-Bowling	42	3.33	1.24
Closing Ceremony	42	3.31	1.55
Lab Tours	42	3.29	1.35
Etiquette Dinner	42	3.29	1.29
Trip to Mall	40	3.05	1.45
Floor Meeting	42	3.05	1.34
Fortune 500 Company Teambuilding Activities	42	2.98	1.42
Individual and Group Pictures	42	2.90	1.61
Move-out Meeting	42	2.83	1.40
STEP Schedule Overview	42	2.81	1.35
University Freshmen Orientation	42	2.71	1.52
Student Panel	42	2.71	1.27
Move-Out	42	2.69	1.67
Friday Seminars	42	2.64	1.27
Seminar Sponsored by Fortune 500 Company	42	2.26	1.29
On-line Survey	42	1.81	1.13

Table 4.36. Activity Means and Standard Deviation from the Summer Bridge Inventory for Goal Commitment/Institutional Adjustment: This College Subscale

Activities	**N**	**Mean**	**SD**
Engineering Class	42	4.43	0.94
Chemistry Class	42	4.33	0.90
Math Class	42	4.26	1.06
Chemistry Lab Class	42	4.17	1.10
Registration & Class Sign Up and information for fall term	42	4.14	1.30
Student ID Pickup	42	4.10	1.30
Campus Tour	42	4.07	1.31
Orientation Meetings with Associate Dean of Engineering	42	4.02	0.95
4th of July Cookout	42	3.76	1.32
Skating	42	3.64	1.28
Lab Tours	42	3.55	1.50
Evening Out-Bowling	42	3.50	1.33
Ropes Course	42	3.45	1.43
Introduction Meeting	42	3.38	1.40
Closing Ceremony	42	3.36	1.54
Floor Meeting	42	3.29	1.35
Student Panel	42	3.17	1.50
Etiquette Dinner	41	3.12	1.50
Updating Your Resumes	42	3.10	1.45
Trip to Mall	40	3.08	1.56
University Freshmen Orientation	42	3.02	1.54
Move-Out	42	2.93	1.70
Individual and Group Pictures	42	2.93	1.52
STEP Schedule Overview	42	2.83	1.45
Move-out Meeting	42	2.83	1.61
Fortune 500 Company Teambuilding Activities	42	2.79	1.54
Friday Seminars	42	2.67	1.28
Seminar Sponsored by Fortune 500 Company	42	2.43	1.43
On-line Survey	42	2.02	1.41

Appendix P: Supplementary Tables 4.45 to 4.55

Table 4.45. Director's and Participants' Responses for AA Theme (Sorted by Gender and Race)

Coding Classification	Academic Adjustment Theme	Gender Male(Female)	Race Minority (Majority)	Director
Comments Pre-College Characteristics	• Independence vs. dependence	3(2)	5(0)	0
	• Introduction	1(0)	0(1)	1
	• Learning styles	6(3)	6(3)	1
	• Preparation	9(9)	13(5)	1
Comments About Involvement	• Skills and abilities	1(5)	4(2)	1
	• Motivation	0(1)	1(0)	0
Comments About the Benefits of Summer Bridge Program	• Independence vs. dependence	7(3)	7(3)	0
	• Preparation	4(5)	5(4)	0
	• Networking	1(2)	2(1)	0

Table 4.46. Director's and Participants' Responses for SA Theme (Sorted By Gender and Race)

Coding Classification	Social Adjustment Theme	Gender Male(Female)	Race Minority(Majority)	Director
Comments Pre-College Characteristics	• Preparation	9(3)	9(3)	1
	• Learning styles	3(4)	3(4)	1
Comments About Involvement	• Skills and abilities	4(6)	5(5)	0
	• Motivation	3(1)	1(3)	0
Comments About the Benefits of Summer Bridge Program	• Preparation	11(9)	12(8)	1
	• Independence and dependence	5(3)	5(3)	0
	• Networking	3(0)	2(1)	0

Table 4.47 Director's and Participants' Responses for PEA Theme (Sorted By Gender and Race)

Coding Classification	Social Adjustment Theme	Gender Male(Female)	Race Minority(Majority)	Director
Comments About Pre-College Characteristics	• Preparation	2(5)	3(4)	3
	• Networking	0(2)	0(2)	0
Comments About Involvement	• Skills and abilities	0(2)	1(1)	0
	• Motivation	1(2)	1(2)	0
Comments About Summer Bridge Program	• Preparation	4(2)	5(1)	1
	• Independence and dependence	1(3)	2(2)	1
	• Networking	5(3)	2(6)	1

Table 4.48. Director's and Participants' Responses for GCIA Theme (Sorted By Gender and Race)

Coding Classification	Goal Commitment and Institutional Adjustment Theme	Gender Male(Female)	Race Minority(Majority)	Director
Comments About Pre-College Characteristics	• Preparation	10(4)	8(6)	1
Comments About Involvement	• Skills and abilities	1(5)	5(1)	1
	• Motivation	13(6)	9(10)	1
Comments About the Benefits of Summer Bridge Program	• Networking	3(2)	0(5)	0
	• Preparation	7(3)	5(5)	1
	• Independence vs. dependence	0(0)	0(0)	1

Table 4.49. Director's and Participants' Responses for Difficulties of SBP (Sorted by Gender and Race)

Coding Classification	Weakness Theme	Gender Male(Female)	Race Minority(Majority)	Director
Comments About Pre-College Characteristics	• Independence vs. dependence	1(1)	2(0)	0
	• Preparation	1(2)	2(1)	1
Comments About Involvement	• Skills and abilities	2(3)	1(4)	0
	• Motivation	0(1)	0(1)	0
Comments About the Benefits of Summer Bridge Program	• Networking	0(1)	0(1)	0
	• Preparation	0(2)	0(2)	1

Table 4.50. Director's and Participants' Response Strengths of SBP (Sorted By Gender and Race)

Coding Classification	Strengths Theme	Gender Male(Female)	Race Minority(Majority)	Director
Comments About Pre-College Characteristics	• Independence vs. dependence	3(1)	4(0)	0
	• Preparation	0(1)	1(0)	1
Comments About Involvement	• Skills and abilities	0(3)	2(1)	1
	• Motivation	0	0	1
Comments About the Benefits of Summer Bridge Program	• Independence vs. dependence	2(4)	5(1)	1
	• Networking	1(2)	1(2)	1
	• Preparation	3(7)	6(4)	1

Table 4.51. Participants' Responses for Perception of SBP Theme (Sorted By Gender and Race)

Coding Classification	Perception of Summer Bridge Program	Gender Male(Female)	Race Minority(Majority)
	• Networking	3(4)	6(1)
	• Preparation	3(4)	6(1)
	• Skills and abilities	1(4)	4(1)
	• Motivation	0(1)	0(1)

Table 4.52. Participants' Responses Guiding Philosophy (Sorted By Gender and Race)

Coding Classification	Guiding Philosophy	Gender Male(Female)	Race Minority(Majority)
	• Preparation	5(4)	4(5)
	• Networking	0(1)	1(0)

Table 4.53. Participants' Responses for Prepare for College (Sorted By Gender and Race)

Coding Classification	SBP: Prepare For College	Gender Male(Female)	Race Minority(Majority)
	• Preparation	11(12)	10(13)
	• Networking	0(5)	2(3)
	• Motivation	0(2)	2(0)
	• Skills and abilities	0(1)	0(1)
	• Independence vs. dependence	1(1)	0(2)

Table 4.54. Director's and Participants' Responses for Other Thoughts (Sorted By Gender and Race)

Coding Classification	Other Thoughts	Gender Male(Female)	Race Minority(Majority)	Director
	• Networking	3(3)	2(3)	1
	• Preparation	3(7)	8(2)	1
	• Skills and abilities	2(0)	2(0)	0

Table 4.55. Responses for the Director Final Remarks

Coding Classification	Director	Director
	• Preparation	5
	• Independence vs. dependence	2