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Transfer students in STEM majors at a Midwestern University: Academic and social involvement factors that influence student success

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by

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DEDICATION

This has been a long journey, with many hours, days, and months of intensive work. This study is especially dedicated to all the community college transfer students. It is also dedicated to my loved ones, those who have been with me step by step in the process and who never stopped giving me their support, time, and help. Lastly, this work is dedicated to my mother who always inspired me to think highly about my career goals. I love you and you will always be in my heart.

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ABSTRACT

There is soon-to-be a shortage of qualified U.S. workers in science, technology, engineering, and mathematics (STEM). As a result, many science-related jobs are being filled by technically-skilled foreign workers. If the U.S wants to maintain its global economic leadership, then it must ensure a continuous growth of highly-trained individuals in STEM disciplines. Therefore, American institutions of higher education, including community colleges, must identify potential factors that contribute to the lack of interest in STEM majors, as well as the low rate of success of students who enter STEM majors but struggle to finish their degrees. The purpose of this study was to ascertain the perceptions of community college transfer students who are pursuing bachelor degrees in STEM majors at Iowa State University (ISU). What were their transfer experiences and what influenced their academic success in STEM. Participants were encouraged to share their transfer experiences while at the community college as well as their experiences on the ISU campus. They were also asked about their level of academic involvement, their relationships with faculty, and their participation in peer group activities prior to and after transferring. The research design included both quantitative and qualitative components, which provided an in-depth look at the experiences of STEM non-engineering and engineering students. Quantitative data include students' background characteristics, demographic information, and college activities at the community college and ISU. Qualitative data were used to illuminate students' overall transfer experience and their successful journey in STEM fields. The combination of quantitative and qualitative methods allowed a better understanding of the strategies students put into practice once they transfer from a community college to a four-year institution in pursuit of a STEM bachelor's degree. The results of this study suggest that there is an association among the background characteristics, community college experiences, university experiences, and the overall adjustment and cumulative GPA of transfer students from STEM non-engineering and engineering majors. In addition, students reported how their early experiences in science and mathematics inspired them to pursue a career in STEM. Even though students chose to go into STEM areas at the community college and university level due to prior interest, the role of academic advisors and faculty were crucial to the adjustment process. Thus, it is vital for academic advisors and faculty to assist students in researching the transfer process to four-year institutions because students need to understand why this is essential to their academic and social adjustment process. The results indicate that it is important to encourage students to interact inside and outside the classroom with other students and instructors. Also, students should become more involved in academic and social groups since these are important factors in enhancing their academic and social adjustment.

CHAPTER 1: INTRODUCTION

"Maintaining our leadership in research and technology is crucial to America's success -- if we want innovation to produce jobs in America and not overseas -- then we also have to win the race to educate our kids."

President Barack Obama State of Union Address (2011)

According to George, Neale, Van Horne, and Malcolm (2001), while the United States is currently the world leader in science, technology, engineering, and mathematics (STEM) other countries stand ready to challenge this economic strength. They stated that one of the main reasons is a shortage of qualified U.S. workers. As a result, many jobs in the U.S are being outsourced to other countries and technically-skilled foreign workers are now meeting the U.S. demand for scientists. If the U.S. wants to maintain its global economic leadership, then it must ensure a continuous growth of highly-trained individuals in STEM disciplines. Recognizing the critical importance of science and technology to America's long-term competitiveness and building on previous efforts to recruit scientists, the Domestic Policy Council Office of Science and Technology Policy (2006) stated that "President Bush introduced the American Competitiveness Initiative, an aggressive, long-term approach to keeping America strong and secure by ensuring that the nation continues to lead the world in science and technology, in his State of the Union Address on January 31, 2006" (p. 2). More recently, Boundaoui (2011) stated that "Science, technology, engineering and math will guide the country's future and education improvements are needed" (p. 1).

Another important factor to take into consideration is that the current STEM workforce, which is comprised of White, non-Hispanic men, is shrinking. Day (1996)

estimated that by 2050, White males are projected to be 26% of the overall STEM workforce, while in 1997 they represented nearly 70% of the STEM workforce. Thus, there is a need to build a diverse workforce in STEM fields in order to sustain the nation's productivity and economic strength. The National Academy of Sciences (2007a, 2007b) stated that, without the participation of individuals of all racial/ethnic backgrounds and genders, the increasing demand for workers in these fields will not be met, potentially compromising the position of the United States as a global leader. Moreover, Anderson and Kim (2006) stated that the nation's changing demographics and its need to remain globally competitive make it clear that colleges and universities must be charged with increasing the number of Hispanics and African Americans earning STEM degrees.

As a result, one of the greatest challenges to the U.S. higher education today is the recruitment and retention of a larger number of African-American and Hispanic students in STEM majors. In order to achieve this goal, it is necessary to identify potential factors that contribute to the lack of interest in STEM majors as well as the low rate of success of students who decide to go into STEM majors and struggle to finish their degrees.

Some other studies have highlighted the fact that faculty in STEM disciplines vary substantially on a broad array of attitudinal and behavioral measures (Fairweather & Paulson, 2008) when it comes to teaching students in the classroom. Careful review of the literature on college teaching and learning suggests that the pedagogical strategies most effective in enhancing student learning outcomes are not discipline-dependent (Pascarella & Terenzini, 2005). Seymour and Hewitt (1997) found that many academically capable students who left the STEM track appeared to have become disenchanted by teaching methods that focused on

"weeding-out" less determined students. In fact, it would be helpful for institutions in higher education to identify and implement teaching strategies that reach those students who need academic support and want to be successful in STEM fields.

Other factors that have been found by researchers that correlate with student success in STEM include: institutional selectivity (Smart, 1986, Tinto, 1980); faculty-student interaction or class size (U.S. Congress, 1992); student involvement and effort (Astin, 1985; Pascarella, 1985); student academic and social integration (Murguia et al., 1991; Tinto, 1986); and parents' college education and financial support (Huang, 2000). These factors lead one to wonder why there are not more students choosing to stay in STEM fields and finish their baccalaureate degree.

It is important to highlight the role of community colleges and their transfer function. Laanan (2001) stated that the transfer function of community colleges is essential to continuing to provide access to students who would otherwise not be eligible for admission to a four-year institution directly following high school. Consequently, institutional leaders have begun to focus on increasing enrollment of students in community colleges (Townsend & Wilson, 2006). Furthermore, the National Governors Association (2011) suggested that community colleges can be used to build a STEM skilled workforce by engaging business to help community colleges to meet regional skills needs, support new models of STEM education, ensuring more effective mathematics remediation and require that college STEM credits and credential are transferable and stackable.

Statement of the Problem

The gap between the choice to pursue a post-secondary STEM degree and how many students actually graduate has long been a concern of educators and policymakers. This concern is increasing due to the lack of fulfillment of the demands of potential employers within companies in the United States. The question still is why students decide to switch or leave STEM fields for other majors. Boundaoui (2011) mentioned in his article,

> Undergraduates across the country are choosing to leave science, technology, engineering and math programs before they graduate with those degrees. Many students in those STEM fields struggle to complete their degrees in four years, or drop out.

Within the same article, James Brown, executive director of the STEM Education Coalition, stated that the big problem is that educators do not often realize the urgency of fostering the next generation of American scientists and engineers. Positive statements from faculty and advisors can help community college transfer students in their pathway to success in STEM fields. By giving students verbal support, faculty and advisors make them feel engaged and provide them with a sense of belonging. For example, Starobin and Laanan (2008) found that female students can be empowered to see and follow their STEM educational path just by receiving a simple statement such as “You can do it” from an advisor or faculty.

As a result of the lack of students pursuing careers in STEM fields, it is crucial for community colleges and universities to understand their role in the transition of community college transfer students whose goal is to enter and stay in STEM majors at four-year institutions. Starobin and Laanan (2005) confirmed that community colleges are being

recognized as pathways for preparing individuals to pursue baccalaureate degrees in STEM areas at four-year universities and colleges. In addition, Berger and Malaney (2003) have demonstrated that community colleges are the leading institutions assisting in increasing the number individuals pursuing bachelor degrees in STEM areas. More recently, the National Science Foundation (NSF) (Mooney & Foley, 2011) used the National Survey of Recent College Graduates (NSRCG) for the academic years of 2001to 2007 and found that the percentage of science, engineering and health graduates who had ever attended community college at some point in their studies remained fairly steady, at around 50% for bachelor's degree recipients and just under 45% for master's degree recipients.

The majority of the literature on community college transfer students focuses on gender differences, GPA, classroom settings and academic preparation (Townsend & Wilson, 2006; Sax, 2001). Despite the importance of these factors, this study examined the impact of academic involvement, relationships with faculty members, and participation in peer group activities on the success of transfer students in STEM fields. By studying these factors closely within community college and university environments, we will have a better sense of what student experiences are like and how these experiences impact their transfer and success in STEM fields.

Purpose of the Study

The purpose of this study is to ascertain the perceptions of community college transfer students who are currently pursuing bachelor degrees in STEM majors at Iowa State University (ISU) as well as the factors that influence their success. The participants were encouraged to share their transfer experiences while at the community college as well as their

experiences once they are on campus at ISU. Students were asked about their level of academic involvement, their relationships with faculty, and their participation in peer group activities prior to and after transferring. In addition, this study includes both quantitative and qualitative components, which provide an in-depth look at the experiences of STEM non-engineering and engineering students. Quantitative data include students' background characteristics, demographic information, and other survey data such as college activities at the community college and ISU. Qualitative data are used to illuminate students' overall transfer experience and their successful journey in STEM fields. The combination of quantitative and qualitative methods allowed a better understanding of the strategies students put into practice once they transfer from a community college to a four-year institution in pursuit of a STEM bachelor's degree.

Most of the literature about transfer students and their experiences emphasize the importance of examining the degree to which social and academic involvement factors impact the academic and personal success of their transfer. Astin (1984) asserted that the more academically and socially involved individuals are and the more they interact with other students and faculty, the more likely they are to persist. Strage (1999) stated that interactions with professors positively influence a student's success. Rendón (1994) stated that the more students perceive an interaction as being positive, the more they view themselves as an integral and valued member of the institution and the more likely they are to persist. Meanwhile, Tinto, Russo, and Kadel (1994) found that classroom involvement becomes a vehicle for involvement beyond the classroom. Pascarella and Terenzini (1991) found that students who participate in campus organizations are more likely to be satisfied

with their college experience as compared to those who do not participate. Additionally, Thompson (2001) stated that an examination of the academic environmental factors is essential to the success of community college students. A shared experience of the curriculum leads students to spend more time together both inside and outside the classroom, which is why learning communities yield important benefits to transfer students (Tinto, Goodsell, & Russo, 1993; Mathews, 1996). Furthermore, Larose, Robinson, Roy, and Legault (1998) stated that seeking help from peers is an important component to student success. Examining the relationships among these factors and having a clear vision of their importance could assist colleges and universities in increasing the participation of students in STEM fields as well as enhance students success and graduation rates.

Research Questions

This study explores and examines the academic and social factors that influence transfer students at ISU who are pursuing a baccalaureate degree in STEM. By addressing the following quantitative and qualitative research questions, this study attempts to generate additional information designed to help community colleges and four-year institutions understand and collaborate in order to successfully transfer and acclimate students pursuing STEM degrees.

Quantitative Research Questions

1. What are the background characteristics of Iowa community college transfer students in engineering and other STEM (non-engineering) at ISU by STEM major type (engineering vs. other STEM [non-engineering])?

2. What are the community college and university experiences of ISU community college transfer students pursuing bachelor degrees at ISU by STEM major type (engineering vs. other STEM [non-engineering])?
3. Are there statistically significant differences in the community college and university experiences by STEM major type (engineering vs. other STEM [non-engineering])?
4. What background characteristics as well as community college and ISU experiences predict academic adjustment and cumulative GPA for community college transfer students in Engineering and other STEM (non-engineering) disciplines?

Qualitative Research Question

1. How do community college transfer students in engineering and other STEM (non-engineering) majors describe the factors that facilitated or impeded their overall adjustment to ISU?

Theoretical Framework

College students spend a considerable amount of time on campus. While students are taking classes, it is essential that they are involved not only with their classmates but also with their professors and advisors. These types of interactions can lead to the success of many students in STEM who aspires to finish their academic degree. This success can depend highly on the extent of their involvement. Astin's (1984) theory is perhaps the most appropriate when investigating and interpreting student involvement. Astin (1984) defines involvement as the amount of physical and psychological energy that the student devotes to

the academic experience. He asserts that the more academically and socially involved individuals are and the more they interact with other students and faculty, the more likely they are to persist. Other researchers have studied students' interactions and view these interactions as a positive contribution to the success of students. For example, Rendón (1994) stated that the more students see interactions as positive, and the more they view themselves as integrated into the institution and as valued members of it, the more likely they are to persist. Similarly, Strage (1999) stated that interactions with professors influence students' success. However, the level of academic and social involvement varies by educational settings (Williamson & Creamer, 1998) and may influence students in different ways (Pascarella, 1985; Terenzini et al., 1994). Furthermore, Tinto, Russo and Kadel (1994) found that involvement in the classroom can become a vehicle for involvement beyond the classroom.

These engagement approaches emphasize what individuals and institutions do to encourage and support individual student involvement. Consequently, academic involvement is closely related to persistence (Tinto, 1998). Tinto also pointed out that students are more likely to remain enrolled in an institution if they become connected to the social and academic life of that institution. Clearly, the academic and social systems of universities overlap both classrooms and university settings in such a way that experiences within and beyond the classroom both impact students' success. Therefore, it is imperative that faculty and policy makers understand the needs of students in STEM fields. This understanding allows them the ability to create multiple pathways that would assist in the success of students in STEM fields.

Significance of the Study

Our nation is in need of attracting students into STEM majors. We need to ensure student retention and success in STEM fields. Therefore, this study is important because it examines the degree to which social and academic factors impact the academic and personal success of community college transfer students at ISU. Some of these factors include: peer interaction, faculty interaction, academic satisfaction, outside influences, college reputation and program offered. Discovering relationships among these factors and having a clear sense of their importance could assist community colleges and universities in the Midwest to enhance student success and improve graduation rates in STEM fields. This study provides initiatives to help instructors to employ effective learning strategies in the classroom, particularly focus on the different concepts related to the use of effective academic and social involvement. Identifying and understanding the factors that influence transfer students in STEM areas will improve their experiences at four-year institutions and will enhance their success during their academic journey.

Definition of Terms

The following definitions were used for the purpose of this study

Academic adjustment: the change to the academic standards, including rigor of classes, grades, etc.

APP: Admission Partnership Program

Community Colleges: any institution accredited to award the Associate in Arts, Associate in Science, Associate in General Studies, or the Associates of Applied Science as its

highest degree. Included in this definition are comprehensive two-year colleges as well as many public and private technical institutions.

E-TSQ: created in 2011by Laanan, is a revised version of the original L-TSQ to exclusively assesses the experiences of Iowa State University community college transfer student who major in engineering

L-TSQ: Laanan-Transfer Student Questionnaire a survey instrument used to examine the community college and university experiences of community college transfer students (Laanan, 1998a, 2004).

Other STEM (non-Engineering): former Iowa Community College student who is in the field of Science, Technology or Mathematics.

Post-transfer experiences: the experiences that take place at the university after transferring from the community college.

Pre-transfer experiences: the experiences that occur while at the community college prior to transferring to the university setting.

STEM: Science, Technology, Engineering and Mathematics according to the National Science Foundation.

Transfer Student: former Iowa Community College student who transferred to ISU; vertical transfer.

Transfer: the movement of students from one higher education institution to another and the process by which academic credits are accepted or not accepted by a receiving institution.

Outline of Dissertation

This study is an attempt to build upon prior research regarding the academic and social involvement of transfer students and how it contributes to their success in STEM areas. More specifically, this study seeks to add to the literature pertaining to the role of community colleges in increasing the number of students pursing baccalaureate degrees in STEM fields.

Chapter 2 summarizes the literature on student transfer in STEM fields. The literature review draws attention to and explores in detail the different layers of student involvement in STEM, which include transfer adjustment, academic involvement, relationship with faculty, and participation in student peer activities. Additionally, self-efficacy is examined in order to better understand the perception of an individual to perform a task and accomplish it. Lastly, the role of community colleges in successfully attracting more students into STEM fields and preparing students to transfer to four-year institutions is discussed.

Chapter 3 presents the methodology and methods used in designing and conducting this study. This includes the methodological approach, data sources, and data analysis procedures. This study is qualitative and quantitative in nature and encompasses interviews, survey data responses, and community college and university transcripts. This methodological approach (i.e., quantitative study with qualitative component) was used to explore and examine the academic and social involvement factors of community college transfer students who are currently pursuing STEM bachelor's degrees at Iowa State University.

Chapter 4 includes a complete overview of the findings of the study. It covers the statistical analysis of the variables connected to the community college and university experiences of STEM non-engineering students as well as engineering students. In addition, the results of the sequential hierarchical regression analysis of the two dependent variables academic adjustment and cumulative GPA are provided, as well as the findings from the open-ended survey questions. This chapter also provides findings from the qualitative component of the community college transfer students in STEM non-engineering and engineering majors.

Chapter 5 summarizes the research findings and provides conclusions and recommendations for policy makers. In addition, best practices and future research are discussed.

CHAPTER 2: REVIEW OF THE LITERATURE

Literature Review

This chapter is a literature review of the academic and social factors that contribute to the success of community college transfer students, and the function and influence of these factors on STEM. In order to address concerns related to the low retention and success of community college transfer students in STEM disciplines at four-year institutions, it is vital to describe the role of community colleges and their potential to engage in the recruitment of students who demonstrate interest in STEM disciplines. Transfer adjustment is also examined as it relates to the experiences of the students in STEM fields. Additionally, it is important to consider a student's background due to the importance that it plays in their pathway to success in college.

Furthermore, social integration such as academic involvement, participation in peer group activities, and interactions with faculty and advisors are explored. More specifically, it is important to ask how community college transfer students perceive these interactions and how these interactions play a role in student success. Additionally, this chapter draws attention to self-efficacy as it relates to the subjective perceptions of STEM students regarding their abilities and capabilities. As an example, a study conducted by Campbell (1990) revealed that men found confidence in their own abilities and attributed unsuccessful occurrences to external forces. However, women tended to attribute their success to teachers, faculty, and peers while internalizing their unsuccessful events. Thus, some researches encounter gender difference in how students perceive their abilities and capabilities in different areas such as within STEM fields.

Community College Transfer Function and STEM Education

According to the National Governors Association (2011), community colleges are uniquely positioned to enhance the pipeline of STEM professionals and produce more STEM-skilled workers. Community colleges are believed to play a vital role in stimulating the numbers of STEM degree recipients and skilled workers completing associate degrees (Hoffman, Starobin, Laanan, & Rivera, 2010). Dougherty (1998) stated that community colleges serve many roles in higher education and have been viewed as "the single largest and most essential threshold into higher education." Similarly, Nettles and Millett (2008) referred to community college as "one of the most important innovations for higher education in the 20th century" (p.1) established primarily in response to the demand of high school graduates to be able to continue their education at the college level. Furthermore, Cohen and Brawer (2003) affirmed that during the 20th century, community colleges have focused primarily on the transfer function, where students transfer to a four-year institution to complete their bachelor's degree after attending a community college for the first two years of their education (Laanan, 1998a; Townsend & Wilson, 2006). Similarly, Eggleston and Laanan (2001) asserted that "at least one out five community college students transfer" (p. 87). They go on stating, that differences in individual characteristics of students will influence how we address their collective needs through support programs. Therefore, universities and student affairs must be ready to receive community college transfer students, on their campuses.

It is important to understand that community colleges serve as bridges to four-year institutions for many community college transfer students. Glass and Harrington (2002)

stated that students who transfer with an associate's degree from a two-year college are more likely to complete their bachelor's degree. Furthermore, Tsapogas (2004) found that an average of 44 percent of students who have earned a bachelor's or master's degree in science or engineering had previously attended a community college at some point during their educational journey.

More recently, the National Science Foundation (NSF) used the National Survey of Recent College Graduates (NSRCG) for the academic years of 2001 to 2007 and found that the primary reason for students attending the community college, especially in regards to studying science, engineering, and health was driven by a desire to earn credits towards a bachelor's degree (Mooney & Foley, 2011). Therefore, it is crucial that institutional leaders encourage and pay closer attention to collaborations and partnerships between two-year colleges and four-year universities in order to enhance the recruitment of students in STEM once they transfer. Community colleges can especially have a positive impact on underrepresented populations in STEM fields. For example, Starobin and Laanan (2008) found in their study that community colleges provide a unique learning culture and environment for female students in engineering. Similarly, Malcom (2010) stated that even though some people may see community colleges as an unconventional path to science and related fields, a significant proportion of Latina/o students are in fact using these institutions as a pathway to the STEM baccalaureate. So, community colleges allow them to overcome the typical barriers that transfer students and many minority students face in STEM majors. Likewise, Reyes (2011) asserted that community colleges have the potential for increasing participation of underrepresented groups in STEM. In addition, Nettles and Millett (2008)

stated that in the past two decades, both part-time and full-time attendance have grown more rapidly at community colleges than at four-year institutions.

Transfer Adjustment

The transfer adjustment process for students varies and it can be challenging. Laanan (2001) asserted that students who transfer from two-year institutions to four-year institutions may experience "transfer shock." Transfer shock is defined by some researcher as a transitory dip in grades and GPA scores (Hills, 1965; Nolan &Hall, 1978). The transfer process from two-year institutions to four-year institutions can be very complex for transfer students and entails adjustments on many different levels, including psychological, academic, and environmental (Laanan, 2001, p.5). Similarly, Laanan, Starobin, and Eggleston (2010) suggested that class size at the community college and closer interactions with instructors might increase students' learning and study skills, which can be influential factor for their academic adjustment. Jackson (2010) stated that faculty, academic advisors and academic preparation play an important role in the adjustment of community college transfer students.

In addition, Laanan (2007) asserted, that students with low GPA and self-concept will have more difficulty in adjusting academically. Moreover, he stated that students who are able to focus less on competition and more on their individual learning will likely experience a positive academic adjustment. Conversely, some researchers have suggested that students who attend community colleges are less academically prepared and, therefore they are less likely to transfer to a four-year institution (Brint & Karabel, 1998). One study focused on students who attended a community college and those who enrolled directly into a four-year institution found that the two groups were equivalent in regards to their academic adjustment.

They also did not differ in a bachelor's degree attainment or graduate school enrolment (Lee, Mackie-Lewis & Marks, 1993).

Background Characteristics and Student Success

The social and economic backgrounds of community college students profoundly influence their academic lives. For example, many of them choose community colleges because they cannot afford four-year institutions and are less likely to have completed a rigorous high school curriculum as compared to peers from middle-and upper-class backgrounds (King, 2002). Similarly, Adelman (2005) argued that socioeconomic status has strong positive relationship with college access and success. Furthermore, Eggleston and Laanan (2001) stated that student adjustment to senior institutions (i.e., four-year institutions) varies depending on a student's race, ethnicity, or cultural background. Similarly, Jackson (2010) stated that when it comes to a student's background, it is important to take into account socioeconomic status, aptitude, career preference aspirations, and values.

Furthermore, Rayman and Brett (1995) suggested that the support received from both parents is a stronger predictor of STEM choice than support from a single parent. However, Shashaani (1994) asserted that parental support can depend on whether parents exhibit stereotypically gender views, which may discourage women from pursuing careers in male-dominated areas of study such as STEM. However, Ong, Wright, Espinosa and Orfield (2011) found that family and community support can also be seen as a force that pulls women from STEM. During their study, some students had family members who questioned their long-term goals of becoming scientists, and they also faced pressure to contribute financially to their family.

Moreover, Pascarella, Pierson, Wolniak and Terenzini (2004) stated that students with non-college educated parents are less likely to know what types of social and academic decisions to make while in college. Malcom (2010) also found that parental education is an important contextual factor associated with Latina/o STEM bachelor's degree holders' institutional pathways. This suggests that students whose parents are less familiar with post-secondary education are more likely to use community college as a pathway to the STEM baccalaureate as compared to students whose parents had earned at least a bachelor's degree.

Additionally, Crisp, Nora and Taggart (2009) stated that students bring pre-college characteristics to college, such as high school experiences and prior academic achievements that influence their college experiences and subsequently their decision to choose a degree. At the same time college experiences such as coursework and academic performance have been found to be linked to students' academic performance, degree goals, and the decision to persist. Likewise, Tyson, Lee, Borman and Hansen (2007) found that pre-college preparation can influence the interest of Hispanic students in STEM fields. As most of the literature states, students' background characteristics influence their career success depending on whether or not these characteristics have a positive or negative influence on the decision to continue their education at the college and university level.

Academic Involvement

It is important to highlight that student involvement plays a large role in the life of the community college transfer student while they are in college. Student involvement is defined by Astin (1984) as "the amount of physical and psychological energy that a student devotes to the academic experience" (p. 518). His theory identifies three factors that contribute to

student success: academic involvement, student-faculty interaction, and participation in peer group activities. Townsend and Wilson (2006) concurred with Astin stating that "social and academic interactions contribute to a student's sense of belonging to the institution" (p. 440). Jackson (2010) emphasized that understanding the level of transfer students' involvement in their socialization experiences will help to better understand how students adjust academically and socially at four-year institutions. Furthermore, Anderson and Kim (2006) demonstrated that student choices have a tremendous impact on their success. For example, students decide the number of courses they will take; what they will study; how often they will interact with faculty members; and how much time they will spend between study and group activities. Other researchers argued that academic involvement is more predominant in STEM students. For example, a research study conducted by Nicholls, Wolfe, Besterfield-Sacre, Shuman and Larpkiattaworn (2007) found that students in STEM disciplines tend to spend more time studying, doing homework, and using the internet than non-STEM students. Similarly, students that are more academically engaged tend to not only finish their academic degrees, but also tend to finish faster than non-engaged students (Svanum & Bigatti, 2009).

Furthermore, Karp, O'Gara and Hughes (2010) found through their study that students report to have less difficulty being attached and involved in an institution if they are part of an information network. They stated that relationships created through an information network were meaningful to students and helped them to strengthen their attachment to the institution as compared to students who were not involved in the network. Moreover, they argued that students who engage in information networks begin to believe that there are

people at the college who want them to succeed and are willing to help them try to reach their goals.

In addition, studies has shown that students who are involved in activities early during their time on campus, such as orientation, tend to be more satisfied with their undergraduate experience and are more positive about their undergraduate institution (Cooper, Healy, & Simpson, 1994). Similarly, Terenzini and Pascarella (1997) stated that students who participate in extracurricular activities on campus are likely to show growth in their academic experiences as well. They argued that students who are involved beyond the classroom are likely to be more thoughtful than their counterparts in the areas of values, attitudes and psychosocial development. Likewise, Light (2001) also maintained that, "students who are able to integrate the in-class and outside-of-class parts of their lives can reap great benefits" (p.22).

Consequently, Gallini and Moely (2003) asserted that the engagement and retention of students at an institution can be directly linked to their level of involvement both inside and outside the classroom. They stated that students who remain involved in university-sponsored leadership or service activities have higher overall grade point averages and higher retention rates versus students who do not remain involved. Similarly, Simon and Cleary (2005) argued that students who participated in leadership or service learning activities while pursuing an undergraduate degree were more likely to connect to local community and remain involved after their service commitment had lapsed. Moreover, Toutkoushian and Smart (2001) have found that students who invest most of their time on school, as opposed to students who spend a large amount of their time working at a job are more likely to see gains

in learning and content knowledge. Furthermore, Price (2010) found through her study on undergraduate women in STEM that, while many students agreed that student-to-student relationships play an important role in STEM extracurricular programs, some identified opportunities for professional development that is offered through participation to be the paramount reason for their continued involvement and success. It is clear from the literature that students who become involved in extracurricular activities are more often academically engaged, create a better networking relationship among other students and experience a higher level of satisfaction from their institution as compared to their less-involved peers.

Relationships with Faculty and Advisors

Research has demonstrated that students tend to positively view their interactions with faculty members, advisors, or both while in college. Pascarella and Terenzini (1991) stated that the degree of effectiveness and accessibility of an instructor has a positive influence on the academic performance and overall institutional satisfaction of students. Similarly, Nora, Cabrera, Hagedorn, and Pascarella (1996) found that factors that predict female persistence at four-year institutions were reflected in their social integration and interaction with faculty. Moreover, according to Seymour and Hewitt (1994), students from science, mathematics and engineering (SME) majors greatly value faculty attitude and pedagogy, where as those who decide to switch from SME to non-SME majors do so because of the perceived lack of interest in teaching by faculty. Kezar and Moriarty (2000) also argued that student-faculty interaction has a positive impact on students. During their study, male students claimed to have better public speaking ability, whereas female students felt more capable influencing others and developing leadership abilities.

According to Ellington (2006) and Whitten et al. (2004), student-faculty relationships have been seen as a pathway to making STEM careers a reality for greater number of women. Moreover, Johnson (2007) argued that students dislike the fact that some professors focus their attention on relaying their expertise on particular subject matters rather than creating interpersonal connections in the classroom with students. Similarly, Reyes (2011) found during her qualitative interviews with women of color in undergraduate STEM disciplines, that students experience differences in institutional culture between community colleges and universities. Students also expressed how much they value the connections that resulted from positive faculty-student interactions at community colleges.

Furthermore, Rayman and Brett (1995) found that receiving career advice from faculty contributed to women's persistence in science careers. Sax, Bryant and Harper (2009) found similar evidence for both men and women, but with faculty having a slightly greater impact on men. They discovered that when students speak with faculty members outside of class, they are more likely to achieve better grades, feel a sense of competiveness, and have a higher level of interest in science. Moreover, Seymour (2000) stated that classroom activities and assessment lead to gains in the learning process as well as improved learning outcomes for both students and teachers.

Additionally, Pascarella and Terenzini (2005) found that a student's academic GPA was positively correlated with time spent on studying as well as encouragement and support from faculty. Piland (1995) claimed that personal attention from faculty may help students acquire the knowledge, skills, and confidence needed for success at the senior institution. Similarly, Starobin and Laanan (2008) found that advising from faculty and program

coordinators was a determining factor for community college students in their decision to continue their study of engineering by transferring to a four-year institution. Meanwhile, Hernandez and Lopez (2004) asserted that students who nurture relationships with faculty members outside of the classroom are more likely to express a higher level of satisfaction with the college and are more likely to persist to graduation. Likewise, Karp, O'Gara and Hughes (2010) found through their study that students expressed the importance of professors encouraging them to participate in class discussions and how these discussions helped them to learn about and become more comfortable on campus.

In addition, some other studies argue that guidance and support from advisors also plays an important role in the educational experiences of transfer students. For example, Flaga (2006) argued that advisors serve as guides for students within their campus environment and that this relationship helps students to connect to and create networks that assist their search for learning resources. Similarly, Concannon and Barrow (2010) stated that advisors need to be good listeners before they can be good advisors and that they should be able to relate to the student's experiences through their own stories. Additionally, advisors should encourage students to continue their degree even if they need to retake a class.

After transferring to a four-year institution, students must sustain their progress toward completing a bachelor's degree and manage to keep their STEM major intact during their academic progress. As a result, orientation, advising, and mentoring programs have been found to be beneficial in assisting students during their transition (Townsend and Wilson, 2006). Packard, Gagnon, Labelle, Jeffers, and Lynn (2011) found through their

study of students who transferred from community colleges to various four-year institutions that students claimed that finding a helpful professor or advisor influenced their persistence with their STEM major.

From the literature regarding the relationships between students, faculty and advisors, it is important to note the manner in which students view the relationship between themselves, faculty and advisors as well as how these relationships can enhance their aspirations, success, and persistence in STEM disciplines.

Participation in Peer Group Activities

Among other factors that influence student academic success in college, some studies have focused on student interaction with peers. For example, Nora, Cabrera, Hagedorn, and Pascarella (1996) found that "students' interaction with peers and developing close personal relationships with other students were related to persistence for both male and females" (p. 445). Similarly, Larose, Robinson, Roy, and Legault (1998) suggested that seeking help from peers enhance student success. Also, learning communities yield important benefits as students form their own supportive peer groups that extend beyond the classroom. Furthermore, the experience of being in a learning community not only benefits students by giving them the opportunity to share the curriculum, but also leads students to spend more time together both inside and outside the classroom (Tinto, Goodsell, & Russo, 1993; Mathews, 1996).

In addition, Zastavker, Ong and Page (2006) found "a positive correlation between student participation in small group work (both inside and outside the classroom) and the extent to which students report that group work positively impacts their own engagement,

enjoyment, motivation, satisfaction and understanding"(p. 3). Other studies conducted among Latino/a students suggest that once these students are in college, factors such as peer support, faculty support, and cocurricular involvement play an important role in their retention (Gloria, Castellanos, Lopez, & Rosales, 2005; Hernandez, 2000, 2000; Hernandez & Lopez, 2004).

Meanwhile, other researchers have studied these peer interactions based on gender. For example, Fitzpatrick & Silverman (1989) and Sax (1994) have argued that women who decide to pursue non-traditional majors receive more support and encouragement and have more positive interactions with faculty, advisors, parents (especially from fathers), and male peers. Furthermore, these interactions can be influenced by a student's perception and upbringing. According to Jones, Howe, and Rua (2000), socialization and cultural experiences seem to play significant roles in shaping student perceptions regarding sciences based upon what is considered gender "appropriate" in society. Also, Seymour and Hewitt (1997) asserted that minorities and women value people and teamwork over individual success, which is typically associated with the culture of STEM. Likewise, Ong, Wright, Espinoza, and Orfield (2011) argued that peer support networks emerged as being critical to long-term student success, particularly given the fact that women of color found it challenging to find other students with similar academic experiences and backgrounds within their majors. Lastly, these students often looked outside STEM, but within their racial or ethnic community, to build peer support.

Institution size can also have a positive or negative impact on peer-interactions. Titus (2004) found that larger four-year institutions have stronger positive effects on student

persistence because larger institutions have stronger socialization capabilities. Speaking on social integration, Townsend and Wilson (2006) found that students expressed greater difficulty in making friends at a four-year university as compared to community colleges. Therefore, some students may feel intimidated by institution size given that they may experience greater occurrences of socialization challenges once they have transferred to larger four-year institutions.

From prior studies, it is well highlighted that students' participation in different activities inside and outside the classroom can lead them to feel more integrated into the campus community and more connected to other students who share the same major and cultural background, sometimes influencing whether or not they see other students as role models.

Self-Efficacy and STEM

Community college transfer students interested in STEM tend to make their decisions to persist based on their capability and ability as well as on their perceived future performance in specific science and math classes. Thus, self-efficacy can be a determinant of student success in STEM. Self-efficacy is defined as the judgments regarding one's ability to organize and execute the courses of action necessary to attain a specific goal and is related to specific tasks within a given domain (Bandura, 1997; Pajares, 2005; Zimmerman, 2000). Consequently, Britner and Pajares (2006) and Pajares (2005) stated that individuals with high science, technology, engineering, and mathematics (STEM) self-efficacy typically perform better and persist longer in STEM disciplines than those with relatively low STEM self-

efficacy. Furthermore, they posited that mathematics and science self-efficacy significantly predict on individual's science grade.

Moreover, Pajares (1996, 2004) stated that self-efficacy can positively or negatively influence people's behavior based on their perception of their abilities concerning a particular task. It also influences the choices people make, the effort they put forth, and how long they persist in the face of obstacles and failure. Additionally, Pajares explained that self-efficacy is often confused with the more general idea of self-confidence where confidence refers to only the strength of a belief in one's abilities. Efficacy, on the other hand, is based on both a specified level of attainment and the strength of one's belief that that level of attainment can be achieved.

Mau (2003) posited that academic proficiency and mathematic task-specific self-efficacy are two major predictors of a person's occupational interest. Similarly, Sax, Bryant, and Harper (2009) found that when students feel supported by faculty, they experience increased confidence in their abilities as scholars, achievers, and leaders. In contrast, some studies have suggested that women feel vulnerable in situations with an unbalanced gender-ratio, experiencing decreased feelings of belonging as well as a decreased desire to participate in that setting (Murphy, Steel, & Gross, 2007). Additionally, it seems that students, especially female students, feel greater encouragement and motivation to choose STEM careers when they receive this encouragement and motivation from home and school. A study conducted by Starobin (2004) argues that receiving encouragement from home and school helps female students in STEM programs develop their self-concept.

Meanwhile, other studies (e.g. Williams and Montgomery, 1995) have argued that male students have higher math self-concepts than female students and, therefore, may perform better in math and science. Concannon and Barrow (2010) found through their study that men's intention to persist in engineering majors was predicted by their belief in being able to complete the required coursework, not by their ability to get an "A" or a "B" grade. They stated that the intentions of men and women to persist are best predicted by their career expectations. Reyes (2011) argued that students are much more likely to stay at a university if they feel a sense of belonging rather than isolation. In addition, Antonio (2004) found through his study that, for students of color, diversity is associated with enhanced self-confidence and aspirations.

Furthermore, in Espinosa's (2008) work related to the development of academic self-concept during the undergraduate years, minority women placed importance on working on group projects in class, tutoring other students, and having high academic expectations at college entry. Likewise, Gwilliam and Betz (2001) determined that a strong relationship exists between science self-efficacy and the choice of a scientific major for African American women. Specifically, self-confidence has been shown to be an important factor in the academic success of African American female engineering majors (Shain, 2002). Similarly, Vogt, Hocevar and Hagedorn (2007) stated, that academic self-efficacy had the strongest effect on GPA and had the greatest impact on perceived help-seeking, effort, and critical thinking behavior. In addition, they suggested that classroom participation needs to be targeted as a means to enhancing student self-efficacy and success in engineering programs.

Furthermore, Hutchison, Follman, Sumpter, and Bodner (2006) argued that when students encounter a situation for which they have slight or no experience, efficacy beliefs may be influenced by their perceptions of the outcomes others have attained when performing similar tasks. In addition, many students claimed that working closely with their team members may develop vicarious experiences that act as sources of self-efficacy beliefs. Also, they found substantial differences between male and female students regarding their abilities in programing and computer tools use. Students attributed computing abilities as either a positive or negative contributor to self-efficacy.

In addition, some other researchers have suggested that teachers would be well-served by paying as much as attention to students' perceptions of competence as to actual competence, for it is the perceptions that may more accurately predict students' motivation and future academic choices (Hackett & Betz, 1989). Similarly, Hackett and Betz's (1989) study on the relationship between mathematical performance and mathematics self-efficacy, found that in some cases, students who had unrealistically low math self-efficacy perceptions, but did not lack capability or skill, may in part be responsible for avoidance of math-related courses and careers. This was found more likely to be the case with women than with men. Likewise, Jackson's (2010) study found that self-efficacy is influenced by different levels and means of socializations, that in turn are affected by the environment in which individuals (in this case women) are exposed.

Summary

Student involvement plays an important role for college transfer students. It is through involvement that students feel more integrated within the campus community. Student involvement also makes them feel less intimidated by participating inside and outside the classroom, helping them to develop a sense of belonging and creating a networking environment during their school years. Current research has drawn attention to student involvement, background influence, faculty-advisor-student relationships, participation in group activities, and self-efficacy during transfer students' journey from community college to four-year institutions. In addition, the areas of STEM have been emphasized in order to facilitate a better understanding regarding their academic and social experiences.

CHAPTER 3: METHODOLOGY OF THE STUDY

Overview

The purpose of this study was to examine the pre-and post-transfer experiences of students who are currently pursuing bachelor degrees in STEM majors at Iowa State University. The goal is to explore the academic and social involvement experiences that may influence a student's success upon transfer. More specifically, this study examines the background characteristics of the transfer students as well as their experiences during their attendance at a community college and Iowa State University, which may help to predict their success in STEM fields.

The methodology for this study consists of a broad mix of assessment tools. The data collected consists of both quantitative (L-TSQ and E-TSQ surveys) and qualitative methods (interviews) conducted with undergraduate students who volunteered to participate via their signed consent at the end of the surveys. The first four research questions addressed in this study are answered using the data collected through the surveys and the last research question is best answered by qualitative methods. Creswell (2009) defines qualitative research as "a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (p.4). In this study, the use of qualitative methodology allowed the experiences of transfer students pursuing a STEM degree to be explored. Furthermore, this methodology allowed the participants to interpret and make meaning of their overall pre-and post- academic and social transfer experiences, using their own voices.

The following research questions guided this study:

Quantitative Research Questions

1. What are the background characteristics of Iowa community college transfer students in engineering and other STEM (non-engineering) at ISU by STEM major type (engineering vs. other STEM [non-engineering])?
2. What are the community college and university experiences of ISU community college transfer students pursuing bachelor degrees at ISU by STEM major type (engineering vs. other STEM [non-engineering])?
3. Are there statistically significant differences in the community college and university experiences by STEM major type (engineering vs. other STEM [non-engineering])?
4. What background characteristics as well as community college and ISU experiences predict academic adjustment and cumulative GPA for community college transfer students in engineering and other STEM (non-engineering) disciplines?

Qualitative Research Questions

1. How do community college transfer students in engineering and other STEM (non-Engineering) majors describe the factors that facilitated or impeded their overall adjustment to ISU?

Answering the above research questions provides essential information to faculty members, administrators, and state policy makers from two-year and four-year institutions, so they can have a better insight about the experiences of community college transfer

students who are pursuing degrees in STEM disciplines at a four-year institution like Iowa State University. Therefore, the findings enhance the understanding of the academic and social adjustment of community college transfer students.

Research Design

This research employed a quantitative research design with a qualitative component. In order to address the quantitative research questions, a survey research design was used via the Laanan Transfer Student Questionnaire (L-TSQ) and Engineering Transfer Student Questionnaire (E-TSQ) (see Appendices A & B). The L-TSQ was developed by Frankie Santos Laanan in 1998 to assess the experiences of Iowa State University community college transfer students. The L-STQ was revised in 2011 at the request of Laanan to incorporate questions pertaining to the Admission Partnership Program (APP), which is a partnership between participating community colleges and Iowa State University designed to provide an advantage to current and future students from those colleges who are planning to earn a bachelor's degree at Iowa State University. The E-TSQ, created in 2011by Laanan, is a revised version of the original L-TSQ. The E-TSQ exclusively assesses the experiences of Iowa State University community college transfer student who major in engineering.

The L-TSQ consists of 159 items and E-TSQ contains an additional five items for a total of 164. These items are organized across three categories: a) background information, b) community college activities and experiences and c) Iowa State University activities and experiences. Both instruments included open-ended questions. These open-ended questions are meant to understand the factors that help students to adjust in their transition to Iowa State University and how this contributed to their success. In addition, these questions

allowed students to provide in-depth explanations about how the community college helped them in their transition to ISU and what advice they can give to future transfer students. The L-TSQ and E-TSQ survey data for this study were collected via Qualtrics, an electronic software program used to develop online surveys. Surveys were administered via email by using Qualtrics during Spring 2011 to students from the following cohort: Fall 2009, Spring 2010, Fall 2010 and Spring 2011. In addition, individual semi-structured interviews were conducted with students from STEM non-engineering and engineering fields to address the qualitative research questions. The qualitative component allowed exploring, in detail, the experiences of the community college transfer students who are pursuing a baccalaureate degree in STEM fields at ISU.

Setting

This study was conducted at Iowa State University (ISU), a prestigious research institution in the Midwest located in Ames, Iowa. ISU is a well-known, international, land-grant university with more than 28,000 undergraduate students. It has 100 majors, the opportunity to study with world-class scholars, and more than 800 student organizations. It has a culturally diverse student body, with students from all 50 states and more than 110 countries. Additionally, ISU's undergraduate engineering program is one of the top 10 largest programs in the United States. *U.S. News & World Report* has ranked ISU as one of the top 50 public universities in the nation (ISU 2011a). Also, ISU's landscape architecture program continues to be among the nation's best, according to a survey of practitioners by *Design Intelligence*.

Iowa State University is one of the 34 best research universities in the nation and is included as a member of the *Association of American Universities* (AAU). Furthermore, a study prepared with support from the National Science Foundation calls ISU a "licensing powerhouse" for its work to transfer technologies developed on campus to businesses. In fact, the Iowa State University Research Foundation ranked second nationally in the number of technology licenses it issued, being second in the country behind the University of California system (ISU 2011a).

It is also important to mention that, according to the U.S News & World Report, ISU has graduate programs that rank among the top 25 of all public universities. Some of these programs include: statistics, inorganic chemistry, analytical chemistry, higher education administration, aerospace engineering, industrial and manufacturing systems engineering, materials science and engineering and chemical and biological engineering (ISU 2011a).

Moreover, ISU has had a considerable increase in the number of transfer students coming from Iowa Area Community Colleges. During the fall semester of 2005, 835 new students transferred from Iowa Area Community Colleges (Iowa State University Fact Book). In 2010, the number of new transfer students from Iowa Area Community Colleges to ISU was 1,001 (ISU 2011).

Population and Sample

The Iowa Board of Regents (2010) reported that “approximately 62% (2,458) of all transfer students at the Regent universities in fall 2010 were from Iowa public community colleges.” Table 1 shows the Fall semester new transfer students by type of transfer college at ISU from 2001 to 2010. A close look at this trend reveals that more than 50% of all transfer

students come from Iowa Area Community Colleges, followed by non-Iowa transfer students.

Table 1.

Fall Semester New Transfer Students by Type of Transfer College at ISU

TRANSFER COLLEGE TYPE	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Iowa Area Community Colleges	930	903	883	848	835	869	948	945	982	1,001
Iowa Four-Year Public										
University of Iowa	70	47	38	54	60	57	41	49	45	54
University of Northern Iowa	48	42	49	43	30	31	39	43	50	44
Subtotal	118	89	87	97	90	88	80	92	95	98
Iowa Four-Year Private	150	110	108	109	106	130	114	115	131	128
Iowa Two-Year Private	13	14	6	9	5	6	5	2	1	1
Non-Iowa (U.S.)	409	355	321	291	296	303	299	313	319	309
Foreign	104	66	39	75	56	65	81	70	94	136
Total	**1,724**	**1,537**	**1,444**	**1,429**	**1,388**	**1,461**	**1,527**	**1,537**	**1,622**	**1,673**

Note. Source: Office of Admission at ISU, 2010; beginning 2002, transfer admissions include undergraduate only; prior to 2002, undergraduate and 1st professional were included.

The survey participants in this study were community college transfer students currently pursuing bachelor's degrees in STEM fields at Iowa State University. This study included community college transfer students who transferred to ISU between Fall 2009 and Spring 2011. These students were identified through the Registrar's Office at ISU and were contacted and invited to participate in this study via e-mail on April 14, 2011. A cover letter explaining the purpose of the study and why they were selected accompanied the e-mail survey (see Appendices C & D). In addition, students who responded to the L-TSQ survey during the first round by April 29, 2011, were entered into a drawing to win one of 30 gift card certificates to the ISU bookstore while students who responded to the E-TSQ survey

were entered into a drawing to win one of 25 gift card certificates to the ISU bookstore. The first reminder (see Appendices E & F) for both surveys was sent on April 20, 2011 to the students who did not participate in the first survey invitation, and a second and final reminder was sent on May 2, 2011, to students who did not participate in the first or second survey invitation. Out of 1,679 students that were invited to take the L-TSQ, 448 students responded to the survey as of October 4, 2011. For the purpose of this study, only 200 respondents pursuing STEM degrees from this sample were filtered and examined.

Additionally, out of 306 students who were invited to take the E-TSQ, 80 students responded as of October 4, 2011 and they were included in this study since they are all engineering majors, which fall under the STEM degree requirement. Therefore, for the purpose of this study the total population of STEM students from both surveys was 280 students. One thousand four hundred-fifty seven (1,457) Iowa community college students did not respond to either of the surveys and, thus, were not included in this study.

Table 2 shows the break down by STEM majors type (engineering and other STEM [non-engineering]) of the semester students entered ISU. Additionally, Table 3 illustrates the breakdown by college of engineering and STEM non-engineering majors' type.

Table 2.

Iowa Community College Transfer to ISU by Semester and STEM Major Type (N=280)

Semester entered ISU	Engineering		STEM non-Eng.		Total
	n	%	*n*	%	*n*
Fall 2009	28	35.0	59	29.5	87
Spring 2010	35	43.8	102	51.0	137
Summer 2010	3	3.7	2	1.0	5
Fall 2010	5	6.2	11	5.5	16
Spring 2011	9	11.3	26	13.0	35
Total	80	100.0	200	100.0	280

Note: Source: Personal Communication, ISU Office of the Registrar, March, 1, 2011

Table 3.

Academic Majors and Colleges of Study Sample by STEM Major Type (N= 280)

STEM (non-engineering) Majors	*n*	%
College of Agriculture (n=98)		
Animal Ecology (A ECL)	4	4.1
Agricultural Studies (AG ST)	19	19.4
Agricultural Biochemistry (AGBIO)	0	0.0
Agricultural and Life Sciences Education (AGLSE)	7	7.1
Agronomy (AGRON)	14	14.3
Animal Science (AN S)	17	17.3
Agricultural Systems Technology (AST)	2	2.0
Biology (BIOLA)	9	9.2
Dietetics (DIETA)	3	3.1
Dairy Science (DY S)	2	2.0
Environmental Science (ENSCA)	1	1.0
Forestry (FOR)	2	2.0
Food Science (FS A)	0	0.0
Genetics (GEN)	2	2.0
General Studies Pre Vet (GENPV)	1	1.0
Global Resources Systems (GLOBE)	1	1.0
Horticulture (HORT)	7	7.1

Table 3. (Continued)

	n	%
College of Agriculture (continued)		
Industrial Technology (I TEC)	2	2.0
Insect Science (INSCI)	1	1.0
Microbiology (MICR)	4	4.1
College of Business (n=13)		
Management (MGMT)	8	61.5
Management Information Systems (MIS)	5	38.5
College of Human Science (n=31)		
Culinary Science (CS H)	1	3.2
Dietetics (DIETH)	3	9.7
Food Science (FS H)	0	0.0
Kinesiology and Health (KIN H)	25	80.6
Nutritional Science (NS H)	0	0.0
Pre-Diet and Exercise (PDEXH)	2	6.5
College of Liberal Arts and Science (n=55)		
Bioinformatics & Computational Biology (BCBIO)	0	0.0
Biochemistry (BIOCH)	1	1.8
Biology (BIOL)	13	23.6
Computer Science (COM S)	2	3.6
Environmental Science (ENSCS)	1	1.8
Genetics (GEN S)	1	1.8
Geology (GEOL)	0	0.0
Mathematics (MATH)	3	5.5
Meteorology (MTEOR)	1	1.8
Pre-Computer Science (P CS)	5	9.1
Preparation for Human Medicine (P MED)	2	3.6
Physics (PHYS)	1	1.8
Statistics (STAT)	0	0.0
Psychology (PSYCH)	24	43.6
Chemistry (CHEM)	1	1.8
College of Design (n=3)		
Architecture (ARC)	1	33.3
Pre Architecture (P ARC)	2	66.7

Table 3. (Continued)

Engineering Majors	*n*	%
College of Engineering (n=80)		
Agricultural Engineering (A E)	0	0.0
Aerospace Engineering (AER E)	4	5.0
Biological Systems Engineering (BSE)	1	1.2
Civil Engineering (C E)	9	11.2
Chemical Engineering (CH E)	8	10.2
Construction Engineering (CON E)	7	8.8
Computer Engineering (CPR E)	7	8.8
Electrical Engineering (E E)	10	12.5
Engineering Undeclared (ENGR)	5	6.3
Industrial Engineering (I E)	2	2.5
Mechanical Engineering (M E)	22	27.5
Materials Engineering (MAT E)	1	1.2
Software Engineering (S E)	4	5.0
Total	280	100.0

Survey Instrument

Data Collection

As previously stated the surveys used for this study, the L-TSQ and E-TSQ, were administrated via email using Qualtrics, which is an online survey software. The L-TSQ consists of 159 items and the E-TSQ contains an additional five items for a total of 164. Both surveys were used to collect quantitative data and open-ended responses and consisted of three main sections: background information, community college experiences and ISU experiences (see Appendices A & B).

The background information section for both L-TSQ and E-TSQ included the following survey items: current place of residence (during the academic year), highest academic degree intended to obtain, parents' highest level of education, parents' total household income last year, gender, age and ethnic background. The community college section of the L-TSQ survey asked students to report the number of hours per week spent on

campus, the number of hours spent studying, the number of hours spent working at a job as well as what type of degree, diploma or certificate (if any) was received. This section also asked students to rate on a four-point scale, their perception of general courses at the community college regarding academic advising/counseling services, the transfer process, course learning, and their experience with faculty, Admission Partnership Program (APP) activities at the community college and studying skills. The community college section of the E-TSQ survey asked students the same above questions as in the L-TSQ with the exception of one item that asked about engineering activities while at the community college.

The university experience section of the L-TSQ survey asked students to report the number of hours per week they spent working at a job, their reason for attending ISU and the reasons that influenced their decision to attend ISU. Additionally, students were asked about their attendance at ISU-sponsored transfer orientation and, if they answered yes, how helpful was it. They were also asked about ISU related activities, course learning, experience with faculty, general perceptions of ISU, the adjustment process and college satisfaction. The university section of the E-TSQ asked students the same above questions as in the L-TSQ with the exception of some items pertaining to engineering activities while at ISU.

Additionally, both surveys included open-ended questions that asked students to share their experiences and perceptions about the factors that help them to adjust to ISU and contribute to their successful or unsuccessful transfer. Students were also asked to provide advice to future transfer students.

Reliability and Validity

Reliability is defined as "the extent to which measures are free from errors" (McMillan, 1996, p. 123). Creswell (2009) described reliability as referring to "whether scores to items on an instrument are internally consistent, stable over time and whether there was consistency in test administration and scoring" (p. 233). In other words, reliability signifies the consistency of testing and scoring as well as consistency across constructs. In this study an exploratory factor analysis was conducted to examine the variability among variables. Then, constructs were developed, and coefficient alphas were calculated for each factor. This method is used with instruments in which there is no right or wrong answer to each item (Laanan, 2004). Furthermore, Laanan (2004) stated that it is an appropriate type of reliability for attitude instruments and other measures that contain a range of possible answers for each item, such as agree-disagree. Alpha scores of 0.6-0.7 indicate acceptable reliability and 0.8 or higher indicates good reliability. The coefficient alphas and factors that emerged from the data collected in this study are reported in Tables 5 and 9.

Validity refers to "whether one can draw meaningful and useful inferences from scores on particular instruments" (Creswell, 2009, p. 235). In other words, validity refers to the degree to which the survey items measure constructs. The quantitative section of this study was adapted from the original L-TSQ (Laanan, 1998a). According to Laanan (1998a), an extensive review of the literature was conducted to establish the instrument's construct validity. In addition, a pilot was conducted on the instruments prior to the surveys being sent to the targeted audience to ensure face validity. Also, scholars and researchers were consulted to validate both the content and constructs of the survey instrument.

Study Variables

Dependent Variables

There were two dependent variables that were used in this study: 1) academic adjustment, and 2) cumulative GPA. A factor analysis was conducted as a data reduction technique for academic adjustment dependent variable. In addition, a reliability test was conducted using Cronbach's alpha to test the reliability of the factors that were developed for the academic adjustment dependent variable listed in Table 5. The academic adjustment questions in the surveys asked students to indicate the extent to which they agreed and or disagree with the statements regarding their adjustment process on a four-point scale: 1= disagree strongly, 2 = disagree somewhat, 3 = agree somewhat and 4 = agree strongly. The second variable, the cumulative GPA is a continuous variable. The coding scale for both dependent variables is listed in (Table 4).

Table 4.

Dependent Variables

Variable	Coding /Scale
Academic adjustment (construct)	four-point scale 1 = disagree strongly 3 = disagree somewhat 3 = agree somewhat 4 = agree strongly
Cumulative GPA	Continuous variable

Table 5.

Factor Loading and Reliability Coefficients of Adjustment Factors (Dependent Variables)

Factor name	Factor loadings
Academic adjustment α=.708	
The large classes intimidate me	0.788
I experienced a dip in grades (GPA) during my first semester	0.768
I often feel (felt) overwhelmed with the size of the student body	0.682
My level of stress increased when I started at ISU	0.680

Independent Variables

The independent variables that were measured in this study were organized in three blocks: 1) Background characteristics; 2) Community college experiences, which measure various experiences while at the community college and prior to transferring to ISU; and 3) ISU experiences, which measure various university experiences.

Background characteristics. One of the goals of this study was to gather background information from student participants. Background characteristics have been documented as contributing to differences in academic performance (Astin, 1984; Pascarella & Terenzini, 1991). The background characteristics that were used in this study include age, gender, race/ethnicity, highest level of education completed by parents, and parents' total household income last year and highest degree intended to obtain at any college. It is important to note that race/ethnicity is a dichotomous variable where 0 = White and 1 = Non-White. The coding for non-Whites includes; African American, Asian, Hispanic/Latino and multi-racial (Table 6).

Community college experiences. Laanan (1996) highlighted the effects of community college experiences on transfer student achievement. Table 7 illustrates the community college experience independent variables that were used in this study and the coding scale for each variable. Some of these variables were confirmed by constructs that emerged once a factor analysis was run. Community college degree status was coded on a 3-point scale 1 = AA (*Associate in Arts*), AS (*Associate in Science*), AAS (*Associate in Applied Sciences*) or AGS (*Associate in General Studies*), 2 = other, and 3 = no associate's degree. Community college GPA and the number of credit hours were obtained at the time of transfer. Hours spent studying or preparing for classes were coded on a five-point scale with 1 = up to 5 hours, 2 = 6 to 10 hours, 3 = 11 to 15 hours, 4 = 16 to 20 hours, and 5 = more than 20 hours. In addition, Admission Partnership Program (APP) activities, which is a dichotomous variable was coded as follows: 0 = no and 1 = yes.

There were five additional independent community college variables, or constructs, used in this study, which were identified after running a factor analysis. The factor analysis identified factors that represent relationships among interrelated variables. The independent variables used to create the constructs were coded as follows: Experience with faculty and course learning were measured using a four-point scale: 1 = *never*, 2 = *occasionally*, 3 = *often* and 4 = *very often*. Academic advising/counseling services, general courses and transfer process were measured using a four-point scale; 1 = *disagree strongly*, 2 = *disagree somewhat*, 3 = *agree somewhat* and 4 = *agree strongly*.

University experiences. Table 8 illustrates the independent variables regarding the ISU experience and the coding scale for each variable. Some of these variables were

confirmed by constructs that emerged after a factor analysis was run. The current place of residence variable was coded on a five-point scale as follows: 1 = *residence halls or other university housing*; 2 = *fraternity or sorority house*; 3 = *private apartment or room within walking distance from the university*; 4 = *house, apartment, etc. (no walking distance from campus)*; and 5 = *with parents or relatives* which was recoded on a dichotomous scale of 0 = *on campus* and 1= *off campus*.

Students' most important reason for attending ISU was coded on a four-point scale, with 1 = *to obtain a bachelor's degree*; 2 = *to gain skills necessary to enter a new job or occupation*; 3 = *to pursue graduate or professional school*; and 4 = *to satisfy a personal interest (cultural, social)*. Meanwhile, the ISU-sponsored student orientation variable is a dichotomous variable and was coded with 1 = *yes* and 2 = *no*.

The others eight university independent variables were identified after running a factor analysis. This technique made possible the identification of constructs for the rest of the university independent variables. The independent variables used to create the constructs were coded as follows: influential reasons for attending ISU; outside influences, financial influences and ISU's reputation. These were coded on a four-point scale with 1 = *not important*, 2 = *somewhat important*, 3 = *important,* and 4 = *very important*. Additionally, experience with faculty and course learning were code on a four-point scale: 1= *never*, 2 = *occasionally*, 3 = often, and 4 = *very often*.

The final three university independent variables are also constructs. A factor analysis was conducted and Cronbach's alpha tests were used to test the reliability of the factors that were developed in the factor analysis which is reported in Table 9. The constructs reported

are; general perception of faculty, general perception of transferring and overall satisfaction, all of the above were coded on a four-point scale with 1 = *disagree strongly*, 2 = *disagree somewhat*, 3 = *agree somewhat*, and 4 = *agree strongly*.

Data Analysis

In order to analyze the data, a hypothetical model was created to get a better handle on the blocks and variables that were used via the surveys in this study. Therefore, the data analysis for this study consisted of three blocks. The first block was composed of background characteristics that include: age, gender, parents' highest level of education completed, total household income, and highest degree intended to obtain. The second block was composed of community college experiences and the third block is related to the university experiences. These three blocks were used to see how they related to and can predict academic adjustment and cumulative GPA at ISU. The dependent variables in this study were academic adjustment and cumulative GPA at ISU.

Table 6.

Background Demographics Independent Variables

Variable	Coding/scale
Age	Continuous variable
Gender	Dichotomous 0 = Female 1 = Male
Race/ethnicity	Dichotomous 0 = White 1 = Non-White
Father's higher educational level	8-point scale 1 = Elementary school or less 2 = Some high school 3 = High school graduate 4 = Some college 5 = Associate's degree from 2-year 6 = Bachelor's degree 7 = Some graduate school 8 = Graduate degree
Mother's higher educational level	8-point scale 1 = Elementary school or less 2 = Some high school 3 = High school graduate 4 = Some college 5 = Associate's degree from 2-year 6 = Bachelor's degree 7 = Some graduate school 8 = Graduate degree
Parent's total household income last year	5-point scale 1 = Less than $20,000 2 = $20,000-$39,999 3 = $40,000-$59,999 4 = $60,000-$79,999 5 = $80,000 or more
ighest degree intended to obtain at any college	5-point scale 1= Bachelor (BA or BS) 2 = Master (MA or MS) 3 = Doctorate (Ph.D. or Ed.D.) 4 = Medical (MD, DDS, DO, or DVM) 5 = Law (JD or LLB)

Table 7.

Community College Experiences Independent Variable

Variable	Coding/scale
Associate's degree obtained	3-point scale 1 = Associate's (AA, AS AGS, AAA, AAS) 2 = Other 3 = None
Transfer semester GPA	Continuous variable
Transfer semester hours	Continuous variable
Hours spent studying/preparing for classes	5-point scale 1 = up to 5 hours 2 = 6 to 10 hours 3 = 11 to 15 hours 4 = 16 to 20 hours 5 = more than 20 hours
Participation in admission Partnership Program (APP)	Dichotomous Variable 0 = no 1 = yes
Experience with faculty (construct: 6 items)	4-point scale 1 = never 2 = occasionally 3 = often 4 = very often
Course learning (construct: 6 items)	4-point scale 1 = never 2 = occasionally 3 = often 4 = very often
Academic advising/counseling services (construct: 6 items)	4-point scale 1 = disagree strongly 2 = disagree somewhat 3 = agree somewhat 4 = agree strongly
General courses (construct: 6 items)	4-point scale 1 = disagree strongly 2 = disagree somewhat 3 = agree somewhat 4 = agree strongly
Transfer process (construct:6 items)	4-point scale 1 = disagree strongly 2 = disagree somewhat 3 = agree somewhat 4 = agree strongly

Table 8.

University Experiences Independent Variables

Variable	Coding/scale
STEM major type	Dichotomous 0 = STEM Major (non-engineering) 1 = Engineering
Current place of residence	Dichotomous 0 = on campus 1 = off campus
ISU GPA	Continuous Variable
Most important reasons for attending ISU (construct)	4-point scale 1 = obtain a bachelor's degree 2 = gain skills for a new job or occupation 3 = to pursue graduate/professional school 4 = personal interest (cultural, social).
Influential reasons for attending ISU Outside influences (construct)	4-point scale 1 = not important 2 = somewhat important 3 = important 4 = very important
Financial influences (construct)	4-point scale 1 = not important 2 = somewhat important 3 = important 4 = very important
ISU's reputation (construct)	4-point scale 1 = not important 2 = somewhat important 3 = important 4 = very important
ISU-sponsored transfer student orientation	Dichotomous 1 = yes 2 = no
Course learning (construct)	4-point scale 1 = never 2 = occasionally 3 = often 4 = very often

Table 8. (Continued)

Variable	Coding/scale
Experience with faculty at ISU (construct)	4-point scale 1 = never 2 = occasionally 3 = often 4 = very often
General perception of ISU (construct)	4-point scale 1 = disagree strongly 2 = disagree somewhat 3 = agree somewhat 4 = agree strongly
Negative perception as a transfer student at ISU (construct)	4-point scale 1 = disagree strongly 2 = disagree somewhat 3 = agree somewhat 4 = agree strongly
Overall satisfaction at ISU (construct)	4-point scale 1 = disagree strongly 2 = disagree somewhat 3 = agree somewhat 4 = agree strongly

Table 9 presents a description of the 62 factors that emerged, which can be organized in the context of community colleges and University (ISU). The factors represent attitudes and behaviors that characterize transfer students and their perceptions and experiences at both community college and university environment. Thirty factors emerged within the community college environment and; 32 factors emerged in the university environment.

Table 9.

Factor Loadings and Reliability Coefficients of Community College and University Experiences

Factor name	Factor loadings
Community College Experiences	
Academic Advising/Counseling Services, α =.932	
Information received from academic advisors/counselors was helpful	0.883
Talked with advisor/counselor about courses, requirements, and plans	0.880
Discussed plans with an advisor/counselor on transferring to a four-year institution	0.879
Consulted with academic advisor/counselor regarding transfer	0.869
Advisor/counselor identified courses needed to transfer to a four-year institution	0.844
Met with academic advisors/counselors regularly	0.823
Experience with Faculty, α = .907	
Visited informally and briefly with an instructor after class	0.893
Discussed career plans/ambitions with a faculty member	0.864
Asked instructor for information related to courses taken	0.828
Visited faculty and sought their advice on class projects	0.823
Asked my instructor for comments and criticisms about my work	0.807
Felt comfortable approaching faculty outside of class	0.742
Course Learning, α = .814	
Tried to see how different facts and ideas fit together	0.816
Thought about practical applications of the material	0.790
Tried to explain material to another student or friend	0.743
Participated in class discussions	0.720
Integrated ideas from various sources on a paper/project	0.671
Took detailed notes in class	0.574
General Courses, α = .841	
Courses prepared me for academic standards at ISU	0.799
Courses were intellectually challenging	0.770
Courses developed my critical/analytical thinking	0.740
Courses required extensive reading and writing	0.736
Courses prepared me for my major at ISU	0.724
Courses demanded intensive writing assignments/projects	0.710
Transfer Process, α = .743	
Spoke to an academic counselor at ISU about transferring	0.766
Visited ISU campus to learn where offices and departments were located	0.766
Visited the admission office at ISU	0.720
Researched aspects of ISU for a better understanding of environment	0.704
Knew what to expect at ISU in terms of academics	0.563
Spoke to former community college transfer students to gain insight	0.424

Table 9. (Continued)

Factor name	Factor loadings
University Experiences	
Course Learning α =.819	
Tried to see how different facts and ideas fit together	0.852
Thought about practical application of the material	0.804
Integrated ideas from various sources on a paper/project	0.748
Participated in class discussions	0.692
Tried to explain material to another student or friend	0.683
Took detailed notes in class	0.562
Experience with Faculty α = .909	
Visited informally and briefly with an instructor after class	0.855
Asked instructor for information related to courses taken	0.851
Asked instructor for comments and criticisms about my work	0.848
Visited faculty and sought their advice on class project	0.845
Felt comfortable approaching faculty outside of class	0.792
Discussed career plans/ambitions with a faculty member	0.783
Influential Reasons for Attending ISU	
Outside Influences α = .640	
Advised by academic counselor(s) at previous college	0.790
A representative from ISU recruited me	0.784
A friend suggested attending	0.741
Financial Influences α = .815	
ISU has affordable tuition	0.911
Cost of ISU	0.886
I was offered financial assistance	0.765
Reputation α = .694	
ISU's academic reputation	0.819
ISU's graduates obtain good jobs	0.817
ISU's ranking in national magazines	0.724
General Perceptions	
Faculty α = .826	
ISU's faculty tends to be accessible to students	0.897
ISU's faculty are easy to approach	0.883
Professors are strongly interested in academic development of undergraduates	0.803

Table 9. (Continued)

Factor name	Factor loadings
Negative Experiences as a Transfer Student α = .743	
There is a stigma at ISU among students for having started at a community college	0.844
Students underestimate my abilities because I am a transfer student	0.814
Treated like a number	0.685
Do not fit in	0.659
Overall Satisfaction of ISU α = .887	
I would recommend to other transfer students to come to ISU	0.908
ISU is an intellectually stimulating and often exciting place to be	0.880
If I could start all over again, I still would go to ISU	0.855
Courses I have taken at ISU have been interesting and worthwhile	0.815

A descriptive, comparative and inferential statistical analysis was conducted on the data collected from both instruments L-TSQ and E-TSQ to understand the profile of the transfer students in the study and the overall community college and university experiences of community college transfer students in engineering and STEM non-engineering majors. Table 10 lists the quantitative research questions and the statistical analysis that were used for each of the questions.

Table 10.

Research Questions, Variables, and Method of Analysis

Research question	Independent variables	Dependent variable	Method of analysis
1. What are the background characteristics of Iowa community college transfer students in engineering and other STEM (non-engineering) at ISU by STEM major type (engineering vs. other STEM [non-engineering])?	Background Characteristics		Descriptive
2. What are the community college and university experiences of ISU community college transfer students pursuing bachelor degrees at ISU by STEM major type (engineering vs. other STEM [non-engineering])?	Community college experiences ISU experiences		Descriptive
3. Are there statistically significant differences in the community college and university experiences by STEM major type (engineering vs. other STEM [non-engineering])?	Background Characteristics Community college experiences ISU experiences	Negative Academic Adjustment Cumulative GPA	Inferential (*t*-test)
4. What background characteristics, community college and ISU experiences predict academic adjustment and cumulative GPA for community college transfer students in engineering and other STEM (non-engineering)?	Background Characteristics Community college experiences ISU experiences Community college preparation ISU academic preparation	Negative Academic Adjustment Cumulative GPA	Multivariate analysis Multiple Regression

Descriptive Statistics

Research Question 1. Descriptive statistics including frequencies, crosstabulations, means and standard deviations were used in order to answer the first research question: What are the background characteristics of Iowa community college transfer students in engineering and other STEM (non-Engineering) major at ISU. The background information included: age, gender, father's highest level of education completed, total household income, highest degree intended to obtain and STEM variable. This analysis was executed to report the background characteristics of the community college transfer students who are pursuing Engineering and STEM (non-engineering) degrees at ISU.

Research Question 2. Descriptive statistics including frequencies, crosstabulations, means and standard deviations were employed to best answer what are the community college and university experiences of ISU community college transfer students pursuing bachelor degrees at ISU by STEM major type (Engineering vs. Other STEM [non-Engineering]) the community college experiences include: community college grade point average (GPA) community college credit hours obtained at the time of transfer, the degree obtained at the community college, hours spent studying or preparing for class, general courses, academic advising/counseling services, transfer process, course learning, and experiences with faculty. The university experiences included: influential reasons for attending ISU (e.g. reputation, financial, friends, ranking in national magazines, convenience and location and academic counselor at previous college), participation in an ISU-sponsored transfer student orientation, how helpful the orientation was in facilitating transition to ISU,

course learning, experience with faculty at ISU, general perceptions of ISU faculty, negative perception of transferring, ISU courses and overall satisfaction at ISU.

Inferential Statistics

Research Question 3. To determine whether or not there were statistically significant differences in the community college and university experiences by STEM major type (engineering vs. other STEM non-engineering), an inferential statistical analysis t-test was conducted to compare the mean scores of the two group's (engineering vs. other STEM non-engineering) community college experience variables (community college credit hours obtained at the time of transfer, the degree obtained at the community college, hours spent studying or preparing for class, general courses, academic advising/counseling services, transfer process, course learning, experience with faculty and admission partnership program activities) and university experience variables (influential reasons for attending ISU, general perception of course learning, transferring, course learning and general perception of faculty and student services). The significant value (two-tailed) was used to determine if there was a significant difference. If $p \leq .05$, then the null hypothesis was rejected, meaning a statistical significant relationship was found. If $p \geq .05$ then the null hypothesis will not be rejected; therefore, it was concluded that there was no sufficient evidence to state that there was a statistical significant relationship.

Multivariate Analysis

Research Question 4. For the fourth and last quantitative research question (what background characteristics, community college and ISU experiences predict academic adjustment and cumulative GPA for community college transfer students in engineering and

other STEM non-engineering disciplines, a multivariate analysis approach was used. This multivariable regression was used to estimate the coefficient for the various independent variables to best predict the value of the dependent variables (academic adjustment and cumulative GPA). The following multiple regression equation was used:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_kX_k$$

The above equation was used for the two sequential hierarchical regression models reflecting the two dependent variables (academic adjustment and cumulative GPA). Figure 1 shows the hypothetical regression model that included background demographics, community college and university experiences. Each of the above was used as blocks with the independent variables in each block entered in the regression model to see how they were related to and predict academic adjustment. Figure 2 shows the hypothetical regression model that included background demographics, community college and university factors that predicted the cumulative GPA. The regression models revealed how well one or more independent variables predicted the dependent variables.

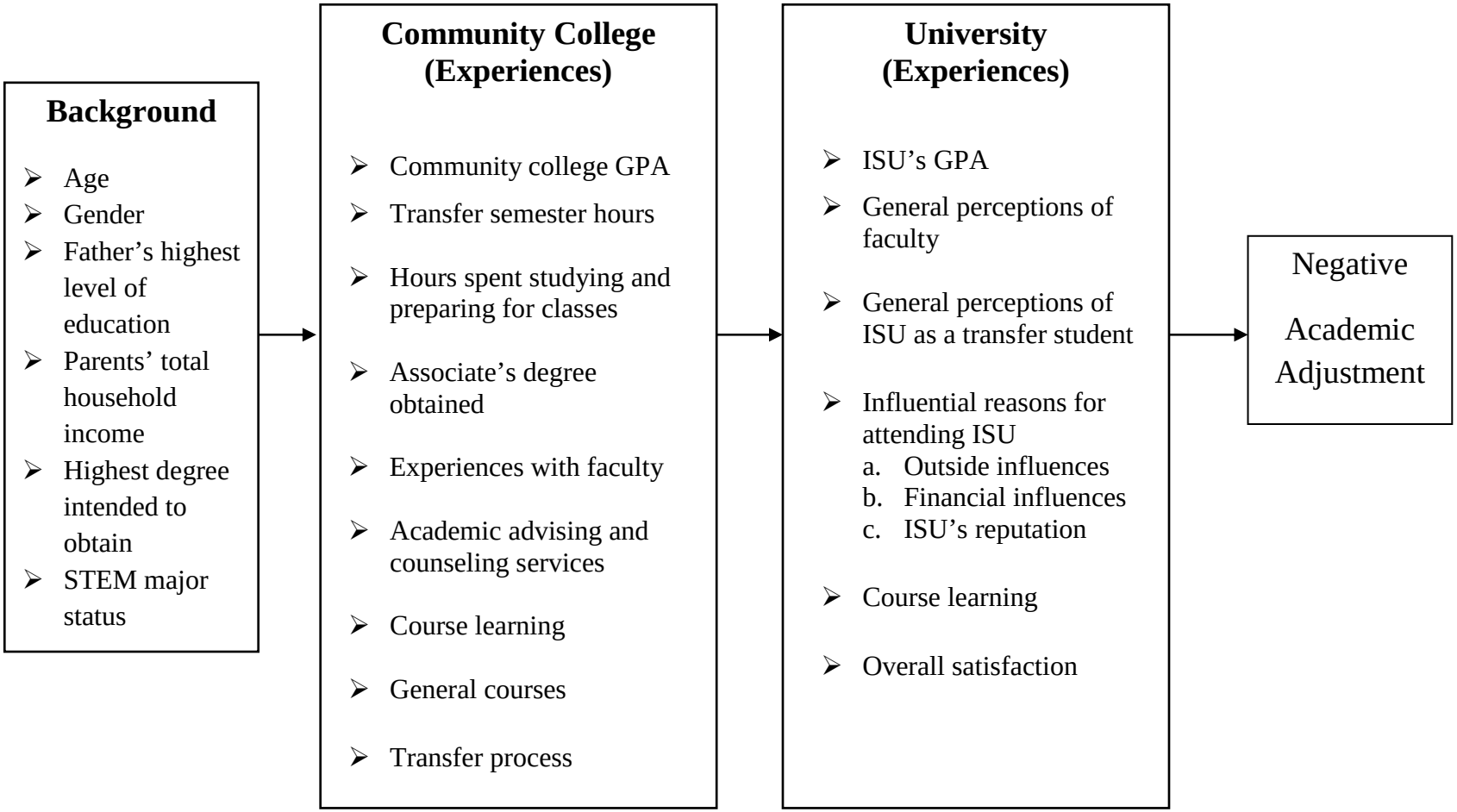

Figure 1. Hypothetical model: Factors that predict community college transfer students' negative academic adjustment.

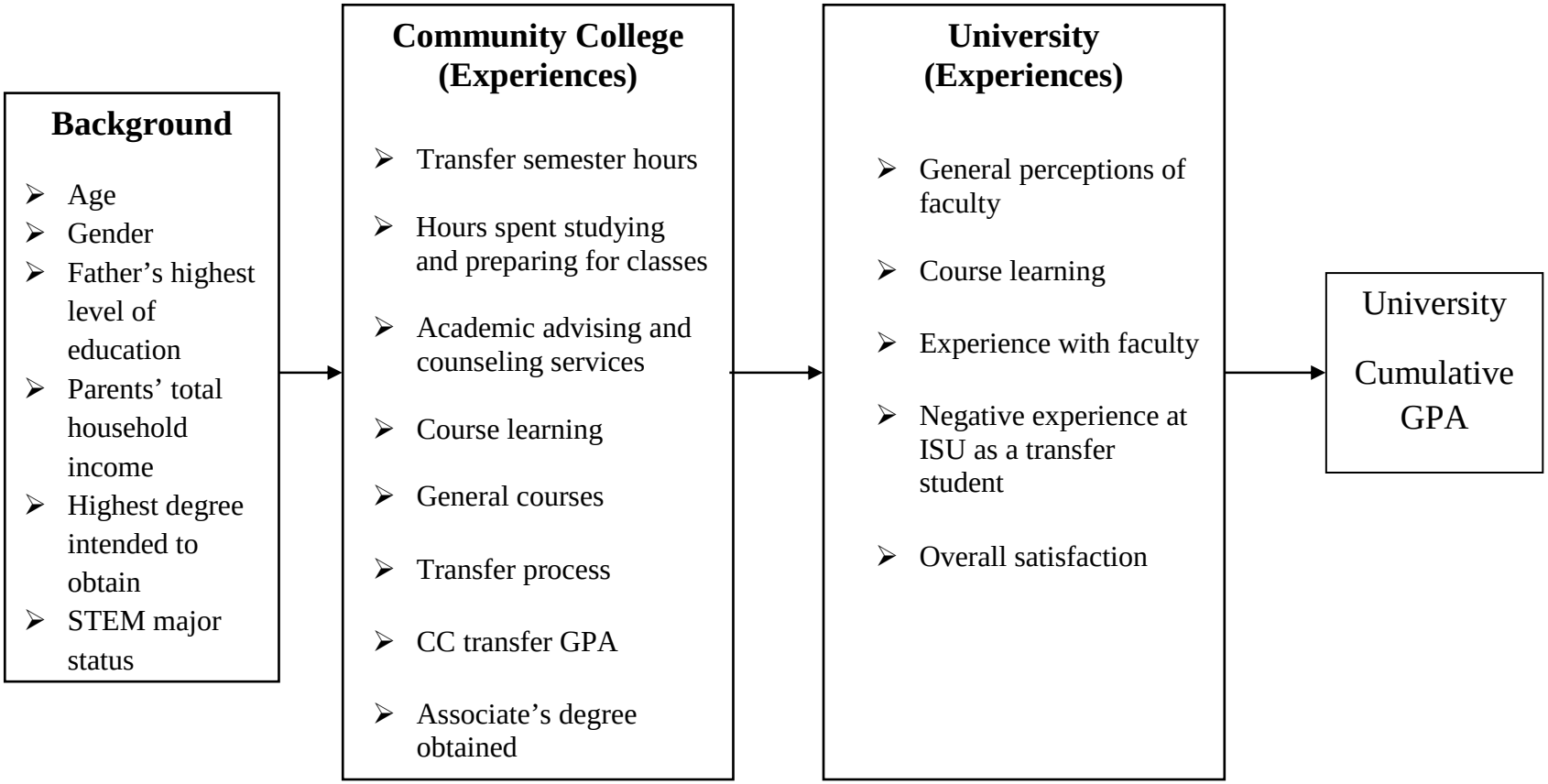

Figure 2. Hypothetical model: Factors that predict community college transfer students' university cumulative GPA

Qualitative Component

The data for the qualitative component were gathered from two sources: open-ended questions on the surveys and the semi-structured interviews. Four open-ended questions focused on the transfer process and adjustment to ISU were asked to participants. The following were the open-ended questions included on the surveys: 1) What factors helped you adjust to ISU? Please explain what factors contributed to your successful transfer (or unsuccessful transfer) to ISU. Feel free to include factors at both your community college and ISU; 2) What might the community college have done to enhance your success or ease the transition to ISU?; 3) If you could give some advice to community college students who will be transferring to ISU, what would that advice be?; and 4) What was not asked that you would like us to know about your experiences at the community college or ISU?

Semi-Structured Interviews

The purpose of interviewing is to describe the connotation of a perception or phenomenon that several individuals share (Marshall & Rossman, 2006). Each interviewee participated in a one-hour semi-structured interview. These interviews were guided by a protocol (see Appendix G) consisting of guiding topics and questions, each interview was audio tape recorded and transcribed. These protocol questions allowed the participants to freely express their feelings about their experiences prior to and after transferring to ISU. Their responses provided a better understanding of their academic involvement, their interactions with faculty and advisors in STEM areas, as well as how peer activities may have a great impact on their STEM career path.

Participants. Interview participants in this study were STEM transfer students who expressed interest in participating via the on-line survey. A question on the L-TSQ and E-TSQ asked individuals to express their interest in participating in interviews to share their academic and social experiences. The participants were chosen based on their survey responses to ensure that they would provide information relative to the research question and focus of the study. Only community college transfer students pursuing STEM non-engineering and engineering bachelor's degree at ISU were contacted. A total of four students, two males and two females were interviewed.

Data Collection. Interviewing is considered the main method of data collection in qualitative research but particularly within phenomenological studies. The purpose of phenomenological interviewing is to describe the meaning of a concept or phenomenon that several individuals share (Marshall & Rossman, 2006). One of the greatest advantages of conducting phenomenological interviews is that "it permits an explicit focus on the researcher's personal experience combined with those of the interviewees" (Marshall and Rosssman, 2006, p. 105). The interviews utilized in this study were semi-structured in nature, allowing the interview to progress naturally. An interview protocol was used that consisted of working topics and questions. Probing questions were used as needed to obtain as much data as possible from participants. Each interviewee participated in a one-hour semi-structured interview conducted during May 2012. These interviews were audiotape recorded and then transcribed.

Data Analysis. Creswell (2009) viewed data analysis as an interactive process and drew attention to six steps in the analysis in qualitative research. I followed these steps

through my qualitative analysis. The interviews were recorded using digital records and transcribed verbatim from the audio recording. After interviews were completed, the first step was to prepare data for analysis. The second step was to read each interview transcript multiple times without taking notes to gain an understanding of each interview. After an understanding was reached, each interview was reread while taking notes and questions were asked in the margins. Then, the coding process began. Coding is the organizing of interview information into segments of text before giving meaning to the information (Rossman & Rallis, 1998). Each interview was then grouped by themes to organize and categorize the findings. The fourth step in the process was to generate description from the coding process, and the fifth step was to explain how the themes were represented in the findings. Lastly the data was interpreted. This process was carried out to analyze the interviews and the open-ended survey questions.

Ethical Considerations

Approval for the use of human subjects was obtained through the Institutional review Board (IRB) at ISU before any information was collected (see Appendices H & I). The researcher was aware of the sensitive nature of this data and complied with all restrictions on the use of data containing important participant information. No data from students were reported without aggregating the results to maintain anonymity of the individuals.

Delimitations of the Study

This study is delimited to community college transfer students from Iowa who are pursuing a bachelor's degree in a STEM major at Iowa State University. Also, the findings of this study are delimited to traditional college students. In addition, this study was

designed to focus exclusively on students who transferred from Iowa community colleges to Iowa State University. Consequently, the experiences of students attending other institutions may be different.

Limitations of the Study

The target population for this study encompasses predominantly White students who may have similar demographic and background characteristics. Therefore, the experience of other ethnicities may vary from the target population. Additionally, the quantitative and qualitative data of this study was self-reported. In other words, students were able to decide whether or not to report and whether or not to respond to certain survey items. Therefore, students who decided not to respond to all the survey questions limited the findings. Furthermore, the quantitative and qualitative findings were limited to the recollection of community college transfer students and their past experiences.

Summary

Chapter 3 outlined the methodological approach employed in this study. This chapter detailed: the quantitative and qualitative research questions, research design, setting, population sample, data collection, instrumentation (L-TSQ and E-TSQ surveys), variables, data management, and method analysis for both the quantitative and qualitative sections of the study. The chapter concludes with information regarding the ethical considerations, limitations and delimitations of the study.

CHAPTER 4: FINDINGS

Overview

An overview of the quantitative and qualitative findings of this study is provided in this chapter, which is organized into five sections. The first section provides details of the background characteristics of community college transfer students. This includes the names of the community colleges attended, father's highest education level, mother's highest education level, parental income, and highest degree intended to obtain at ISU. This section also includes the community college and university experiences of the transfer students. Frequencies and percentages are reported for each of the above categories. Percent differences between STEM non-engineering and engineering are also reported for transfer students' community college experiences and university experiences. The second section covers a statistical analysis of community college and university experiences by STEM non-engineering and engineering students. The third section reports the results of the sequential hierarchical regression analysis of the two dependent variables academic adjustment and cumulative grade point average (GPA). The fourth section provides the findings from the open-ended questions. Lastly, in the fifth section, the findings from the qualitative interviews are articulated.

Descriptive Analysis of the Overall Sample

In order to address research Questions 1 and 2, which asked for a description of background characteristics and of community college and university experiences of transfer students, descriptive statistics are provided. Table 11 illustrates the Iowa community colleges represented in this study. The sample includes the frequencies and percentages of

Table 11.

Iowa Community Colleges Transfers at ISU by STEM non-Eng., and Engineering (N = 280)

	STEM non-Eng. (n=200)		Engineering (n=80)	
Community College	n	%	n	%
Clinton Community College	1	0.5	1	1.3
Des Moines Area Community College– Ankeny	42	21.0	15	18.8
Des Moines Area Community College–Boone	16	8.0	5	6.3
Des Moines Area Community College–Carroll	3	1.5	1	1.3
Des Moines Area Community College–Newton	2	1.0	0	0.0
Des Moines Area Community College–Urban	11	5.5	4	5.0
Des Moines Area Community College–West	1	0.5	0	0.0
Ellsworth Community College	5	2.5	3	3.8
Hawkeye Community College	8	4.0	7	8.8
Indian Hills Community College–Centerville	0	0.0	0	0.0
Indian Hills Community College–Ottumwa	9	4.5	2	2.5
Iowa Central Community College–Fort Dodge	22	11.0	10	12.5
Iowa Central Community College–Webster City	2	1.0	1	1.3
Iowa Lakes Community College–Emmetsburg	5	2.5	0	0.0
Iowa Lakes Community College–Estherville	3	1.5	3	3.8
Iowa Western Community College–Clarinda	0	0.0	0	0.0
Iowa Western Community College–Council	3	1.5	3	3.8
Kirkwood Community College	23	11.5	10	12.5
Kirkwood Community College–Iowa City	2	1.0	0	0.0
Marshalltown Community College	5	2.0	2	2.5
Muscatine Community College	3	1.5	3	3.8
North Iowa Area Community College	19	9.5	3	3.8
Northeast Iowa Community College–Calmar	4	2.0	1	1.3
Northeast Iowa Community College–Peosta	1	0.5	1	1.3
Northwest Iowa community College	1	0.5	1	1.3
Scott Community College	1	0.5	2	2.5
Southeastern Community College–Burlington	3	1.5	1	1.3
Southwestern Community College	2	1.0	1	1.3
Western Iowa Tech Community College	3	1.5	0	0.0
Total	200	100	80	100

transfer students at each community college by STEM non-engineering and engineering. The highest percentage of students in the sample transferred from DMACC-Ankeny (39.8%, *n* = 57), followed by Kirkwood Community college (24%, *n* = 33), and Iowa Central Community College-Fort Dodge (23.5%, *n* =32). A total of 280 students (200 STEM non-engineering and 80 engineering) who participated in this study transferred from Iowa community colleges between Fall 2009 and Spring 2011 (Table 11).

Background Characteristics

In order to have a better understanding of the background characteristics of Iowa community college transfer students who transferred to ISU, a comprehensive description is provided in Table 12.

Here is a general summary of the key characteristics:

Gender, age, and race/ethnicity. The majority of the students surveyed from STEM non-engineering were females (51.5%) and less than two fourths were male (48.5%). Whereas, a vast majority of the engineering students were male (91.2%) and almost 9% of the sample were female students (8.8%). In terms of age, almost three fourths of the STEM non-engineering students (71.4%) and more than two thirds of the engineering students (67.1%) were 20 years of age or younger. Regarding race and ethnicity, the majority of STEM non-engineering students (89.2%) were White while only (10.8%) of the students identified as non-White. Meanwhile, (86.1%) of students from engineering majors were White with (13.9%) of students identified as being from other racial/ethnic backgrounds.

Parents' Education and Income Level. Regarding the highest level of education completed by parents, the data indicated that the majority of students from both STEM non-

engineering and engineering had mothers who obtained at least an associate's degree from two year college or a bachelor's degree.

Table 12.

Transfer Students' Background Characteristics by STEM (non-engineering) and Engineering (N=280)

	STEM non-Eng. (*n*=200)		Engineering (*n*=80)	
Variable	*n*	%	*n*	%
Gender				
Female	103	51.5	7	8.8
Male	97	48.5	73	91.2
Age				
20 or younger	140	71.4	53	67.1
21-24 years old	28	14.3	9	11.5
25-29 years old	15	7.5	11	14.0
30-35 years old	10	5.0	3	3.9
36-45 years old	3	1.5	3	3.9
Race/Ethnicity				
White	174	89.2	68	86.1
Non-White	21	10.8	11	13.9
Highest level of education completed by mother				
Elementary school or less	1	0.5	3	3.8
Some high school	3	1.5	3	3.8
High school graduate	44	22.6	14	17.7
Some college	45	23.1	13	16.5
Associate's degree from two year	47	24.1	15	19.0
Bachelor 's degree	37	19.0	23	29.1
Some graduate school	2	1.0	1	1.3
Graduate degree	14	7.2	7	8.9
Don't know	2	1.0	0	0.0

Table 12. (Continued)

Variable	STEM non-Eng. (*n*=200)		Engineering (*n*=80)	
	n	%	*n*	%
Highest level of education completed by father				
Elementary school or less	3	1.5	0	0.0
Some high school	7	3.6	4	5.1
High school graduate	62	31.8	23	29.1
Some college	34	17.4	11	13.9
Associates' degree from two year	27	13.8	12	15.2
Bachelor's degree	38	19.5	20	25.3
Some graduate school	3	1.5	1	1.3
Graduate degree	16	8.2	8	10.1
Don't know	5	2.6	0	0.0
Parents total household income last year				
Independent	24	12.4	15	19.0
Less than $20,000	7	3.6	4	5.1
$20,000-$39,999	31	16.1	7	8.9
$40,000-$59,999	42	21.8	15	19.0
$60,000-$79,999	44	22.8	15	19.0
$80,000 or more	45	23.3	23	29.1
Highest academic degree intended to obtain				
Bachelor (BA or BS)	84	42.0	42	52.5
Master (MA or MS)	59	29.5	26	32.5
Doctorate (Ph.D or Ed.D)	25	12.5	10	12.5
Medical (MD, DDS, DO, or DVM)	24	12.0	0	0.0
LAW (JD OR LLB)	0	0.0	0	0.0
Other	5	2.5	2	2.5

24.1% of STEM non-engineering students had mothers who obtained at least an associate's degree from a two-year college, while 29.1% of the engineering students had mothers who had obtained at least a bachelor's degree. In addition, a small percentage of both STEM non-engineering (7.2%) and engineering (8.9%) students had mothers who finished a graduate degree.

Data on the highest level of education completed by the father, indicated that the majority of students from both STEM non-engineering and engineering had fathers who obtained at least a high school diploma. About one third of the STEM non-engineering students (31.8%) had fathers who had obtained at least a high school diploma and less than one third of the engineering students (29.1%) had fathers who had obtained at least a high school diploma. In addition, almost one fifth of the STEM non-engineering students (19.5%) had fathers who had completed a bachelor's degree as compared to one-fourth of the engineering students (25.3%) who had fathers who had completed a bachelor's degree. Only 8.2% and 10.1% of the STEM non-engineering and engineering students, respectively had fathers who obtained a graduate degree.

Additionally the majority of the parents of transfer students had an income level greater than $40,000 a year. More specifically, 21.8% of STEM non-engineering students and 19.0% of engineering students' parental income level was between $40,000 and $59,999. Meanwhile, almost one fourth of STEM non-engineering (25.6%) and almost one-fifth of engineering students (19.0%) had parents with incomes between $60,000 and $79,999. A larger percentage of engineering students (29.1%) as compared to less than one-fourth of STEM non-engineering students (23.3%) had parents with income levels that exceeded

$80,000 a year. Lastly, the data indicated that 12.4 % of the STEM non-engineering and 19.0% of the engineering students declared themselves as independent.

Highest Academic Degree Intended to Obtain. The data demonstrated that more than half of both STEM non-engineering (81.6%) and engineering students (64.6%) intended to obtain a bachelor's degree. About 10.7% of the STEM non-engineering and over one-fourth of engineering students (29.1%) aspired to obtain a master's degree. There was no difference between the percentage of STEM non-engineering and engineering students interested in obtaining a doctorate degree.

Summary of Background Characteristics

1. The largest percentage of STEM non-engineering (37.5%) and engineering (31.4%) students transferred from DMACC to ISU during Fall 2009-Spring 2011.
2. Over half of the sample was females (51.5%) from STEM non-engineering majors whereas (8.8%) were engineering majors. More than one third of the sample was males (34.6%) from STEM non-engineering majors while the majority of male students (91.2%) were from engineering majors.
3. The majority of the STEM non-engineering (71.4%) and engineering (67.1%) students in this study were 20 years old or younger.
4. A vast majority of the sample was compromised of White students (89.2% and 86.1% of STEM non-engineering and engineering, respectively).
5. The fathers of STEM non-engineering (31.8%) and engineering (29.1%) students had at least a high school diploma. Whereas almost one-fourth of the mothers from STEM non-engineering students (24.1%) had obtained at least a high school

diploma and almost 30% of the mothers from the engineering students (29.1%) at least had obtained a bachelor's degree.

6. Less than one fourth of STEM non-engineering students (23.3%) and one-third of engineering (33.3%) students had parents with incomes of $80,000 or more, which represents the highest percent for both STEM non-engineering and engineering students.
7. More than 40% of STEM non-engineering students (42.0%) and more than half of engineering students (57.4%) aspired to obtain at least a bachelor's degree.

Community College Experiences

Table 13 presents the community college experiences of Iowa community college transfer students by STEM non-engineering and engineering majors respectively. Percentage differences were calculated by subtracting engineering from STEM non-engineering. A positive percentage indicates a higher percentage for STEM non-engineering students while a negative percentage indicates a higher percentage for engineering students.

Regarding the associate's degree obtained by students, less than two-thirds of STEM non-engineering (63.0%) and less than half of the engineering (43.9%) students obtained an associate's degree. Additionally, 4.5% of STEM non-engineering and 5.0% of engineering students reported to earn more than one associate degree. In contrast, 25.5% of STEM non-engineering and 46.3% of engineering students did not obtain an associate's degree.

In terms of the transfer semester GPA, more than one-third of the students from STEM non-engineering (37.0%) transferred with a GPA of 2.00-2.99, followed by (35.0%) who transferred with a GPA of 3.00-3.49 and over one-fourth (27.5%) transferred with a

GPA of 3.5 or higher. Additionally, the mean of STEM non-engineering students GPAs was 2.90, with standard deviation = 0.50.

Similarly, data from engineering students showed that only one student from engineering transferred with a GPA below 2.0, and one-fourth transferred with a GPA of 2.00-2.99, followed by over two-fifths of the engineering students (41.3%) who transferred with a GPA of 3.00-3.49, and less than one-third (30.0%) transferred with a GPA of 3.5 or higher. In addition, the mean of the engineering respondents community college transfer GPAs was 3.00 with standard deviation = 0.55.

Regarding transfer semester hours, the majority of STEM non-engineering (81.5%) and engineering (72.5%) students transferred with 50-100 credit hours. Less than one-fifth of STEM non-engineering (14.5%) and over one-fifth of engineering (22.5%) students transferred with 1-49 credit hours, while only 4.0% of the STEM non-engineering and 5.0% of engineering students transferred with over 100 hours.

In terms of time spent studying and preparing for class, less than three-fourths of STEM non-engineering students (72.0%) and more than half of the engineering students (63.8%) spent between 1 to 10 hours studying per week. Of the sample, almost one-fifth of STEM non-engineering (18.0%) and more than one-fourth of the engineering students (26.3%) spent between 11 to 20 hours per week studying for class. Only 2.5% of STEM non-engineering and 8.8% of engineering students spent more than 20 hours per week studying.

Table 13.

Community College Experiences by STEM non-Engineering and Engineering (N = 280*)*

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Associate's degree obtained					
Associate's (AA, AS, AAS, AGS)	126	63.0	35	43.9	19.1
Other	9	4.5	4	5.0	-0.5
None	51	25.5	37	46.3	-20.8
Transfer semester GPA					
0.00-1.99	0	0.0	1	1.3	-1.3
2.00-2.99	74	37.0	22	27.5	9.5
3.00-3.49	71	35.5	33	41.3	-5.8
3.5 or higher	55	27.5	24	30.0	-2.5
Transfer semester hours					
1-49 hours	29	14.5	18	22.5	-8.0
50-100 hours	163	81.5	58	72.5	9.0
Over 100 hours	8	4.0	4	5.0	-1.0
Hours spent studying and preparing for class					
1-5 hours	88	44.0	24	30.0	14.0
6-10 hours	56	28.0	27	33.8	-5.8
11-15 hours	26	13.0	15	18.8	-5.8
16-20 hours	10	5.0	6	7.5	-2.5
More than 20 hours	5	2.5	7	8.8	-6.3
Participated in Admission Partnership Program (APP) Activities					
No	133	66.5	53	66.3	0.2
Yes	31	15.5	20	25.0	-9.5
Academic advising					
Consulted with academic advisor regarding transfer					
Disagree strongly	39	19.5	9	11.3	8.2
Disagree somewhat	17	8.5	15	18.8	-10.3
Agree somewhat	60	30.0	22	27.5	2.5
Agree strongly	67	33.5	30	37.5	-4.0
Information received from academic advisor was helpful					
Disagree strongly	47	23.5	14	17.5	6.0
Disagree somewhat	24	12.0	11	13.8	-1.8
Agree somewhat	66	33.0	29	36.3	-3.3
Agree strongly	45	22.5	22	27.5	-5.0

Table 13. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Met with academic advisors/counselors regularly					
Disagree strongly	53	26.5	23	28.8	-2.3
Disagree somewhat	54	27.0	17	21.3	5.7
Agree somewhat	43	21.5	19	23.8	-2.3
Agree strongly	33	16.5	16	20.0	-3.5
Talked with advisor/counselor about courses, requirements, and plans					
Disagree strongly	35	17.5	12	15.0	2.5
Disagree somewhat	27	13.5	12	15.0	-1.5
Agree somewhat	78	39.0	29	36.3	2.7
Agree strongly	43	21.5	23	28.8	-7.3
Discussed plans with an advisor/counselor on transferring to a four-year institution					
Disagree strongly	37	18.5	14	17.5	1.0
Disagree somewhat	21	10.5	10	12.5	-2.0
Agree somewhat	64	32.0	23	28.8	3.2
Agree strongly	61	30.5	29	36.3	-5.8
Advisor/counselor identified courses needed to transfer to a four-year institution					
Disagree strongly	45	22.5	15	18.8	3.7
Disagree somewhat	34	17.0	15	18.8	-1.8
Agree somewhat	52	26.0	27	33.8	-7.8
Agree strongly	52	26.0	19	23.8	2.2
General courses					
Courses prepared me for academic standards at ISU					
Disagree strongly	21	10.5	8	10.0	0.5
Disagree somewhat	46	23.0	24	30.0	-7.0
Agree somewhat	85	42.5	28	35.5	7.0
Agree strongly	32	16.0	16	20.0	-4.0
Courses were intellectually challenging					
Disagree strongly	6	3.0	2	2.5	0.5
Disagree somewhat	37	18.5	9	11.3	7.2
Agree somewhat	102	51.0	44	55.0	-4.0
Agree strongly	39	19.5	20	33.9	-14.4

Table 13. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Courses developed my critical/analytical thinking					
Disagree strongly	8	4.0	2	2.5	1.5
Disagree somewhat	15	7.5	9	11.3	-3.8
Agree somewhat	126	63.0	39	48.8	14.2
Agree strongly	34	17.0	26	32.5	-15.5
Courses required extensive reading and writing					
Disagree strongly	20	10.0	5	6.3	3.7
Disagree somewhat	64	32.0	23	28.8	3.2
Agree somewhat	81	40.5	38	47.5	-7.0
Agree strongly	19	9.5	10	12.5	-3.0
Courses prepared me for my major at ISU					
Disagree strongly	22	11.0	12	15.0	-4.0
Disagree somewhat	46	23.0	14	17.5	5.5
Agree somewhat	77	38.5	35	43.8	-5.3
Agree strongly	40	20.0	15	18.8	1.2
Courses demanded intensive writing assignments/projects					
Disagree strongly	13	6.5	2	2.5	4.0
Disagree somewhat	73	36.5	24	30.0	6.5
Agree somewhat	70	35.5	39	48.8	-13.3
Agree strongly	28	14.0	11	13.8	0.2
Transfer process					
Spoke to an academic counselor at ISU about transferring					
Disagree strongly	19	9.5	11	13.8	-4.3
Disagree somewhat	17	8.5	10	12.5	-4.0
Agree somewhat	67	33.5	29	36.3	-2.8
Agree strongly	81	40.5	25	31.3	9.2
Visited ISU campus to learn where offices and departments were located					
Disagree strongly	16	8.0	8	10.0	-2.0
Disagree somewhat	27	13.5	9	11.3	2.2
Agree somewhat	72	36.0	33	41.3	-5.3
Agree strongly	68	34.0	26	32.5	1.5

Table 13. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Visited the admission office at ISU					
Disagree strongly	28	14.0	11	13.8	0.2
Disagree somewhat	23	11.5	18	22.5	-11.0
Agree somewhat	64	32.0	20	25.0	7.0
Agree strongly	68	34.0	27	33.8	0.2
Researched aspects of ISU for better understanding of environment					
Disagree strongly	17	8.5	7	8.8	-0.3
Disagree somewhat	26	13.0	16	20.0	-7.0
Agree somewhat	95	47.5	33	41.3	6.2
Agree strongly	46	23.0	20	25.0	-2.0
Knew what to expect at ISU in terms of academics					
Disagree strongly	19	9.5	6	7.5	2.0
Disagree somewhat	41	20.5	26	32.5	-12.0
Agree somewhat	81	40.5	30	37.5	3.0
Agree strongly	42	21.0	13	16.3	4.7
Spoke to former community college transfer students to gain insight					
Disagree strongly	65	32.5	34	42.5	-10.0
Disagree somewhat	52	26.0	8	10.0	16.0
Agree somewhat	38	19.0	26	32.5	-13.5
Agree strongly	29	14.5	8	10.0	4.5
Course learning					
Tried to see how different facts and ideas fit together					
Never	4	2.0	1	1.3	0.7
Occasionally	30	15.0	11	13.8	1.2
Often	74	37.0	25	31.3	5.7
Very often	57	28.5	36	45.0	-16.5
Thought about practical applications of the material					
Never	1	0.5	2	2.5	-2.0
Occasionally	28	14.0	7	8.8	5.2
Often	79	39.5	31	38.8	0.7
Very often	58	29.0	34	42.5	-13.5

Table 13. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Tried to explain material to another student					
Never	4	2.0	3	3.8	-1.8
Occasionally	43	21.5	12	15.0	6.5
Often	60	30.0	33	41.3	-11.3
Very often	59	29.5	26	32.5	-3.0
Participated in class discussion					
Never	3	1.5	1	1.3	0.2
Occasionally	32	16.0	16	20.0	-4.0
Often	62	31.0	27	33.8	-2.8
Very often	68	34.0	30	37.5	-3.5
Integrated ideas from various sources on a paper/project					
Never	5	2.5	3	3.8	-1.3
Occasionally	45	22.5	20	25.0	-2.5
Often	62	31.0	24	30.0	1.0
Very often	54	27.0	26	32.5	-5.5
Took detailed notes in class					
Never	4	2.0	2	2.5	-0.5
Occasionally	38	19.0	18	22.5	-3.5
Often	66	33.0	19	23.8	9.2
Very often	58	29.0	35	43.8	-14.8
Experience with faculty					
Visited informally with an instructor after class					
Never	19	9.5	5	6.3	3.2
Occasionally	61	30.5	27	33.8	-3.3
Often	44	22.0	22	27.5	-5.5
Very often	41	20.5	19	23.8	-3.3
Discuss career plans with a faculty member					
Never	28	14.0	14	17.5	-3.5
Occasionally	60	30.0	25	31.3	-1.3
Often	41	20.5	20	25.0	-4.5
Very often	36	18.0	15	18.8	-0.8
Asked instructor for information related to courses taken					
Never	5	2.5	4	5.0	-2.5
Occasionally	52	26.0	20	25.0	1.0
Often	63	31.5	30	37.5	-6.0
Very often	44	22.0	20	25.0	-3.0

Table 13. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Visited faculty and sought their advice on class project					
Never	21	10.5	9	11.3	-0.8
Occasionally	72	36.0	29	36.3	-0.3
Often	46	23.0	20	25.0	-2.0
Very often	26	13.0	16	20.0	-7.0
Asked my instructor for comments and criticism about my work					
Never	29	14.5	10	12.5	2.0
Occasionally	64	32.0	32	40.0	-8.0
Often	40	20.0	21	26.3	-6.3
Very often	32	16.0	11	13.8	2.2
Felt comfortable approaching faculty outside of class					
Never	4	2.0	3	3.8	-1.8
Occasionally	47	23.5	13	16.3	7.2
Often	43	21.5	25	31.3	-9.8
Very often	71	35.5	33	41.3	-5.8

[a] Difference was calculated by subtracting engineering from STEM non-engineering. A positive percentage indicates a higher percentage for STEM non-engineering students.

In terms of academic advising/counseling services, most STEM non-engineering (63.5%) and engineering (65.0%) students agreed somewhat or agreed strongly that they consulted with advisors or counseling services about transferring. Additionally, less than two- thirds of STEM non-engineering (62.5%) and engineering (65.1 %) students agreed somewhat or agreed strongly that they discussed their plans on transferring to a four-year institution with an academic advisor/counselor.

Regarding general courses taken at their community college, 70.5% of STEM non-engineering and 80.0% of the engineering students agreed somewhat or agreed strongly that general courses were intellectually challenging. In addition, more than three-fourths of

STEM non-engineering (80.0%) and engineering (81.3%) students agreed somewhat or agreed strongly that general courses helped them to develop their analytical thinking.

In relation to the transfer process to ISU, almost three-fourths of the students from STEM non-engineering (74.0%) and more than two-thirds of engineering (67.6%) students agreed somewhat or agreed strongly that they spoke with an academic advisor at ISU about transferring. Also, over two-thirds of STEM non-engineering (70.5%) and engineering (67.6%) students agreed somewhat or agreed strongly to have researched aspects of ISU to have a better understanding of the campus environment.

About students' experiences with faculty, STEM non-engineering and engineering students reported feeling comfortable on some level with approaching faculty outside of class and asking them for course related information. More than half of the STEM non-engineering students (57.0%) and about three-fourths of engineering students (72.6%) reported to have often or very often felt comfortable approaching faculty members outside the classroom. Additionally, over half of STEM non-engineering (53.5%) and almost two-thirds of engineering (62.5%) students reported to have often or very often asked faculty members information related to the course they were taking.

In relation to course learning, more than two-thirds of STEM non-engineering (68.5%) and 81.3% of engineering students reported to have often or very often thought about the practical applications of the material covered in class. Similarly, about two-thirds of STEM non-engineering (65.5%) and more than three-fourths of engineering (76.3%) students tried to see how different facts and ideas fit together. Lastly, less than two-thirds of

STEM non-engineering (65.0%) and almost three-fourths of engineering (71.3%) students reported to have often or very often participated in class discussions.

University Experiences

Table 14 reports the transfer students' university experiences by STEM non-engineering and engineering students, respectively. Percentage differences were calculated by subtracting engineering from STEM non-engineering. A positive percentage indicates a higher percentage for STEM non-engineering students while a negative percentage indicates a higher percentage for engineering students.

In terms of place of residence, over two-thirds of the STEM non-engineering students (70.3%) lived off campus, while over one-fourth (29.7%) lived on campus. Similarly, over two-thirds of engineering students (68.8%) lived off campus and almost one-third of them (31.2%) lived on campus.

Regarding the most important reason for attending ISU, almost half of STEM non-engineering students (47.5%) decided to attend ISU to obtain a bachelor's degree and about one-fifth (20.5%) decided to attend ISU to pursue graduate or professional school. Meanwhile, half of the engineering students (50.0%) decided to attend ISU to obtain a bachelor's degree and over one-third (35.0%) wanted to gain skills necessary to enter a new job or occupation. In regards to ISU-sponsored transfer student orientation, about half of STEM non-engineering students (47.5%) participated in the orientation as compared to over two-thirds of engineering students (69.0%). Over one-third of STEM non-engineering (34.0%) and more than two-fifths of engineering (41.3%) students found the transfer student orientation to be somewhat helpful or very helpful.

Table 14.

University Experiences by STEM non-Engineering and Engineering (N = 280)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Current place of residence					
On campus	59	29.7	25	31.2	-1.5
Off campus	139	70.3	55	68.8	1.5
University GPA (as of Fall 2010)					
0.00-1.99	27	13.5	10	12.5	1.0
2.00-2.99	87	43.5	36	45.0	-1.5
3.00-3.49	52	26.0	22	27.5	-1.5
3.5 or higher	34	17.0	12	15.0	2.0
Most important reasons for attending ISU					
To obtain a bachelor's degree	95	47.5	40	50.0	-2.5
To gain skills necessary to enter a new job occupation	25	12.5	28	35.0	-22.5
To pursue graduate or professional school	41	20.5	5	6.3	14.2
To satisfy a personal interest (cultural, social)	0	0.0	1	1.3	-1.3
ISU-sponsored Transfer Student Orientation					
Yes	95	47.5	48	60.0	-12.5
No	64	32.0	26	32.5	-0.5
How helpful was the transfer student orientation					
Very unhelpful	16	8.0	8	10.0	-2.0
Somewhat unhelpful	15	7.5	10	12.5	-5.0
Somewhat helpful	52	26.0	25	31.3	-5.3
Very helpful	16	8.0	8	10.0	-2.0
Influential reasons for attending ISU					
Outside Influences					
Advised by academic counselor(s) at previous college					
Not important	77	48.7	33	44.6	4.1
Somewhat important	35	22.2	17	23.0	-0.8
Important	30	19.0	17	23.0	-4.0
Very important	16	10.1	7	9.5	0.6
A representative from ISU recruited me					
Not important	116	74.4	53	72.6	1.8
Somewhat important	21	13.5	12	16.4	-2.9
Important	17	10.9	7	9.6	1.3
Very important	2	1.3	1	1.4	-0.1

Table 14. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
A friend suggested attending					
Not important	68	43.0	36	49.3	-6.3
Somewhat important	36	22.8	17	23.3	-0.5
Important	40	25.3	16	21.9	3.4
Very important	14	8.9	4	5.5	3.4
Financial Influences					
ISU has affordable tuition					
Not important	15	9.4	9	12.3	-2.9
Somewhat important	17	10.7	9	12.3	-1.6
Important	57	35.8	26	35.6	0.2
Very important	70	44.0	29	39.7	4.3
Cost of ISU					
Not important	19	12.0	11	14.9	-2.9
Somewhat important	24	15.2	10	13.5	1.7
Important	49	31.0	31	41.9	-10.9
Very important	66	41.8	22	29.7	12.1
I was offered financial assistance					
Not important	33	20.8	18	24.3	-3.5
Somewhat important	26	16.4	11	14.9	1.5
Important	45	28.3	22	29.7	-1.4
Very important	55	34.6	23	31.1	3.5
Reputation					
ISU's academic reputation					
Not important	6	3.8	1	1.4	2.4
Somewhat important	16	10.1	6	8.1	2.0
Important	69	43.4	29	39.2	4.2
Very important	68	42.8	38	51.4	-8.6
ISU's graduates obtain good jobs					
Not important	13	8.2	6	8.2	0.0
Somewhat important	13	8.2	7	9.6	-1.4
Important	67	42.1	26	35.6	6.5
Very important	66	41.5	34	46.6	-5.1

Table 14. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
ISU's ranking in national magazines					
Not important	52	32.9	22	29.7	3.2
Somewhat important	31	19.6	16	21.6	-2.0
Important	51	32.3	20	27.0	5.3
Very important	24	15.2	16	21.6	-6.4
Course learning					
Tried to see how different facts and ideas fit together					
Never	1	0.6	0	0.0	0.6
Occasionally	28	18.1	7	10.1	8.0
Often	72	46.5	25	36.2	10.3
Very often	54	34.8	37	53.6	-18.8
Thought about practical application of the material					
Never	2	1.3	0	0.0	1.3
Occasionally	16	10.4	5	7.1	3.3
Often	75	48.7	29	41.4	7.3
Very often	61	39.6	36	51.4	-11.8
Integrated ideas from various sources on a paper/project					
Never	2	1.3	4	5.8	-4.5
Occasionally	22	14.3	16	23.2	-8.9
Often	71	46.1	22	31.9	14.2
Very often	59	38.3	27	39.1	-0.8
Participated in class discussions					
Never	9	5.8	7	10.1	-4.3
Occasionally	61	39.4	21	30.4	9.0
Often	45	29.0	15	21.7	7.3
Very often	40	25.8	26	37.7	-11.9
Tried to explain material to another student or friend					
Never	3	1.9	1	1.4	0.5
Occasionally	46	29.7	17	24.3	5.4
Often	55	35.5	29	41.4	-5.9
Very often	51	32.9	23	32.9	0.0

Table 14. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Took detailed notes in class					
Never	1	0.6	1	1.4	-0.8
Occasionally	24	15.5	9	13.0	2.5
Often	49	31.6	19	27.5	4.1
Very often	81	52.3	40	58.0	-5.7
Experience with Faculty					
Visited informally and briefly with an instructor after class					
Never	32	20.5	18	26.1	-5.6
Occasionally	70	44.9	26	37.7	7.2
Often	34	21.8	16	23.2	-1.4
Very often	20	12.8	9	13.0	-0.2
Asked instructor for information related to courses taken					
Never	14	9.0	6	8.6	0.4
Occasionally	72	46.2	30	42.9	3.3
Often	48	30.8	22	31.4	-0.6
Very often	22	14.1	12	17.1	-3.0
Asked instructor for comments and criticisms about my work					
Never	56	36.1	20	28.6	7.5
Occasionally	51	32.9	30	42.9	-10.0
Often	32	20.6	16	22.9	-2.3
Very often	16	10.3	4	5.7	4.6
Visited faculty and sought their advice on class project					
Never	27	17.3	13	18.6	-1.3
Occasionally	77	49.4	24	34.3	15.1
Often	36	23.1	26	37.1	-14.0
Very often	16	10.3	7	10.0	0.3
Felt comfortable approaching faculty outside of class					
Never	23	14.8	6	8.6	6.2
Occasionally	60	38.7	32	45.7	-7.0
Often	39	25.2	20	28.6	-3.4
Very often	33	21.3	12	17.1	4.2

Table 14. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Discussed career plan/ambitions with a faculty member					
Never	45	28.8	31	44.3	-15.5
Occasionally	59	37.8	23	32.9	4.9
Often	35	22.4	11	15.7	6.7
Very often	17	10.9	5	7.1	3.8
General Perceptions					
Faculty					
ISU's faculty tend to be accessible to students					
Disagree strongly	6	3.9	3	4.2	-0.3
Disagree somewhat	42	27.5	9	12.7	14.8
Agree somewhat	69	45.1	46	64.8	-19.7
Agree strongly	36	23.5	13	18.3	5.2
ISU's faculty are easy to approach					
Disagree strongly	8	5.2	2	2.8	2.4
Disagree somewhat	30	19.5	16	22.5	-3.0
Agree somewhat	75	48.7	39	54.9	-6.2
Agree strongly	41	26.6	14	19.7	6.9
Professors are strongly interested in academic development of undergraduates					
Disagree strongly	12	7.8	3	4.3	3.5
Disagree somewhat	47	30.5	16	22.9	7.6
Agree somewhat	70	45.5	38	54.3	-8.8
Agree strongly	25	16.2	13	18.6	-2.4
Negative experiences as a transfer student					
There is a stigma at ISU among students for having started at a community college					
Disagree strongly	46	30.7	20	28.2	2.5
Disagree somewhat	46	30.7	30	42.3	-11.6
Agree somewhat	42	28.0	16	22.5	5.5
Agree strongly	16	10.7	5	7.00	3.7
Students underestimate my abilities because I am a transfer student					
Disagree strongly	38	25.0	18	25.7	-0.7
Disagree somewhat	44	28.9	30	42.9	-14.0
Agree somewhat	44	28.9	12	17.1	11.8
Agree strongly	26	17.1	10	14.3	2.8

Table 14. (Continued)

	STEM non-Eng. (n=200)		Engineering (n=80)		Difference[a]
Variable	*n*	%	*n*	%	%
Treated like a number					
Disagree strongly	18	11.7	13	18.6	-6.9
Disagree somewhat	57	37.0	21	30.0	7.0
Agree somewhat	52	33.8	31	44.3	-10.5
Agree strongly	27	17.5	5	7.1	10.4
Do not fit in					
Disagree strongly	29	18.8	15	21.7	-2.9
Disagree somewhat	79	51.3	37	53.6	-2.3
Agree somewhat	34	22.1	12	17.4	4.7
Agree strongly	12	7.8	5	7.2	0.6
Overall Satisfaction of ISU					
I would recommend to other transfer students to come to ISU					
Disagree strongly	3	1.9	2	2.8	-0.9
Disagree somewhat	9	5.8	7	9.9	-4.1
Agree somewhat	59	38.3	29	40.8	-2.5
Agree strongly	83	53.9	33	46.5	7.4
ISU is an intellectually stimulating and often exciting place to be					
Disagree strongly	4	2.6	1	1.4	1.2
Disagree somewhat	6	3.9	8	11.3	-7.4
Agree somewhat	84	54.2	34	47.9	6.3
Agree strongly	61	39.4	28	39.4	0.0
If I could start all over again, I still would go to ISU					
Disagree strongly	5	3.2	1	1.4	1.8
Disagree somewhat	14	9.1	7	9.9	-0.8
Agree somewhat	47	30.5	25	35.2	-4.7
Agree strongly	88	57.1	38	53.5	3.6
Courses I have taken at ISU have been interesting and worthwhile					
Disagree strongly	4	2.6	2	2.8	-0.2
Disagree somewhat	18	11.6	7	9.9	1.7
Agree somewhat	70	45.2	39	54.9	-9.7
Agree strongly	63	40.6	23	32.4	8.2

[a] Difference was calculated by subtracting engineering from STEM non-engineering. A positive percentage indicates a higher percentage for STEM non-engineering students.

To facilitate the analysis of the influential reasons for attending ISU, the survey question was divided into three major categories: outside influences, financial influences and ISU's reputation. In regards to outside influences, less than three-fourths of STEM non-engineering (70.9%) and over two-thirds of engineering (67.6%) students found that being advised by an academic counselor at their previous college was not important or somewhat important as an influential reason for attending ISU. Also, the majority of both STEM non-engineering (87.9%) and engineering (89.0%) students found that being recruited by an ISU representative was not important or somewhat important as an influential reason for attending ISU. Almost two-thirds of STEM non-engineering (65.8%) and less than three- fourths of engineering (71.6%) students found that attending ISU when suggested by a friend was not important or somewhat important as an influential reason for attending ISU.

In terms of financial influences for attending ISU, more than three-fourths of both STEM non-engineering (79.8%) and engineering (75.3%) students found that ISU's affordable tuition was important or very important as an influential reason to attend ISU. Relatedly, more than two-thirds of both STEM non-engineering (72.8%) and engineering (72.6%) students found the cost of ISU was important or very important in attending ISU. Less than two-thirds of both STEM non-engineering (62.9%) and engineering (60.8%) students found that being offered financial assistance was important or very important as an influential reason for attending ISU.

Regarding ISU's reputation, the majority of both STEM non-engineering (86.2%) and engineering (90.6%) students found ISU's academic reputation as being important or

very important influential reason to attend ISU. In addition, over three-fourths of both STEM non-engineering (83.6%) and engineering (82.2%) students found the fact that ISU's graduates obtain good jobs upon graduation was an important or very important reason for attending ISU.

In relation to course learning at ISU, the majority of both STEM non-engineering (83.9%) and engineering (85.5%) students reported that they took detailed notes in class often or very often. Also, most STEM non-engineering (81.3%) and engineering (89.8%) students reported that they often or very often tried to see how different facts and ideas fit together. Additionally, a vast majority of STEM non-engineering (88.3%) and engineering (92.8%) students reported to have thought about the practical application of the course material often or very often.

Regarding experiences with faculty at ISU, about two-thirds of STEM non-engineering (66.7%) and more than half of engineering (60.9%) students reported to have visited informally and briefly with an instructor after class occasionally or often. More than three-fourths of STEM non-engineering (77.0%) and less than three-fourths of engineering (74.3%) students reported that they occasionally or often asked the instructor for course-related information. Lastly, less than two-thirds of STEM non-engineering (63.9%) and almost three-fourths of engineering (74.3%) students reported that they occasionally or often felt comfortable approaching faculty outside the classroom.

To facilitate the analysis of survey questions regarding the general perception of students, questions were divided into three categories: the general perception about

faculty, the negative general perception of being a transfer student, and overall experience at ISU.

Regarding the general perception of ISU's faculty, more than two-thirds of STEM non-engineering students (68.6%), as compared to the majority of engineering students (83.1%), agreed somewhat or agreed strongly that faculty tend to be accessible to students. In addition, about three-fourths of both STEM non-engineering (75.3%) and engineering (74.6%) students agreed somewhat or agreed strongly that faculty tend to be easy to approach. Lastly, three-fourths of STEM non-engineering (75.0%) and more than three-fourths of engineering (77.2%) students disagreed somewhat or agreed somewhat that professors are interested in the academic development of undergraduates.

In regards to the negative general perception of being a transfer student, less than two-thirds of STEM non-engineering (61.4%) and over two-thirds of engineering (70.5%) students disagreed strongly or disagreed somewhat that there is a stigma among students at ISU for having started at a community college. Also, over half of STEM non-engineering (53.9%) and over two-thirds of engineering (68.6%) students disagreed strongly or disagreed somewhat with the statement that transfer students are underestimated by other students based on the fact that they attended a community college. Additionally, more than two-thirds of STEM non-engineering (70.8%) and almost three-fourths of engineering students (74.3%) disagreed somewhat or agreed somewhat about being treated like a number at ISU.

In regards to their overall satisfaction with ISU, the majority of both STEM non-engineering (92.2%) and engineering (87.3%) students agreed somewhat or agreed

strongly that they would recommend other transfer students to come to ISU. Meanwhile, the majority of STEM non-engineering (87.6%) and engineering (88.7%) students agreed somewhat or agreed strongly that if they could start all over again, they would have still opted to attend ISU. Lastly, a vast majority of both STEM non-engineering (93.6%) and engineering (88.7%) students agreed somewhat or agreed strongly that ISU is an intellectually stimulating and often exciting place to be.

Statistical Analysis of Community College and University Experiences by STEM non-engineering and Engineering

To respond to research Question 3, inferential statistics were conducted. Independent samples *t*-tests were conducted to compare the mean scores of two groups (STEM non-engineering and engineering) related to community college experience and university experience variables. The grouping variable used were, 1 = STEM non-engineering and 2 = engineering. Tables 15 and 16 summarize the means of the independent samples *t*-test of community college and university experiences respectively. Appendixes J and K show the details of the *t*-tests.

Community College Experiences

As shown in Table 15, the mean community college GPA of STEM non-engineering (2.90) and engineering (3.00) differed by -0.10, which was not statistically significant between both groups (t = -0.90, df = 278, p = .369) at the p = .05 level. The scale was continuous.

The mean of community college transfer semester hours for STEM non-engineering and engineering students was 63.40 and 61.61, respectively, with a difference of 1.79. The

means were not statistically significant between both groups (t = 0.58, df = 116.65, p = .563) at the p = .05 level. Because of the p-value for Levene's test was ≤ .05 (.048), the null hypothesis that the variances of the two groups are equal was rejected, implying that the variances were unequal. The scale was continuous.

The means regarding community college academic advising for STEM non-engineering and engineering students were 2.65 and 2.73, respectively, which was not statistically significant between both groups (t = -.61, df = 255, p = .540) at the p = .05 level. The STEM non-engineering and engineering students both reported that they "disagreed somewhat" that they had consulted and interacted with academic advisors and counseling services during the transfer process. The scale for this section was a 4-point Likert scale ranging from 1 = *disagree strongly* to 4 = *agree strongly*.

Table 15.

Means, Standard Deviations, and t-test Results for Community College Experiences

Community college experiences	STEM non-Eng.		Engineering					Confidence interval	
	M	*SD*	*M*	*SD*	*t*	*df*	*p*	Lower	Upper
Transfer semester credit hours	63.40	18.83	61.61	24.96	0.58	116.65	.36	-4.33	7.91
Transfer GPA	2.90	0.79	3.00	0.80	0.90	278	.37	-.30	.11
Academic advising	2.65	0.95	2.73	0.91	-0.61	255	.54	-.33	.18
Experience with faculty	2.67	0.77	2.72	0.78	-0.42	235	.67	-.26	.17
Course learning	3.09	0.57	3.18	0.60	-1.03	235	.30	-.24	.07
General courses	2.75	0.59	2.85	0.62	-1.15	254	.58	-.26	.06
Transfer process	2.83	0.64	2.72	0.65	1.21	253	.22	-.06	.28
Hours spent studying and preparing for class	1.85	1.03	2.30	1.23	-2.84	126.55	.005*	-.76	-.13

*p<.05

The mean of the responses regarding community college experiences with faculty was 2.67 for STEM non-engineering and 2.72 for engineering students with a difference of -0.05. This difference in means was not statistically significant between groups (t = -0.42, *df* = 235, *p* = .673) at the *p* = .05 level. Students from both STEM non-engineering and engineering students reported "occasionally" visiting faculty and seeking their advice in certain areas both inside and outside of the classroom. The scale for this section was a 4-point Likert scale ranging from 1 = *never* to 4 = *very often*. The mean of the responses regarding community college course learning was 3.09 for STEM non-engineering and 3.18 for engineering students, with a difference of -0.09, this difference in means was not statistically significant between both groups (*t* = -1.037, *df* = 235, *p* = .301) at the *p* = .05 level. Students from both STEM non-engineering and engineering reported that they have "often" thought about practical applications of the material covered in class. They "often" participated in class activities and discussions as well. The scale for this section was a 4-point Likert-type scale ranging from 1 = *never* to 4 = *very often*.

The mean of the responses regarding community college general courses was 2.75 for STEM non-engineering and 2.85 for engineering students, resulting in a difference of -0.10, which was not statistically significant between both groups (*t* = -1.159, *df* = 254, *p* = .248) at the *p* = .05 level. Both STEM non-engineering and engineering students reported to "disagree somewhat" that the courses at the community college were intense, developed their critical and analytical thinking, and prepared them for the academic standards at ISU. The scale for this section was a 4-point Likert scale ranging from 1 = *disagree strongly* to 4 = *agree strongly*.

The mean of the responses regarding the community college transfer process was 2.83 for STEM non-engineering and 2.72 for engineering students, with a difference of 0.11. This difference, was not statistically significant between both groups (t = 1.213, df = 253, p = .226) at the p = .05 level. STEM non-engineering students reported to "disagree somewhat" that they researched aspects and visited ISU to learn where offices and departments were located. The scale for this section was a 4-point Likert scale ranging from 1 = *disagree strongly* to 4 = *agree strongly*.

The mean of the responses regarding community college hours spent studying and preparing for class was 1.85 for STEM non-engineering and 2.30 for engineering students, with a difference of -0.45, which was statistically significant between both groups (t = -3.05, df = 262, p = .005) at the p = .05 level. Students from STEM non-engineering reported spending about 1 to 5 hours a week studying and preparing for class. However, engineering students reported studying between 6 to10 hours a week for class. The scale for this section was a five-point scale ranging from 1 = *1 to 5 hours* to 5 = *more than 20 hours*.

University Experiences

As shown in Table 16, the means of the ISU GPA for STEM non-engineering and engineering students, as of Spring 2011, were 2.46 and 2.45 respectively. The difference in GPA between the two groups (0.01) was not statistically significant between both groups (t =123, df = 278, p = .902) at the p =.05 level. The scale was continuous.

The mean of the responses regarding university experience with faculty was 2.29 for STEM non-engineering and 2.27 for engineering students, with a difference of 0.02. This difference was not statistically significant between both groups (t = .170, df = 221, p = .86) at

the $p = .05$ level. Both STEM non-engineering and engineering students reported to have "occasionally" visited faculty to seek their advice in certain areas both inside and outside the classroom. The scale for this section was a 4-point Likert scale ranging from 1 = *never* to 4 = *very often*. The mean of the responses regarding university course learning was 3.11 for STEM non-engineering and 3.21 for engineering students, with a difference of -0.10. This difference was not statistically significant between both groups ($t = -1.13$, $df = 219$, $p = .257$) at the $p = .05$ level. Both groups reported that they "often" took detailed notes in class and thought about the practical application of the course material. The scale for this section was a 4-point Likert scale ranging from 1 = *never* to 4 = *very often*.

Table 16.

Means, Standard Deviations, and t-test Results for University Experiences

University experiences	STEM non-Eng.		Engineering					Confidence interval	
	M	*SD*	*M*	*SD*	*t*	*df*	*p*	Lower	Upper
ISU GPA (as of Spring 2011)	2.46	0.92	2.45	0.89	0.12	278	.90	-.22	.25
Influential reasons to attend									
a. Outside influences	1.76	0.70	1.73	0.73	0.25	227	.80	-.17	.22
b. Financial influences	2.97	0.87	2.85	0.93	0.98	229	.32	-.12	.37
c. Reputation of ISU	2.90	0.72	3.00	0.73	-0.92	229	.35	-.29	.10
Experience with faculty	2.29	0.79	2.27	0.70	0.17	221	.86	-.24	.07
Course learning	3.11	0.55	3.21	0.59	-1.13	219	.58	-.25	.06
Negative perception as a transfer student	2.33	0.71	2.19	0.68	1.27	217	.20	-.07	.33
General perception of faculty	2.85	0.72	2.91	0.59	-0.68	220	.49	-.26	.12
Overall satisfaction	3.34	0.62	3.28	0.63	0.64	222	.52	-.12	.23

*$p<.05$

The mean of the responses regarding outside influences (previous community college advisors, friends, and ISU recruiter) as being influential in their reasons for attending ISU was 1.76 for STEM non-engineering and 1.73 for engineering students. The difference of 0.03, between the groups was not statistically significant (t = .25, df = 227, p = .801) at the p = .05 level. Both STEM non-engineering and engineering students reported advisors, friends, and ISU advisors as a "not important" factor in their reasons for attending ISU. The scale for this section was a 4-point Likert scale ranging from 1 = *not important* to 4 = *very important*.

The mean of the responses regarding the influence of financial reasons in attending ISU was 2.97 for STEM non-engineering and 2.85 for engineering, with a difference of 0.12. This difference was not statistically significant between both groups (t = 0.98, df = 229, p = .32) at the p = .05 level. Students from STEM non-engineering and engineering reported that financial reasons were "somewhat important" leaning more toward "important" in their decision to attend ISU. The scale for this section was a 4-point Likert scale ranging from 1 = *not important* to 4 = *very important*.

The mean of the responses regarding ISU's reputation as being an influential factor in a student's reason for attending ISU was 2.90 for STEM non-engineering and 3.00 for engineering students. The difference between the two groups was -0.10, which was not statistically significant (t = -.92, df = 229, p = .356) at the p = .05 level. Students from STEM non-engineering reported that ISU's reputation was "somewhat important" or "important" to their decision to attend ISU. However, engineering students reported ISU's

reputation as being an "important" factor for attending ISU. The scale for this section was a 4-point Likert scale ranging from 1 = *not important* to 4 = *very important*.

The mean of the responses regarding transfer students' negative general perception of how the university views them was 2.33 for STEM non-engineering and 2.19 for engineering students, with a difference of 0.14. This difference between the groups was not statistically significant ($t = 1.27$, $df = 217$, $p = .202$) at the $p = .05$ level. STEM non-engineering and engineering students both reported to "disagree somewhat" with the assertion that they perceive their abilities as being underestimated by students and faculty or that there is a stigma that exist due to being a transfer student at ISU. The scale for this section was a 4-point Likert scale ranging from 1 = *disagree strongly* to 4 = *agree strongly*.

The mean of the responses regarding the general perception of faculty was 2.85 for STEM non-engineering and 2.91 for engineering students. There was a difference between the groups of (-0.06), that was not statistically significant between both groups ($t = -.68$, $df = 220$, $p = .49$) at the $p = .05$ level. Because of the p value for the Levene's test was $\leq .05$, the null hypothesis that the variances of the two groups are equal was rejected, implying that the variances were unequal. Both STEM non-engineering and engineering students, reported to "disagree somewhat" leaning more toward "agree somewhat" with the assertion that ISU's faculty were interested in the academic development of undergraduates and were easy to approach. The scale for this section was a 4-point Likert scale ranging from 1 = *not important* to 4 = *very important*.

The mean of the responses regarding overall satisfaction with ISU was 3.34 for STEM non-engineering and 3.28 for engineering students, with a difference of 0.06. This

difference was not statistically significant between both groups (t = .64, df = 222, p = .523) at the p = .05 level. Both STEM non-engineering and engineering students reported that they "agreed somewhat" with the statement that if they could start all over again, they would still opt to attend ISU. They also "agreed somewhat" that ISU is an intellectually stimulating and often exciting place to be. The scale for this section was a 4-point Likert scale ranging from 1 = *not important* to 4 = *very important*

Hierarchical Multiple Regression Analysis

Two sequential hierarchical regression analyses were conducted on two dependent variables - academic adjustment and cumulative grade point average (GPA) - to test the predictive validity of the multiple independent variables contained in the proposed models (Figure 1 and 2). These independent variables were grouped into three blocks; background characteristics, community college experiences, and ISU experiences, respectively. Pairs of regression models were run in order to determine which ones had the best model fit. This helped to predict the correlation between the independent variables from block 1, block 2, and block 3 as well as the dependent variables "academic adjustment" and "cumulative GPA." The final models are presented in Figure 3 and 4. The regression model revealed how well one or more independent variables predicted the dependent variables.

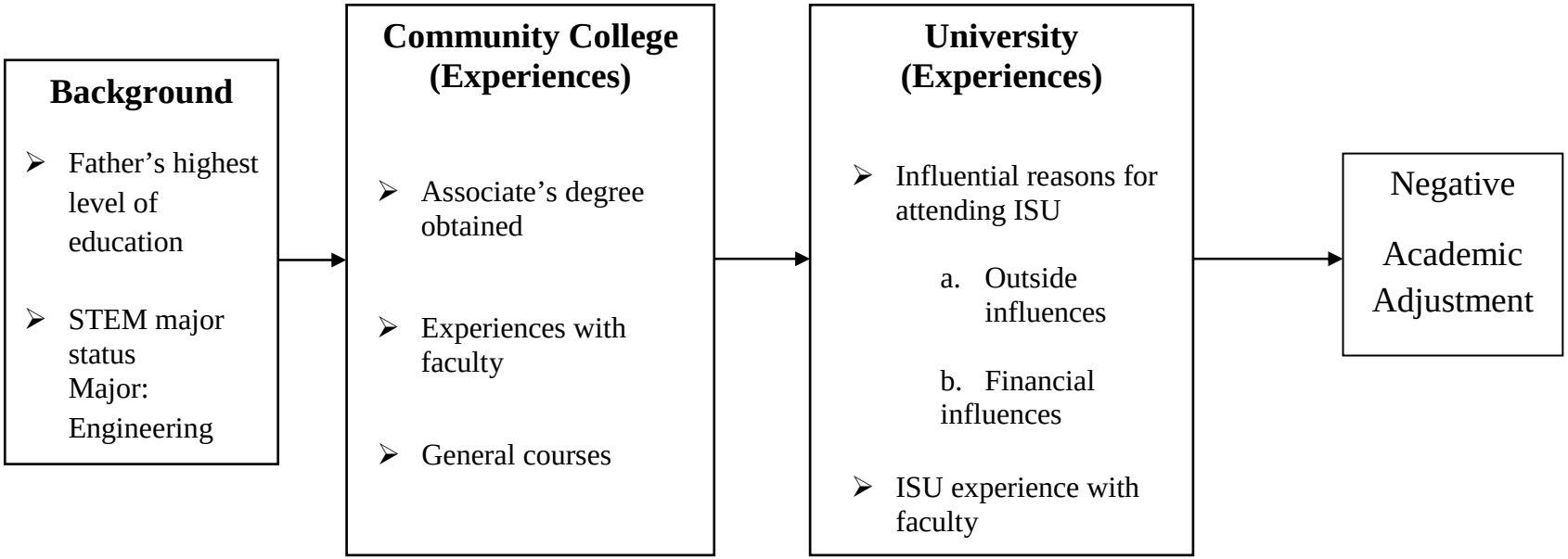

Figure 3. Final best fit model: Factors that predicted community college transfer students' negative academic adjustment.

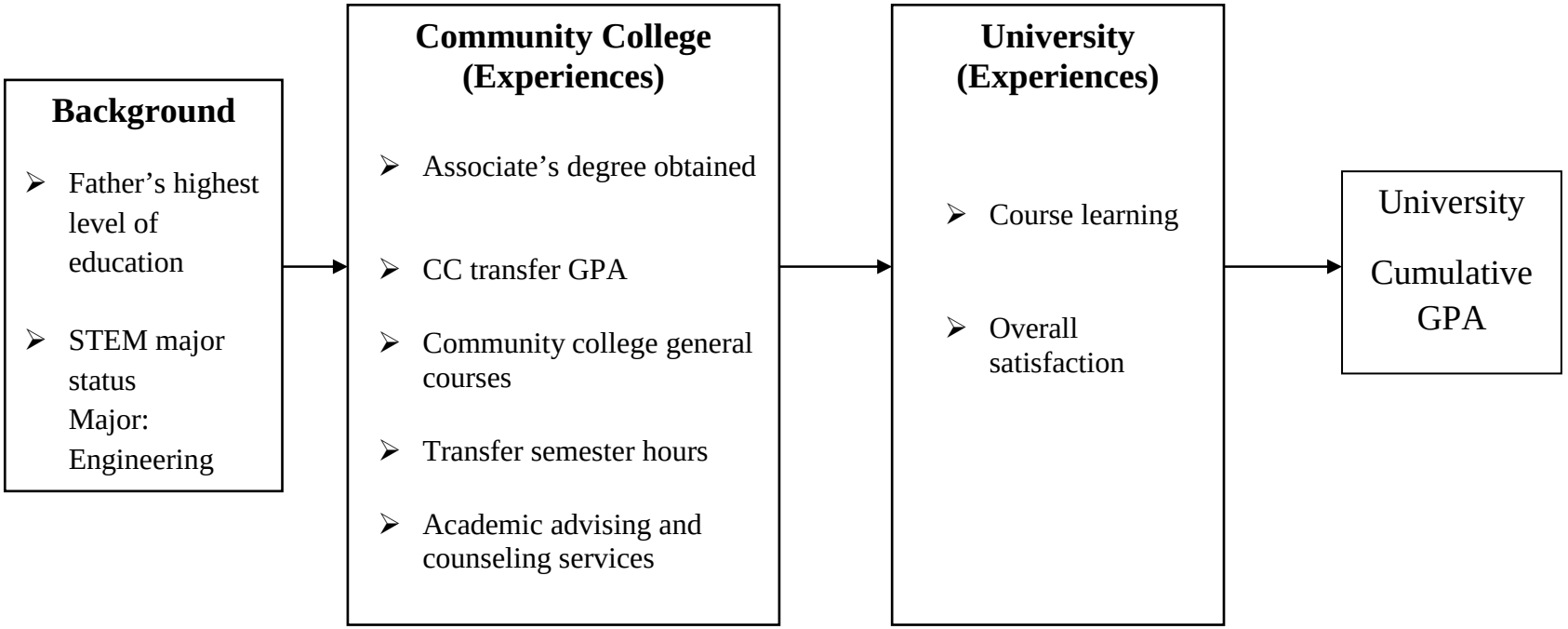

Figure 4. Final best fit model: Factors that predicted community college transfer students' university cumulative GPA

Academic Adjustment

The dependent variable for academic adjustment represented the overall experience of STEM non-engineering and engineering students and their academic adjustment to ISU. The academic adjustment construct included the following items: "the large class intimidated me," "I experienced a dip in grades (GPA) during my first semester," "I often feel (felt) overwhelmed with the size of the student body," and "My level of stress increased when I started at ISU." Table 17 demonstrates the variables entered into the regression equation for all students regarding academic adjustment, as well as the corresponding standardized regression coefficients (beta) for each variable. A summary of the final regression models can be found in Appendix L while the correlation matrix for both academic adjustment and cumulative GPA can be found in Appendix M. The second multiple regression analysis, was conducted using cumulative GPA as the continuous dependent variable. As described in Chapter 3, the independent variables were grouped into three blocks for both models for academic adjustment and cumulative GPA. The blocks were the following: *Block1 = Background characteristics; Block 2 = Community college experiences; and Block 3 = University experiences*. The multiple regression model was conducted for the overall sample (N = 280).

Model 1 (Block1 = Background characteristics)

The results of the multiple regression analysis for the total sample indicated that the *highest education completed by student's father* is a statistically significant predictor of academic adjustment at $p < .05$. The *highest level of education completed by student's father* was found to be a negative predictor of academic adjustment. This indicates that the more educated the father is, the less likely students are to have a negative academic adjustment.

Although the STEM independent variable was not statistically significant as a predictor of academic adjustment at $p < .05$, the data suggests that students majoring in engineering are more likely to have a negative academic adjustment (Table 17). The background characteristic variables account for 3.5% of the model variance.

Table 17.

Predictors of Community College Transfer Student Negative Academic Adjustment to ISU

	Standardized regression coefficients		
Variable blocks	Model 1	Model 2	Model 3
Background characteristics (Block 1)			
Father's highest level of education	-.184*	-.160*	-.123*
Major: Engineering	.028	.078	.091
Community college experiences (Block 2)			
Associate's degree obtained		.179*	.110
Experience with faculty		.214**	.178*
General courses		-.112	-.110
University experiences (Block 3)			
Influential reasons for attending–outside			.103
Influential reasons for attending–financial			.100
ISU experience with faculty			-.142*
Negative general perception as a transfer student			.311**
R	.186[a]	.323[b]	.506[c]
R^2	.035	.104	.256
ΔR^2	.025	.082	.223

[a]Model 1. [b]Model 2. [c] Model 3

*$p \leq .05$, **$p \leq .01$

Model 2 (Block 2 = Community college experiences)

The results included the independent variables from Block 1 (Background characteristics). The *highest education completed by student's father* remained a statistically significant variable within Model 2 at $p < .05$. Of the community college independent variables added to the equation, *experience with faculty was* found to be a positive predictor of academic adjustment. Also, *community college experience with faculty* was statistically significant at $p < .01$ and $p < .05$, respectively. In other words, the more that students visit with an instructor after class, discuss career plans, ask advice about class projects, and feel comfortable approaching faculty out of the classroom, the more likely students are to adjust better academically at ISU. However, the variable *general courses* was not statistically significant at $p < .05$. The background characteristics and community college variables accounted for 10.4% of the model variance.

Model 3 (Block 3 = University experiences)

Model 3 was the full model that included the independent variables from Block 1 (Background characteristics), Block 2 (Community college experiences), and Block 3 (University experiences). Once again, *the highest education completed by student's father* and *experience with faculty* remained significant at $p < .05$. Once more, *community college experience with faculty* remained statistically significant at $p < .01$ and $p < .05$, respectively. In addition, to the aforementioned background characteristics and community college independent variables, four more independent variables were added to the model equation. Out of these four new variables, two were statistically significant; they were *ISU experience with faculty* and *negative general perception as a transfer student* at $p < .01$. ISU experience

with faculty was a negative predictor of academic adjustment. Thus, students who have less interaction with instructors inside and outside the classroom are more likely to have poor academic adjustment at ISU. *Negative general perception as a transfer student* was a positive predictor of academic adjustment, suggesting that the more students feel treated like a number, feel as though they do not fit in, or feel underestimated by other students, the more likely they will have a negative academic adjustment at the university. The R^2 for the initial model and the change in R^2 (denoted as ΔR^2) for each subsequent step of the model are reported in Table 17. The university experiences variables accounted for 25.6% of the model variance.

Cumulative Grade Point Average (GPA) at ISU

The cumulative GPA was a continuous dependent variable where students who scored high on this dimension experienced greater academic success and progress towards receiving their degrees in STEM non-engineering and engineering disciplines at ISU. Table 18 shows the variables entered into the regression equation for all students regarding cumulative GPA, as well as the corresponding standardized regression coefficients (beta) for each variable. A summary of the regression models can be found in Appendix L while the correlation matrix for cumulative GPA can be found in Appendix M. As explained in Chapter 3, the independent variables were grouped into three blocks for both models for academic adjustment and cumulative GPA. The blocks were the following; *Block1 = Background characteristics; Block 2 = Community college experiences; and Block 3 = University experiences*. The multiple regression model was conducted for the overall sample (N = 280).

In Model 1 (Block1 = Background characteristics)

The results of the multiple regression analysis for the total sample for Model 1 indicated that the *highest education completed by student's father* was a statistically significant and positive predictor of cumulative GPA at ISU at $p < .05$. That is to say that, the higher the education of the student's father is, then the more likely the students will have a high cumulative GPA at the university. Interestingly, even though the engineering major independent variable was not statistically significant, it was a negative predictor of cumulative GPA at $p < .05$ (Table 18), meaning that engineering students are more likely to have low GPAs. The background characteristic variables accounted for 3.7% of the model variance.

Model 2 (Block 2 = Community college experiences)

Model 2 included Block1 (Background characteristics) independent variables. Once again, the *highest education completed by student's father* remained statistically significant at $p < .05$. Of the community college independent variables added to the equation, *associate's degree obtained, community college transfer GPA, community college general courses and transfer semester hours* were statistically significant at $p < .05$. The independent variable *community college academic advising* was not statistically significant as a predictor for cumulative GPA at ISU. The background characteristics and community college variables accounted for 35.4% of the model variance. Among the community college variables, *associate's degree obtained* was statistically significant and a negative predictor of cumulative GPA at $p < .05$, in the model. Thus student who have obtained an associate's degree are more likely to have a low GPA at ISU. The variable *community college transfer*

GPA was statistically significant and positive predictor of cumulative GPA at $p < .01$ and $p < .05$, respectively. This suggests that the higher a student's GPA is before transferring, the more likely they will have a high GPA at ISU. The variable *community college general courses(construct)* was found to be statistically significant and positive predictor of cumulative GPA at $p < .01$ and $p < .05$, respectively. Therefore, if students are intellectually challenged, develop their critical/ analytical thinking and take courses at the community college that demand intensive reading and writing, then more likely they will be academically prepared to succeed in achieving a high cumulative GPA at ISU. The community college experiences variables accounted for 35.4% of the model variance.

Model 3 (Block3 = University experiences)

Model 3 was the full model that included the independent variables for Block 1 (Background characteristics), Block 2 (Community college experiences) and Block 3 (University experiences). This final model revealed that the variable *highest education completed by student's father* remained statistically significant as a predictor of cumulative GPA at $p < .05$. In addition, in the final model of the community college experiences block, the *transfer semester hours'* variable remained statistically significant and positive predictor of cumulative GPA at $p < .05$. This suggests that the more semester hours students transfer to ISU, the more likely they will have a high cumulative GPA. Lastly, the community college advising variable was not statistically significant at $p < .05$ (Table 18).

Among the variables in Block 3 (*University experiences*), the *ISU course learning (construct)* was statistically significant and positive predictor of cumulative GPA at $p < .05$. This implies that the more students participate in class, take detailed notes, and try to explain

the material to their peers, the more likely they are to have a high cumulative GPA. The final model that included the variables background characteristics, community college experiences and university experiences, explains 38.9% of the model variance.

Table 18.

Predictors of Community College Transfer Students' Cumulative GPA at ISU

	Standardized regression coefficients		
Variable blocks	Model 1	Model 2	Model 3
Background characteristics (Block 1)			
Father's highest level of education	.188*	.136*	.119*
Major: Engineering	-.044	-.102	-.104
Community college experiences (Block 2)			
Associate's degree obtained		-.176*	-.183*
Community college transfer GPA		.426**	.435**
Community college General Courses		.268**	.227**
Transfer semester hours		.135*	.123*
Community college academic advising		-.085	-.092
University experiences (Block 3)			
ISU course learning			.130*
ISU overall satisfaction			.102
R	.192[a]	.595[b]	.623[c]
R^2	.037	.354	.389
ΔR^2	.028	.332	.362

[a]Model 1. [b]Model 2. [c]Model 3

*$p \leq .05$, **$p \leq .01$

Findings from Open-Ended Questions

To collect further information in regards to student experiences, the survey asked STEM non-engineering and engineering students three open-ended questions about their transfer process from community college to ISU. In general, students clearly expressed the importance of involvement and participation in group activities in order to make friends and to network. They emphasized that interactions with advisors and faculty members were important at both institutional levels-community college and ISU. They also shared challenges they faced during their transfer process and adjustment period from community college to ISU. Below is a summary of the students' responses and quotes in relation to the open-ended questions posed to them at the end of the survey.

Adjustment Factors

Question one was, related to adjustment factors, where students were asked, "What factors help you to adjust to ISU? Please explain what factors contributed to your successful transfer (or unsuccessful transfer) to ISU. Feel free to include factors at both your community college and ISU." Three themes emerged from student responses: 1) the guidance of advisors and professors played an important role in students' success 2) building friendships and meeting other students from the same field allowed students to share experiences, develop a sense of belonging, and feel more engaged in classes, and 3) being involved with different organizations and activities on campus helped students learn about the university and meet new people. This resulted in reduced struggle with homework and greater success in passing their classes.

Advisor and faculty interactions. Students expressed that advisor and faculty interactions played an important role during their time at community college and university.

Below are the quotes from students;

The major factors that helped to make my transfer smoother were my faculty and advisor in the horticulture department. They encouraged me and took interest in my academic career.

Meeting with an advisor at Iowa State before transferring so I could get the classes I need.

My engineering professors at the community college were excellent in preparing me for my transfer to Iowa State University. They were extremely helpful as academic advisors and as instructors.

The help of my academic advisor at ISU helped make my transfer successful.

My advisor was great about explaining everything and answering any questions I had.

Advisors and professors have been the biggest help in adjusting to ISU.

Making friends with other students. Students reported making friends with other students facilitated their adjustment.

The following are the quotes from the students;

Having friendships with those from community college and participating in activities and social events helped me to adjust the most.

Making friends was the best way to adjust to the university setting.

Building relationships with other students normally outside my group of contacts has helped me a lot.

Making friends is the best step to figure out how ISU works.

Meeting people in my field of study helped me adjust the best.

Involvement in social and academic clubs and extra-curricular activities. Students expressed that by being involved in social and academic activities allowed then to enhance their transfer process.

Below are the quotes from students;

I have been very successful in all my classes, but I was also involved in a lot of extra-curricular activities.

Destination Iowa State was a great help in my transfer period. It allowed me to meet other transfer students that were in the same situation.

Joining a fraternity allowed me to be around different guys who have experienced the ISU culture.

Being involved in student activities helped me a lot my first semester here. I was involved in marching band and everyone was like family. It really helped me adjust and gave me the sense of belonging.

Peer mentoring from the E2020 program was the most helpful thing I had.

Having a helpful advisor, getting involved in several clubs right away, and making friends with other transfer students have helped me to succeed.

Success and Transition

The students were then asked, "What might the community college have done to enhance your success or ease the transition to ISU?" Four themes emerged from responses to this question: 1) students generally felt that they would have benefited more from having

classes with a similar structure as the ones at ISU and that students could have been held more accountable for assignments and deadlines; 2) students suggested that community colleges could have encouraged greater club involvement; 3) students stated that they would have liked to have had advisors with more concrete strategies in selecting the right classes and creating a career plan for transfer students; and 4) students expressed that a better articulation agreement between their community college and the university should exist for students to have a clear academic plan before transferring.

Classes should be more demanding and challenging. Students emphasized the need of having more demanding and challenging classes at the community college level.

The following are the quotes from students;

They could have had higher standards in academic homework and placed a sense of competition on the class to get us ready for ISU.

The greatest failing I perceived in my community college was an unwillingness to hold students accountable. Too many times I saw instructors accept late assignments after saying they wouldn't and in general forgive academic laziness.

Make classes more challenging and more real world applicable.

They should set their academic standards similar to ISU. Then students will not be in shock when they realize how much is expected from them.

A majority of the courses that I took at the community college seemed elementary compared to the ones here at ISU, and therefore did not require me to study that often.

Encourage students to get involved in clubs at the community college. Students suggested that community colleges should encouraged students to get involved in extra-curricular activities.

The following are quotes from students;

Have more activities connected to the university so community college students could become more involved before transferring.

Push club involvement while at the community college, so it does not seem so strange to do so when transferred.

Reliable mentorship from an advisor. Students expressed that mentorship from an advisor while at the community college is essential for a smooth transfer process.

The following quotes reflect students' opinions;

Make meetings with advisors more than once during the semester to create a solid future plan.

Advisors should encourage campus visits to connect with faculty/staff at ISU to make a better transition.

Have advisors that are more involved with engineering transfer students explain required classes better and suggest which ones to take.

To have advisors knowledgeable about transferring would be very helpful.

Talk with your community college advisor about your future plans and where you plan to transfer to, that way can make sure you are talking the right classes that will transfer.

Better articulation between the community college and university. Students expressed their concern about the important of a better articulation between the two-year and four-year institutions to enhance their transfer.

The following quotes state what students expressed;

I wish I had a better idea of what classes transferred to ISU, because I ended up taking classes that did not count towards my major.

The community college could have been more aware of what classes will transfer. I took some classes that were not need for my major, and did not transfer how I thought they would.

Explain required core classes better and suggest which ones to take.

The DMACC advisors are misinformed on several items as far as what to take and what to transfer. Perhaps in the future, ISU could send a general engineering advisor to DMACC a couple of times a semester.

Advices to Future Community College Transfer Students

As mentioned earlier, community college transfer students faced many personal and professional challenges, but most of them are still in science or engineering majors trying to complete their degree. With this in mind, the next question asked students to look back and reflect on their experiences during transfer and to provide advice to future community college transfer students. Specifically, they were asked, "If you could give some advice to community college students who will be transferring to ISU, what would that advice be?" Three themes emerged from student responses: 1) the most significant advice provided by students was to get involved with student clubs, groups, and programs; 2) students

mentioned the importance of keeping in contact with advisors and faculty; and 3) students emphasized that readiness and preparedness are important factors in assisting community college transfer students during their transfer.

Getting involved with student clubs, groups and programs. Students suggested to future transfer students to get involved socially and academically.

The following quotes are the reflections of the students;

Get involved with groups on campus since it is the easiest way to make friends with common interests and goals.

Get involved with as many student clubs and group you can. Meet new people every opportunity you get.

Get involved as soon as possible, as it is those relationships that help adjusting the most.

Get involved in any way you can with extracurricular activities.

Join a club ASAP and actually participate in it.

Be open to new experiences and try to participate as much as possible in the first few weeks.

Get involved on campus. In the large lectures, introduce yourself to the people around you.

If you are planning on coming to ISU sign up for the AAP program and get involved with ISU as soon as you can.

Keeping in contact with advisors and faculty. Students expressed that maintaining communication with advisors and faculty would help to adjust.

Below are the quotes from students;

Talk to you advisor at the community college about your future plans and where you plan to transfer to.

Get to know your advisor and faculty and communicate with them as often as possible.

Contact and keep in contact with an advisor and talk to people who have transferred.

Importance of readiness and preparedness. Students suggested that to be ready and academically prepared it is crucial to have a successful transfer.

The following are students' quotes:

Try to decide on a major before getting to ISU, because it seems like students that are still unsure about their major tend to struggle more.

Make sure that classes you are taking will be accepted for your degree at ISU.

Learn good time management, do your homework as soon as it is assigned and be prepared for the work load and stress levels to substantially increase.

Understand the importance of taking notes in class and studying for tests.

Be ready to work on your own.

Explore everything when doing your homework, do not waste time when you are stuck, ask your teacher, TA, and fellow students.

Student General Perception

Finally, students expressed some concern about being a non-traditional student and how it makes a big difference when one transfers. Some of the students highlighted the importance of the class size and how it impacts learning.

Accommodating non-traditional students. Students highlighted the importance of nurturing non-traditional students.

The following are quotes from students;

I realize that I am an unusual student because of my age and also my family situation. It doesn't feel like the social and academic environment is accommodating to students with families.

Non-traditional students are at a disadvantage at this school. The experience is designed for kids straight out of high school and instructors are often not very understanding about circumstances that arise for a student with three children. There have been a few who have gone out of their way to help make things work in the context of my life and its ups and downs, but generally instructors have no compassion and understanding when it comes to a life that doesn't fit in the definition of an on-campus traditional college student.

Class size at the university. Students expressed their concern about the size of the classes at four-year institution

This is what the students expressed;

I think huge lecture halls of students eliminate real education. The large lecture hall setting promotes memorizing facts or formulas, whereas small classes forces students to be accountable and use critical thinking skills.

Big classes are incredibly impersonal. I didn't think they would make a big difference, but it really does. The professors really do know what they are talking

about, but not being able to ask questions make understanding difficult topics even more difficult.

The one on one at the community college was more effective than the 300+ class size where you cannot even ask a question.

Semi-Structured Interview Findings

The main goal of this study was to learn about the academic and social experiences of students pursuing STEM non-engineering and engineering bachelor degrees at ISU. In order to explore their experiences, semi-structured one-on-one interviews were conducted with four Iowa community college transfer students pursuing STEM non-engineering and engineering bachelor degrees at ISU. Descriptive reporting is used to disclose the profile of the four transfer students, two males and two females, who participated in the qualitative part of the study. Pseudonyms were assigned to each student who participated.

To have better insight into the transfer experience of these students, this section is divided into three sections for clarity. First, an overall profile of the participants is provided. Second, individual profiles are elaborated upon for each of the four participants. Each of the profiles follows the outline described in chapter three: background characteristics, community college experiences and university experiences, respectively. This section also provides the current educational stage of the participants. Lastly, the final section presents the themes that emerged from the STEM non-engineering and engineering students' interviews.

Overall Participant Profiles

The four students interviewed were Iowa community college transfer students who were pursuing either STEM non-engineering or engineering bachelor degrees at ISU. Thus, all the participants attended an Iowa community college prior to come to ISU. These four interview participants were all White from both STEM non-engineering and engineering majors. Table 19 provides a summary of each of the participants who were interviewed.

Table 19.

Background of Interview Participants

Pseudonym	Community college credentials[a]	Classification	Major
Iris	None	Senior	Aerospace engineering
Tatiana	None	Senior	Kinesiology and health
Kevin	AA	Senior	Mathematics
Joshua	AS	Senior	Biology

[a]AS = Associate in Science and [a]AA= Associate in Arts

The two male participants obtained an associate's degrees prior to transferring to ISU while the two female participants did not. Instead, they transferred with credit hours. Most of the participants aspire to attend graduate school, except for one who expressed that they will most likely apply to work full time in their field upon finishing their degree. All of the interviews were conducted face-to-face. All of the participants stated that they were born and raised in Iowa. In addition, they enrolled in ISU as STEM non-engineering and engineering degree- seekers. During their interviews, students expressed different motivations and influences in their choice to pursue a STEM degree. Below are their stories and unique experiences as community college transfer students at ISU.

Individual Participant Profiles

Iris. Iris comes from a small family and is the younger of two children. During her interview she recalled the enjoyment of solving puzzles and later doing math as a child. One of the biggest influences in her love of math was the big support from her father, who spent a lot of hours helping her with her homework everyday while she was in elementary school. Thinking back on her time with him, she shared,

> Up to eighth grade I did not like math, and my dad would sit down with me every night and go through my homework. If it wasn't for him sitting down with me pretty much every night to do homework, I probably still wouldn't like math.

Regarding Iris' pre-college background characteristics, she admits to reading books about engineering and that she likes challenges. For her, the idea of going into STEM, more specifically engineering, was a great challenge because she always heard that engineering was tough and that you need to love math. She stated, "I remember reading about the different types of engineering in a book and when I read about aerospace engineering, I thought that was right for me because it sounds like the hardest field in engineering."

In regards to her experiences at the community college, she went to a community college for about three years, taking general courses, calculus and physics that are required for engineering majors. She expressed that there were not many people at the community college that she went to that were interested in math and science and that most students were pursuing liberal arts. Despite being different from her peers, she felt connected to her instructor at the community college, especially one instructor who advised her well regarding

the classes she needed to take to be able to transfer. Iris valued the small class sizes and the availability of instructors to help students after class. She said,

> There were only 12 people in class and the teacher was always available after class. Since the class was small, he was able to create study groups so students could help each other and also understand the material covered in class.
>
> The advisor I had was also my differential equation and calculus teacher, who made my transfer a lot easier and a very easy process for me. He was very well informed about the transfer process.

Iris definitely considered her attendance at the community college to be a rewarding experience and helped her to enhance her transfer process.

Reflecting on her university experiences, Iris found advising to be a smooth and clear process. She felt that advisors were not necessarily supportive but that they were available to provide help. She found classes at ISU to be very challenging and somewhat difficult, which was most likely due to the fact that she did not have a teacher to help her when she needed it the most. Iris also had a professor who was hardly ever in their office during office hours as well as TAs (teaching assistants) who were not fully prepared to help with assignments. "The difficulty of the classes could be, not having a teacher that is not often willing to help, hardly had office hours and did not prepare the TA's to properly guide students with assignments."

Classes are much bigger at ISU than at community college. Therefore, Iris found that trying to be part of a study group difficult because you have to go into an unfamiliar crowd and invite yourself to join the group. Also, she realized that student involvement was

important, and one of the places she was able to connect with peers was the engineering computer lab. For Iris, being in the computer lab facilitated her interaction with senior students, allowing her to talk to other students from other majors, to exchange ideas about careers and future goals, and to get help with homework. Iris said,

> Just being in the computer lab and having those peers available helps a lot. Most of the time you find other students from your class or the upper class students that took your class and they can help you as well as to have a conversation about what is going on plus I do not get distracted as if I stay studying at home.

The overall experience for Iris at the university level has been challenging but at the same time a very valuable learning experience. She would have loved to start at ISU rather than at the community college. At the same time, she expressed that all of the hard courses, such as calculus and physics, that she took at the community college would have been more difficult if she had taken them at ISU, mostly due to large class sizes and the difficulty of finding a study group right from the start.

Tatiana. Tatiana is from a small town in Southwest Iowa. Neither of her parents went to college, and she has a brother a year younger than her, who also attends ISU. Ever since she was little, she liked sports and being active; thus, as an adult, she now does a lot of running and biking. Her biggest support comes from her parents, who always encouraged her various activities and any career decision she made. Her biggest inspiration to go into Kinesiology has been her father, who is a very active runner. She expressed,

When I was in junior high my dad started getting into running and for one of his races he said, "You should do it with me." After that, I start getting into running and love sports more than before.

My dad is always asking about my classes and my mom is very supportive of whatever I choose to do.

Regarding her pre-college characteristics, Tatiana has always been interested in sports and in knowing what is going on in the body during exercise. In addition, she enjoys reading articles about sports and the human body as well as searching for information regarding possible graduate programs involving exercise and the human body. She said, "I have always loved sports and very interested about how exercise help people and the different ways this can improve their health."

About her experiences at the community college, Tatiana attended to Des Moines Area Community College (DMACC) for only half a year. She did not take many classes, but the ones she took she enjoyed a lot especially because she found the professors to be very helpful and supportive. She shared "I took anatomy and physiology. I enjoyed the subject and teachers. They were very supportive and they liked the fact of seeing a potential on me to be in kinesiology." Overall her experience at the community college, though it was very short was enjoyable, especially the interactions with instructors.

In regards to her university experiences, Tatiana's experiences have been rewarding and positive at ISU. She has loved her classes at ISU. She particularly enjoyed exercise physiology because she is considering specializing in that area. She is also, seriously thinking about doing research and getting a PhD in the near future. She felt that her time

spent at the university has been a rewarding learning experience and that she has grown a lot since she started at the university. Tatiana has also had the opportunity to work with a graduate student as a research assistant which has been helpful for her professional development. However, she felt that she is still working on how to initiate a conversation to make friends and meet new people. Giving that the university is much bigger than her home town community college, she believes that she is overwhelmed by the number of people to meet and be friends with. She expressed,

> I have been helping a graduate student in the motor control lab, doing testing and recording data. This is has been a great experience for me to see how people conduct research and how it is to have hands on experience in the lab.
>
> Some of the classes have been very interesting and rich in information. I am seriously thinking about doing research and hopefully eventually get a PhD.
>
> All of my classes have made me appreciate what the body can do and health in general.

Tatiana described her overall experience at ISU as exciting, challenging, and very positive. She felt that her professors were very encouraging. Additionally, she demands more of herself and expects more from her performance at school given the motivation from her professors.

Kevin. Kevin is a triplet with one brother and one sister. His mother is a lab technician and his father has some college background. He started playing chess in middle school and joined chess clubs. He participated in the Science Olympiad during all four years of high school. Today he uses technology to play chess online and video games. His parents

encouraged him to go into math because they knew that at very young age he was good at math and science classes. He shared, **"**At a very young age I discovered I was good in math and science, but I was never good in English, so my parents kind of encouraged me and support the idea of me staying in the math field."

Regarding Kevin's pre-college background characteristics, his family has been very supportive of his major since they believe that he is gifted in math and that he really enjoys the complicated work that goes with it. Kevin has always thought that math is about solving equations, analyzing data and giving meaning to numbers and that is how he pictured himself in the future. He expressed, "Both of my siblings are gifted in math, but they are not like me that I like to do the complicated work that goes with it."

Reflecting on his experience at the community college, Kevin attended community college for a year, to take dual credits that counted towards his high school diploma and his AA degree. His calculus teacher was very supportive saying that he should stay in the math field and suggested he should become a teacher. Kevin began to be a part of the Lego League, helping small kids with math concepts. He assisted them with different types of calculations to get the precise answers. Kevin stated,

> My calculus teacher at one point suggested that I should become a math teacher, since I was very good at solving math problems with large calculations.
>
> I really enjoyed helping kids at the Lego League, helping them and watching them to go through those calculations made me feel good. And when they had trouble, it was fun to help them.

Kevin found the overall community college experience to be positive. The classes in community college allowed him to participate in events related to math, a field he loves the most. Also, the good interaction with his teachers allowed him to learn more from them.

Regarding his university experiences, Kevin found advisors at ISU to be very busy at times and sometimes really hard to visit. On the other hand, he expressed that his peers were very helpful and that they helped him with class assignments. He had to readjust himself and learn how to study more than he used to in high school and community college. He found that classes at ISU are more in depth and require a bit more effort to get the grades that he wanted in class. He felt that the large class sizes frustrated him because there are too many people in the classroom. Sometimes, the teacher cannot go forward or winds up wasting the time for some students when they go over about the same problem twice. He was not affiliated with any academic or social groups, but he wished he could of being more involved so that he can meet other peers and stay on campus longer. Kevin expressed,

> My peers are very helpful. I have classes where they can help explain things to me that I do not quite understand. My teachers are very understanding as well.
>
> My advisor is a bit hard to get a hold of, but once he has some free time he can help a lot.
>
> The class sizes do get a little bit frustrating. If somebody does not get it, the teacher has to explain it all over again which might be a little bit redundant for some people.

Kevin's overall university experiences were very rewarding, and he felt that his classes helped him to decide that he wants to be an actuary. He expressed he has become more

confident about doing higher level calculations and has also decided to pursue a second major in statistics.

Josh. Josh is the youngest of five children and comes from a separated family. When he was very young, his parents got divorced. His mother went to community college to get her degree and works for Pioneer. Josh considers himself to be an active person and has been playing sports, especially football and track and field, since he was a child. He expressed that he likes outdoor activities. His biggest inspiration for going into science was his mother, who took him to the lab where she works during child-work day. His parents have been supportive, and they are both excited about his decision to pursue science. Josh stated, "My mother has a science background and she works in the lab. That really helped point me in that direction because some of the stuff I saw her doing at work."

Regarding his pre-college background characteristics, Josh has always been interested in science since he was a child. He enjoys the outdoor, which is another reason why he chose a career in biology and hopes to work outdoors throughout his career. He took a marine biology class while in college where he studied saltwater fish, freshwater fish and mainly just aquatic organisms. This experience peaked his interest to go to college and pursue a scientific career. He expressed,

> I always did better in science, whether it would be just normal science classes or the Iowa Test of Basic Skills, I always did better in the science portion.
>
> I took a Florida trip every spring break to scuba dive and study the different ecosystems and compared them to the ones in Iowa, which really spiked my interest to go to college and chose a career in science.

In relation to his experiences at the community college, Josh had very positive interactions with professors, and he found it was very interesting to talk with his professors about their careers, projects and where they came from. He felt that the advisors were not very helpful because they were focused more on graduating students rather than preparing students to transfer to a university. His biology professor was helpful and knowledgeable, and he was always willing to help him with assignments and general questions about class. Josh said,

> My favorite professors were my intro to biology and my biology II. I really talked to them quite a bit, and they were interesting to talk about their interest and experience they have in the field.
>
> I kind of had some issues with some of the advisors in my community college, because they were working more towards making their graduation rates higher than easing my transfer.

Josh found his experience at the community college increased his interest in biology. He felt a great connection with the professors, especially those in the area of biology.

In terms of his university experiences, Josh expressed that being at ISU was very intimidating at first and that it was interesting transferring from a community college where the maximum number of students in a class were 30-40 students as compare to ISU, where some classes have 300+ students. He did not meet with an advisor often, but when he did, his advisor was direct about what he should do and what classes to take in order to be successful during the academic semester. Josh felt that the professors have been very outgoing and friendly. They have been open and he felt comfortable talking about his

personal life and career progress with them. He has been a member of the biological club ever since he started at ISU and he found the club to be very helpful in meeting other people pursuing the same major and other faculty. After finishing his degree at ISU he plans to go to graduate school in California. He said,

> I think those big classes of at least 350 students helped me adjust to ISU because it is not easy to transfer from a community college where the max students in class are 30-40, that was very intimidating at first.
>
> It was really nice to come to ISU and meet a professor that I can talk to about my life, how it is going, how are my classes are and what I want to do in the future.
>
> The biological science club has allowed me to talk to a lot upper class students about their experiences and graduate school and I was able to talk to other people in the scientific community here at Iowa State.

The overall experience for Josh at the university has been enlightening helping him to develop new skills via his classes. He believes that being in STEM is one of the best things for him. He also felt that being in the sciences allows him to contribute to groundbreaking research in science.

Giving Meaning to Participants' Opinions

The qualitative component of this study was designed to explore the responses of community college transfer students to the following research question: "How do community college transfer students in engineering and other STEM non-engineering majors describe the factors that facilitated or impeded their overall adjustment to ISU?" When exploring this question, three themes emerged from the transfer students' stories: class size, the availability

of faculty members, and social and academic interactions. The findings are interlaced within elements of Astin's (1984) involvement theory. An important aspect of Astin's theory is the belief that students' academic and social interactions influence their academic success.

Class Size

Students, in general, found that the class sizes at ISU were a challenge to their adjustment. They expressed that part of the difficulty was that it was hard to make friends and to form study groups when a class has more than 100 students. In addition, they felt that it was difficult to interact with professors and receive help from them due to the class size. Yet, some students felt that once they had been exposed to a large lecture class, then the next time they had a large class it would be easier to connect with the professor or other students. Students expressed,

> If I came straight to Iowa State, I'd be in all of those classes full of 100+ students, which wouldn't be the ideal situation for any class. While at a community college, there are at max maybe 30, at minimum maybe 15 students in a class. You get more face time with a teacher and they'd be able to help you out.
>
> When I first got here it was pretty intimidating. It was an interesting transfer process coming from a community college where the max class was 30, maybe 40 people. And then I get into a chemistry lecture hall that has maybe 350.
>
> At the community college, there were 12 people in my classes, so the study group just kind of formed, but here at ISU you actually have to go out and find one. They don't just happen like at the community college.

I don't know if the community college classes are easier, but they are smaller and the teachers are there to help you and they'll stay late if they have to.

After I passed my first huge lecture hall, it really helped me to adjust and find a way to talk and ask for help to my professors, even though classes were big.

Faculty Availability

Another important factor that tended to influence the adjustment of community college transfer students to a four-year intuition (ISU) was the interaction between students and faculty inside and outside the classroom. Students felt more encouraged to do well in class when faculty appreciated their effort, listened, helped or advised them. Students said,

It was really nice to come to Iowa State and meet a professor, I can talk to, talk about my life, how it is going, how my classes are and what do I want to do.

My professor was really helpful in helping me with my classes and issues that I had been having since last spring.

One challenge I had was not to have a teacher for helping me at times. I had one teacher this semester that hardly had office hours.

I was more connected with the teachers from my community college than I am with any of them here at Iowa State.

My advisor was also my differential equations and calculus teacher, he was associated with ISU and very familiar with the transfer process, so he made my transfer and adjustment a lot easier.

Social and Academic Interactions

Students viewed social and academic interactions as an influential factor in making friends, interacting with other students of the same or different majors, and meeting professors in their field of study. In addition, students found that these interactions helped them with their professional development. In the other hand, some of the students expressed that they missed not being involved with any academic or social group because they did not have time or they were not inspired by anyone else to participate. Students expressed,

> When I was a freshman, I was in the biological sciences club. I was able to talk to older students that were going to be graduating about their experiences at Iowa State. Also, I was able to talk to people from the scientific community here at Iowa State that either come to give a presentation or just guest lectures.
>
> I was accepted into the honor program when I first start school, but I let people who were in that program deferred me from it because they said it's a lot of extra work and it's not really worth it. Then I decided to join the triathlon club which is a recreational club but I wish I could get involved with clubs or professional organizations instead.
>
> There is one thing I would like to change if I could start all over again, to be more involved in clubs. I always hear people talking about how much fun they have and what they learned. Those probably are the memories I want to remember, the club experiences, not the hours I spent on homework.
>
> The computer labs are awesome, they have been my number one peer interaction place. I can always find people from my classes or upper classmen that they are

about to graduate and can help me with my assignments. Talking about what is going on with classes and have that break during assignments is great.

I am not in any groups, but I kind of wish I was, because then I'd be able to stay on campus and communicate with some of my peers. I have always missed the groups' day (Clubfest) where they have all the groups in the Memorial Union, but I've always had class during the time that they were doing that or I was busy working on something else.

Qualitative Findings Interviews Summary

This section presented the qualitative findings of this study thorough an analysis of individual profiles, group profiles of interviewed participants, and a summary of three emergent themes: class size, faculty availability, and social/academic interactions. When presented collectively, these themes provide an understanding of how community college transfers students from STEM non-engineering and engineering majors describe their overall academic and social adjustment experience. Based on the data collected from the interviews, a deep solid description of how these students perceive their overall transfer experience was obtained.

CHAPTER 5: DISCUSSION OF FINDINGS, IMPLICATIONS FOR POLICY AND PRACTICE, AND CONCLUSION

This chapter summarizes the major findings of this study, with a discussion of the quantitative and qualitative findings. In addition, this chapter includes a conclusion describing implications for higher education policy and practice. There is also a discussion of how the results of this study can be applied as well as recommendations for future research.

This study sought to better understand how the experiences of transfer students at the community college level and at ISU enhance their pathway to STEM careers and help them to succeed. In other words, the study examined the major factors that impact students in STEM fields before and after their transition to a four-year institution.

Summary of the Study

Chapter 1 described the importance of increasing the representation of community college transfer students in STEM fields. Furthermore, it highlighted the national need for at all educational levels to be engaged in promoting and supporting greater representation of transfer students in STEM fields.

Chapter 2 exhibited an overview of the literature, including the academic and social factors that contribute to the success of community college transfer students. It also addressed the role of these factors in students functioning in STEM. Astin's (1984) theory of involvement provided a foundation for understanding the various involvement factors that impact students during their academic life. These factors play an important role in students' academic success, including their level of academic and social adjustments to a four-year

institution. Moreover, self-efficacy was examined as it relates to a person's belief in their ability to succeed in a particular setting or environment. Lastly, this chapter explored the role of community colleges and their crucial function in STEM education.

Chapter 3 presented the quantitative and qualitative methodology used to design and conduct this study. The following was also described in this chapter: research questions (quantitative and qualitative), research design, setting, population/ sample, data collection, instrumentation, variables, data management, and data analysis.

Chapter 4 revealed the results of the data analysis pertaining to the quantitative and qualitative components. This chapter reported a comprehensive study of the demographics of community college transfer students. A statistical analysis of the experiences of STEM non-engineering and engineering students while at community college and the university was presented. In addition, results of sequential hierarchical regression analysis on the two dependent variables, academic adjustment and cumulative GPA at ISU, and findings generated from the open-ended questions were examined. Lastly, in this chapter, interview responses from four community college transfer students (two males and two females from STEM non-engineering and engineering majors) were discussed. The findings were presented through individual profiles, group profiles, and a comprehensive summary of the themes that emerged from the students' voices.

Chapter 5 presents a summary of the research, conclusion, implications for policy and practice, application of the study and recommendations for future research are included.

Discussion of Findings

The findings of this study are supported by the dimensions of Astin's (1984) theory of involvement. Specifically, how community college transfer students viewed their academic and social experiences as influential factors to their academic adjustment. The quantitative findings of this study revealed how these factors pertain to the experiences of students from STEM non-engineering and engineering majors. The sections below focus on findings related to their background and collegiate experiences within the context of the literature review presented in Chapter 2.

The findings of this study support literature regarding background characteristics and student success, which states that the support received from both parents, is a strong predictor of STEM choice (Rayman & Brett, 1995). Furthermore, it showed that students pursuing STEM degrees were exposed to STEM-related activities at an early age and had the full support of their parents. For instance, the students interviewed in this study were involved in organizations and activities related to science and math in their childhood. They also expressed that their parents influenced their perceptions of STEM areas. One student asserted that his mother was a lab technician and that she sometimes took him with her to spend the day at work with her. Another student expressed that her father helped her almost every day with her math homework until she learned to enjoy it. Additionally, one male student stated, that his parents were very supportive with every one of his math and science activities during elementary and high school. It is clear that students from this study had previous experiences with math and science in their youth.

Academic Adjustment

Literature about academic involvement and peer interactions suggests that seeking help from peers enhances student success (Larose et al., 2007). As inferred by the literature and the results of this study, students adjust easier when they are able to spend more time after class talking to faculty and peers as well as when they are able to create a study groups. Similarly, Laanan, Starobin and Eggleston (2010) suggested that class size at the community college and closer interaction with instructors might contribute to students' learning and study skills, which could be influential in their academic adjustment. Furthermore, Laanan (2007) asserted, that students with low GPA and self-concept will have greater difficulty in adjusting academically. The qualitative findings from interviews with STEM non-engineering and engineering students revealed that those students who spend more time studying after class, received more help from other students, completed homework assignments, and established study groups easily. As a result, students were more likely to academically adjust as compared to, those who did not spend much time studying after class or interacting with peers. Moreover, due to differences in class size students expressed that they had closer interactions with instructors and participated more in class at the community college than at the university. Consequently, students felt challenged by big classes at the university, lack of interaction with instructors, and the difficulty of forming study groups with other students.

Collegiate Environments

In addition, community college and university environments play an important role in the level of adjustment among community college transfer students. Both are influential

components in whether or not students decide to continue in engineering or STEM non-engineering areas. The findings of this study revealed several factors that directly or indirectly impact the academic adjustment of community college transfer students.

Most literature highlights faculty interaction as being a crucial component in the success of community college transfer students. Pascarella and Terenzini (1991) stated that the degree of effectiveness and accessibility of an instructor has a positive influence on the academic performance and overall institutional satisfaction of students. Similarly, Nora, Cabrera, Hagedorn, and Pascarella (1996) found that social integration and interaction with faculty predict female persistence at four-year institutions. Moreover, according to Seymour and Hewitt (1994), successful students from science, mathematics, and engineering (SME) majors greatly value faculty attitude and pedagogy. The findings of the regression analysis in this study align with those of previous studies, revealing that student-faculty interaction plays an important role in the academic adjustment of students. The findings demonstrated that the more that students visit and approach instructors after class, discuss career plans, ask advice about class projects, the more likely students are to adjust better academically at ISU.

Furthermore, in the qualitative interviews, students expressed that it was very important for them to interact with their instructors and receive help when they had problems doing homework, had course related questions, and questions regarding future career plans. It seems students perceive the interaction with faculty at the community college level as an important component to their aspirations, preparation and future success in STEM fields.

Lastly, in regards to academic adjustment, the findings of this study indicated that the more students fell treated like a number , feel though they do not fit in , or feel

underestimated by other students the more likely they will have a negative academic adjustment at the university.

Cumulative Grade Point Average (GPA)

Cumulative GPA was examined in order to have a better understanding of student adjustment and success in the areas of STEM non-engineering and engineering during transfer.

One of the interesting findings of this study is that major: Engineering variable was not a predictor of the academic adjustment or cumulative GPA of community college transfer students. In other words, the analysis showed that the academic adjustment and cumulative GPA of students from engineering majors were not significantly impacted by the fact that students were majoring in STEM fields. On the other hand, the findings of the study revealed that the highest level of education obtained by student's father was positive predictor of whether or not a student had a high cumulative GPA at the university. This implies that the higher the education of the student's father is, then the more likely the students will have a high cumulative GPA at the university. Findings also revealed that students who had a high community college GPA before transferring were more likely to continue to have a high cumulative GPA at ISU. A reasonable explanation is that students who have been making the effort to maintain a good GPA at the community college level are better prepared to maintain a good GPA at the university level.

In addition, this study revealed that community college general courses play an important role as a predictor of whether or not a student had a high cumulative GPA. In other words, if students are intellectually challenged, develop their critical/analytical

thinking, and take courses at the community college that demand intensive reading and writing then the more likely they will be academically prepared to succeed in achieving a high cumulative GPA at the university. Similarly, the study revealed that the number of transfer semester hours obtained by students positively impact their cumulative GPA. Thus, the more students engage themselves with taking more classes and spending more hours studying the more likely they will have a high cumulative GPA at the university.

An interesting finding of the study is that community college academic advising was not statistically significant, indicating that it did not affect students' cumulative GPA directly. During the qualitative interviews students expressed that their advisors at the community college were not really helpful with recommending classes they needed to transfer. Students were particularly concerned with the lack of experience that some advisors had at the community college with the transfer process to a four-year institution.

In addition, the findings of this study showed that the more often students participated in class discussions, took detailed notes in class, explained class materials to other students, or thought about how different facts and ideas fit together (ISU Course learning construct), the more likely they were to have a high cumulative GPA. In the qualitative interviews, students expressed that the university classes they have taken have been a rewarding learning experiences.

Involvement

Astin (1984) focused attention on the level of student involvement inside and outside the classroom. It is important to mention that student involvement plays a large role in the lives of community college transfer student when they transfer to a four-year institution. For

example, Rendón (1994) stated that the more students see interactions as positive, and the more they view themselves as integrated valued members of the institution, the more likely they are to persist. In this study, a high level of student involvement in academic and social clubs was common among STEM non-engineering and engineering students. Findings from open-ended survey questions showed that students found being involved in group activities as being important to making friends and networking. This resulted in reduced struggle with homework and greater success in passing their classes. The findings also highlighted the fact that students tended to emphasize the importance of their interactions with advisors and faculty members at both institutional levels (community college and ISU). Moreover, students expressed that they felt more engaged and felt a sense of belonging by participating in academic and social clubs.

In addition, during interviews, students expressed that they viewed their social and academic interactions as being influential factors in making friends, interacting with other students from the same or different majors, and meeting professors in their field of study. They found that these interactions helped them with their professional development. On the other hand, some of the students expressed that they missed not being involved with any academic or social groups because they did not have time or because they were not inspired by anyone else to participate. It is important to note that non-traditional students were more likely to not be as involved in the academic environment as their traditional-age counterparts since the majority of non-traditional students work full-time and have less time to be on campus participating in social and academic activities.

Conclusion

The purpose of this study was to examine the academic and social experiences of community college transfer students in STEM non-engineering and engineering majors. The results of this study suggest that there is an association between the background characteristics, community college, university experiences and the overall adjustment and cumulative GPA of transfer students from STEM non-engineering and engineering majors to four-year institutions.

This study builds on earlier research regarding the experiences of community college transfer students. Much of the current research conducted by Laanan (2003), Tsapogas (2004), Townsend and Wilson (2006) and Jackson (2010) emphasize the transfer and adjustment experiences of community college transfer students in STEM fields. Understanding the academic and social involvement experiences of community college transfer students is fundamental to increasing the representation and participation of individuals pursuing degrees in STEM disciplines. During interviews with students in this study, none of the students relayed experiences of differential treatment based on gender from other students in the classrooms or campus environment. One conceivable explanation is that the support from family members, instructors, and friends as well as their level of involvement in organizations allowed students to feel comfortable and confident. In addition, students reported how their early experiences in science and mathematics allowed them to find a pathway to pursue a career in STEM. Even though students still chose to go into STEM areas at the community college and university level, the role of academic advisors and faculty are crucial in the adjustment process. At the same time, it is important

to encourage students to interact inside and outside the classroom with other students and instructors. Also, students should become more involved in academic and social groups since these are important factors in enhancing their academic and social adjustment. It is also vital to assist students in researching the transfer process to four-year institutions because students need to understand why this is essential to their academic and social adjustment process.

Implications for Policy and Practice

The factors that predict academic and social adjustment among community college transfer students continue to be an interesting and important subject of study. It is vital to understand the experiences of community college transfer students in order to increase their participation in STEM disciplines. Findings from this study support the literature based on student involvement and how involvement plays a key role in the success of transfer students in academic and social adjustment. Based on the findings, it seems clear that aspirations to pursue STEM areas of study begin at home. In most cases, parents become role models for students in their early age. The qualitative and quantitative findings of this study draw attention to how parents influence a student's decision to pursue a baccalaureate degree in a STEM field. Furthermore, regardless of the importance of student-family interaction, it is essential to understand the role of the post-secondary institution in encouraging, engaging, and motivating students to consider choosing a career in STEM areas. As highlighted early in Chapter 2, community colleges are uniquely positioned to enhance the pipeline of STEM professionals and produce more STEM-skilled workers (National Governors Association, 2011).

Recommendations for Community Colleges

As suggest by the data collected in this study on community college transfer students, some of the initiatives that community colleges should consider putting into practice are the following:

1. Community colleges should encourage students to get more involved in academic and social groups.
2. Community colleges should hold students more accountable for assignments and deadlines.
3. Community colleges should have math and science classes that structurally align with courses at ISU so that students can be more academically prepared and can transition more easily.
4. Community colleges should have advisors with more concrete strategies for selecting the right classes and for creating a career plan for transfer students.
5. Community colleges should encourage students' participation and involvement inside and outside classroom.

Recommendations for Universities

The findings of this study suggest that academic and social adjustment is essential for the academic success of community college transfer students. The general perception of faculty, course learning, the different reasons for attending ISU and the negative experience as a transfer student are influential in the academic and psychological adjustment of community college transfer students.

The following are initiatives that universities should consider putting into practice:

1. Universities should encourage and motivate faculty members to interact more with students on a one-to-one basis inside and outside the classroom.
2. Universities should maintain the concept that the guidance of professors and advisors play an important role in the success of students.
3. Universities should offer encouragement, support, and motivation to students since these are essential factors in helping students with their academic grade point average (GPA).
4. Universities should inspire students to get involved with social and academic clubs and other extracurricular activities.

There are two initiatives that should be considered in partnership between community colleges and universities:

1. There should be a better articulation agreement between community colleges and universities in order for students to have a clear academic plan before transferring.
2. There should be better collaboration between advisors from both community colleges and universities to understand what courses students need to be academically prepared and what classes will transfer to the university.

Application of the Study

The findings of this study can be useful for community colleges and universities, by faculty, academic advisors, financial aid officers, academic and social groups, and academic recruiters. In addition, this study can be useful for programs that are related to the recruitment, retention, and assistance of successful transfer students in STEM areas.

Students depend on advisors for courses and transfer requirements. They consider advisors to be essential to their transfer and academic success. Furthermore, faculty members can make a difference in how students perceive their academic journey and how well they perform academically. The findings demonstrated that students tended to report that the more they interact with their instructors inside and outside the classroom, the more positive their academic adjustment was. In addition, students expressed that when they were involved in different organizations and activities on campus, it helped them learn about the university and meet new people. At the same time, this type of involvement allowed them to develop a sense of belonging.

Recommendations for Future Research

Academic and social involvement is a significant factor in helping community college transfer students to adjust and succeed at the university. Understanding the impact of these factors on student success is essential in increasing the representation of students in STEM disciplines. Increasing the participation of students in STEM is vital to responding to the shortage of qualified U.S. individuals in STEM disciplines.

President Obama has publically recognized the need for assisting and supporting educational programs whose main role is to recruit, retain and graduate individuals in STEM areas. In order to address the lack of interest in STEM majors, it is necessary to identify potential factors that contribute to it. As a result, there is a need for longitudinal studies that follow students from early grade school and throughout their post-secondary education in order to further understand their academic and social involvement and how it impacts them.

Understanding the factors that influence academic and social involvement will help find adjustment factors that could help students succeed academically in the areas of STEM.

In addition, it would be interesting to conduct a qualitative research study on community college transfer students from STEM and non-STEM majors to better understand the similarities and differences in academic and social involvement among the two groups. It may be valuable to consider exploring differences among community college transfer students from STEM non-engineering and engineering majors in regards to gender, ethnicity, and the types of experiences they have regarding academic and social involvement.

It is important to mention that the findings of this study represent the experiences of White traditional-age students. Therefore, further research focusing primarily on students of color and their academic and social experiences will be beneficial in providing recommendations that would be valuable to students of specific demographic and characteristics. In addition, future studies should consider exploring the academic and social involvement of non-traditional community college transfer students and how they perceive their overall adjustment to STEM non-engineering and engineering majors at four-year institutions.

It would be interesting to examine the impact of new technology on students' academic and social involvement in STEM non-engineering and engineering disciplines. Online courses have been increasing in number in post-secondary institutions; so, it would be interesting to explore and interpret how much time students invest studying and doing homework, how technological tools affect students' academic and social interactions, and ultimately how these technological tools impact their success in STEM areas. Lastly, it is

essential that community colleges engage themselves more in increasing the number of students in STEM fields to ensure that the United States continues to lead the world in science, technology, engineering, and mathematics.

APPENDIX A. L-TSQ SURVEY INSTRUMENT

Iowa State University

Transfer Student Questionnaire (TSQ)

Thank you for your willingness to complete this survey.

Please answer the following questions based on your experience as a transfer student at Iowa State University. All information you provide will be kept completely confidential and will be used in summary to assist ISU administrators, faculty members, and student affairs professionals in developing resources and programs that will benefit transfer students. Your name will not be associated with your responses in any part of the reporting process.

- The survey is divided into six short sections.
- Scroll through each section to answer the questions.

If you submit your completed survey by Friday, April 29, 2011 you will be entered into a drawing to win one of Thirty (30) ISU bookstore gift certificates worth $25.

If you have any difficulty with this survey, please contact Carlos Lopez by email: clopez@iastate.edu or by telephone: 515-294-0598.

Background Information

First, please complete the following background questions.

Current place of residence (during academic year).

- ○ Residence hall or other university housing
- ○ Fraternity or sorority house
- ○ Private apartment or room within walking distance of the university
- ○ House,apartment, etc. (not walking distance from campus)
- ○ with parents or relatives

What is the highest academic degree that you intend to obtain at any college?

- ○ Bachelor (BA or BS)
- ○ Master (MA or MS)
- ○ Doctorate (Ph.D. or Ed.D.)

- Medical (MD, DDS, DO, or DVM)
- Law (JD or LLB)
- Other _____

At Iowa State University?

- Bachelor (BA or BS)
- Master (MA or MS)
- Doctorate (Ph.D. or Ed.D.)
- Other _____

What is the highest level of education completed by your parents?

	Elementary school or less	Some High School	High School graduate	Some college	Associate's degree from two year	Bachelor's degree	Some graduate school	Graduate degree	Don't know
Mother	○	○	○	○	○	○	○	○	○
Father	○	○	○	○	○	○	○	○	○

What is your best estimate of your parents' total household income last year?

- ☐ If you are independent check here
- ☐ Less than $20,000
- ☐ $20,000-$39,999
- ☐ $40,000-$59,999
- ☐ $60,000-$79,999
- ☐ $80,000 or more

Gender

- Female
- Male

What is your age?

What is your ethnic background? (you may select more than one answer)

- ☐ African American or Black

- [ ] Asian American/Pacific Islander
- [ ] Hispanic or Latino/a
- [ ] Native American or Alaskan Native
- [ ] White (non-Hispanic)
- [ ] Other _____

Community College Experiences

The purpose of this section is to obtain information about your community college experiences prior to your transfer to ISU.

About how many hours a week did you usually spend on the community college campus, **not counting time attending classes**?

- ○ None
- ○ 1 to 3 hours
- ○ 4 to 6 hours
- ○ 7 to 9 hours
- ○ 10 to 12 hours
- ○ more than 12 hours

About how many hours a week did you usually spend studying or preparing for your classes?

- ○ 1 to 5 hours
- ○ 6 to 10 hours
- ○ 11 to 15 hours
- ○ 16 to 20 hours
- ○ more than 20 hours

During your time at the community college, about how many hours a week did you usually spend working on a job for pay?

- ○ None, I didn't have a job
- ○ 1-10 hours
- ○ 11-15 hours
- ○ 16-20 hours
- ○ 21-30 hours
- ○ more than 30 hours

What type of degree, diploma or certificate did you receive? **If multiple, please list each in 'Other'.**

- None
- AA (Associate of Arts)
- AS (Associate of Science)
- AGS (Associate of General Studies)
- AAA (Associate of Applied Arts)
- AAS (Associate of Applied Science)
- Diploma
- Certificate
- Other _____

General Courses

The following questions addresses various aspects of your community college experience. For each item below, please indicate the extent to which you disagree or agree with the statement.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
The courses developed my critical and analytical thinking.				
The courses demanded intensive writing assignments and projects.				
Overall, the courses were intellectually challenging.				
The courses prepared me for the academic standards at ISU.				
The courses prepared me for my major at ISU.				
The courses required extensive reading and writing.				

Academic Advising/Counseling Services

The following items address your use of academic advising/counseling services at your community college. Please indicate the extent to which you disagree or agree with each statement

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I consulted with academic advisors/counselors regarding transfer.				
Information received from academic advisors/counselors was helpful in the transfer process.				
I met with academic advisors/counselors on a regular basis.				
I talked with an advisor/counselor about courses to take, requirements, education plans.				
I discussed my plans for				

transferring to a four-year college or university with an academic advisor/counselor.	○	○	○	○
Advisors/counselors identified courses needed to meet the general education/major requirements of a four-year college or university I was interested in attending.	○	○	○	○

Transfer Process

These items pertain to your perceptions about the "transfer process" while you were enrolled at the community college. Please indicate the extent to which you disagree or agree with each statement.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I researched various aspects of ISU to get a better understanding of the environment and academic expectations.	○	○	○	○
I knew what to expect at ISU in terms of academics.	○	○	○	○
I visited the ISU campus to learn where offices and departments were located.	○	○	○	○
I spoke to academic counselors at ISU about transferring and major requirements.	○	○	○	○
I visited the admission office at ISU.	○	○	○	○
I spoke to former community college transfers students to gain insight about their adjustment experiences.	○	○	○	○

College Activities at Your Community College

Course Learning

In your experience at your community college, about how often did you do each of the following?

	Never	Occasionally	Often	Very Often
Took detailed notes in class.	○	○	○	○
Participated in class discussions.	○	○	○	○
Tried to see how different facts and ideas fit together.	○	○	○	○
Thought about practical applications of the material.	○	○	○	○
Worked on a paper or project where I had to integrate ideas from various sources.	○	○	○	○
Tried to explain the material to another student or friend.	○	○	○	○

Experience with Faculty

How often did you do each of the following at your community college?

	Never	Occasionally	Often	Very Often
Visited faculty and sought their advice on class projects such as writing assignments and research papers.	○	○	○	○
Felt comfortable approaching faculty outside class.	○	○	○	○
Asked my instructor for information related to a course I was taking (grades, make-up work, assignments, etc.)	○	○	○	○
Visited informally and briefly with an instructor after class.	○	○	○	○
Discuss my career plans and ambitions with a faculty member.	○	○	○	○
Asked my instructor for comments and criticisms about my work.	○	○	○	○

Admission Partnership Program (APP) Activities:

While at the community college:

For the items below, please indicate the services or programs that you participated in at the community college by selecting NO or YES. If you select "YES", please indicate the extent to which they influenced your transfer preparation using the following scale;

	Participation		Please Rate			
	No	Yes	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Participated in the Admission Partnership Program (APP)	○	○	○	○	○	○
Interacted with an ISU Transfer Peer Mentor	○	○	○	○	○	○
Interacted with an ISU College Advisor	○	○	○	○	○	○
Interacted with an ISU Faculty Member	○	○	○	○	○	○
Attended an ISU campus event/activity	○	○	○	○	○	○
Obtained an ISU student ID	○	○	○	○	○	○
Obtained an ISU email account	○	○	○	○	○	○
Attended "Experience Iowa State Days"	○	○	○	○	○	○
Attended Transfer Visit Days	○	○	○	○	○	○
	No	Yes	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Attended Admissions Partnership Program (APP) Days	○	○	○	○	○	○
Came to ISU campus during a prospective student visit	○	○	○	○	○	○
Developed a Transfer Plan	○	○	○	○	○	○

Utilized ISU's TRANSIT (transfer credit system) to develop an ISU Transfer Plan						
Participated in an ISU student organization						
Participated in a community college learning community						
Interacted with community college advisors						
Interacted with ISU's website for chosen major						
Lived in ISU Residence Hall						

Learning and Study Skills

To what extent do you agree or disagree that your academic experiences at your community college gave you the skills you needed to prepare you for the standards and academic rigor at ISU?

	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly
Computer skills					
Mathematical skills					
Note taking skills					
Problem solving skills					
Reading skills					
Research skills					
Speaking and oral presentation skills					
Test taking skills					
Time management skills					
Writing skills					

ISU Experiences

The purpose of this section is to obtain information about your current experiences at Iowa State University.

About how many hours a week do you usually spend working on a job for pay?

- None, I don't have a job
- 1 to 10 hours
- 11 to 15 hours
- 16 to 20 hours
- 21 to 30 hours
- more than 30 hours

What is the most important reason for attending ISU?

- To obtain a bachelor's degree
- To gain skills necessary to enter a new job or occupation
- To pursue graduate or professional school
- To satisfy a personal interest (cultural, social)

Listed below are some reasons that might have influenced your decision to attend ISU. How important was each reason in your decision to come here?

	Not important	Somewhat Important	Important	Very Important
ISU has a very good academic reputation.				
ISU has a very good reputation for its social activities.				
I was offered financial assistance.				
ISU has affordable tuition.				
Academic counselor(s) at my previous college advised me.				
A friend suggested attending.				
A ISU representative recruited me.				
ISU's graduates gain admission to top graduate/professional schools.				
ISU's graduates get good jobs.				
ISU's ranking in national magazines.				
Parents recommended that I attend ISU.				
My brother(s)/sister(s) attended ISU.				
Convenience and location.				
Size of ISU.				
Cost of ISU.				

Did you attend a ISU-sponsored Transfer Student Orientation?

- Yes
- No

If you answered **yes** to the question above, how helpful was the orientation program in facilitating your transition to ISU?

- Very unhelpful
- Somewhat unhelpful
- Somewhat helpful
- Very helpful

ISU Related Activities:

While at ISU:

For the items below, please indicate the services or programs that you have participated in while being a student at ISU by selecting NO or YES. If you select "YES", please indicate the extent to which they influenced your transfer process using the following scale:

	Participation		Please Rate			
	No	Yes	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Participated in On-line Orientation	○	○	○	○	○	○
Participation in an ISU Learning Community	○	○	○	○	○	○
Participation in scholarship program	○	○	○	○	○	○
Interaction with academic advisor	○	○	○	○	○	○
Interaction with faculty in my major	○	○	○	○	○	○
Interaction with academic support services (Tutoring,Supplemental Instruction (SI), Academic Success Center, Faculty Office Hours, etc.)	○	○	○	○	○	○

College Activities at ISU

Course Learning

During the past year at ISU, about how often did you do each of the following?

	Never	Occasionally	Often	Very Often
Took detailed notes in class.	○	○	○	○
Participated in class discussions.	○	○	○	○
Tried to see how different facts and ideas fit together.	○	○	○	○
Thought about practical applications of the material.	○	○	○	○
Worked on a paper or project where I had to integrate ideas from various sources.	○	○	○	○
Tried to explain the material to another student or friend.	○	○	○	○

Experience with Faculty

During the past year at ISU, about how often did you do each of the following?

	Never	Occasionally	Often	Very Often
Visited faculty and sought their advice on class projects such as writing assignments and research papers.	○	○	○	○
Felt comfortable approaching faculty outside class.	○	○	○	○

Asked my instructor for information related to a course I was taking (grades, make-up work, assignments,etc.)	○	○	○	○
Visited informally and briefly with an instructor after class.	○	○	○	○
Discussed my career plans and ambitions with a faculty member.	○	○	○	○
Asked my instructor for comments and criticisms about my work.	○	○	○	○

General Perceptions of ISU

The following are statements about your general perceptions, adjustment process, and opinion of you overall satisfaction at ISU. Please indicate the extent to which you agree or disagree.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
ISU faculty are easy to approach.	○	○	○	○
ISU faculty tend to be accessible to students.	○	○	○	○
It was difficult learning the "red tape" when I started.	○	○	○	○
Because I am a "community college transfer," most students tend to underestimate my abilities.	○	○	○	○
Because I am a "community college transfer," most faculty tend to underestimate my abilities.	○	○	○	○
There is a stigma at ISU among students for having started at a community college.	○	○	○	○
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Generally, students are more concerned about "getting the grade" instead of learning the material.	○	○	○	○
Many students feel like they do not "fit in" on this campus.	○	○	○	○
Professors are strongly interested in the academic development of undergraduates.	○	○	○	○
Most students are treated like a "number."	○	○	○	○
Student services are responsive to student needs.	○	○	○	○
If students expect to benefit from what ISU has to offer, they have to take the initiative.	○	○	○	○
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I feel the courses I have taken at ISU have been interesting and worthwhile.	○	○	○	○

ISU is an intellectually stimulating and often exciting place to be.	○	○	○	○
I would recommend to other transfer students to come to ISU.	○	○	○	○
If I could start over again, I still would go to ISU.	○	○	○	○

Adjustment Process

Please indicate the extent to which you agree or disagree with the following statements.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Adjusting to the academic standards or expectations at ISU has been easy.	○	○	○	○
Adjusting to the social environment at ISU has been easy.	○	○	○	○
I often feel (felt) overwhelmed by the size of the student body.	○	○	○	○
Upon transferring I felt alienated at ISU.	○	○	○	○
I am very involved with social activities at ISU.	○	○	○	○
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I am meeting as many people and making as many friends as I would like at ISU.	○	○	○	○
The large classes intimidate me.	○	○	○	○
It is easy to find my way around campus.	○	○	○	○
My level of stress increased when I started ISU.	○	○	○	○
I experienced a dip in grades (GPA) during my first semester at ISU.	○	○	○	○
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
It is easy to make friends at ISU.	○	○	○	○
I feel comfortable spending time with friends that I made at the community college I attended.	○	○	○	○
I feel more comfortable making friends with transfer students than non-transfers.	○	○	○	○
There is a sense of competition between/among students at ISU that is not found in community colleges.	○	○	○	○

College Satisfaction

Please rate your satisfaction with each of the aspects of campus life listed below.

	Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied	Not Applicable

Sense of belonging at ISU.	○	○	○	○	○
Decision to transfer to ISU.	○	○	○	○	○
Overall quality of instruction.	○	○	○	○	○
Sense of community on campus.	○	○	○	○	○
Academic advising.	○	○	○	○	○
Career counseling and advising.	○	○	○	○	○
Student housing.	○	○	○	○	○
Courses in your major field.	○	○	○	○	○
Financial aid services.	○	○	○	○	○
Amount of contact with faculty.	○	○	○	○	○
Opportunities for community service.	○	○	○	○	○
Job placement services for students.	○	○	○	○	○
Class Size.	○	○	○	○	○
Interaction with other students.	○	○	○	○	○
Ethnic/racial diversity of the faculty.	○	○	○	○	○
Leadership opportunities.	○	○	○	○	○
Overall college experience.	○	○	○	○	○

Open-Ended Questions

What factors **helped you adjust** to ISU? Please explain what factors contributed to your successful transfer (or unsuccessful transfer) to ISU. Feel free to include factors at both your community college and ISU.

What might the community college have done to enhance your success or ease the transition to ISU?

If you could give some advice to community college students who will be transferring to ISU, what would that

advice be?

What have we **NOT** asked that you would like us to know about your experiences at the community college or ISU?

Focus Group Participation

We would like to solicit your participation in a focus group to obtain in-depth information about your overall educational experiences. The focus group will last 1.5 hours. If you are interested in participating in a focus group, please provide the following information.

First Name

Last Name

Best number to call

E-Mail

If you participate in the focus group, please be advised that your responses will remain "CONFIDENTIAL." Findings will be reported in the aggregate and no personal identifiable information will be associated with your responses.

If you have any questions about the survey, please contact Carlos Lopez by email: clopez@iastate.edu or by telephone: (515) 294-0598.

Thank you

Thank you very much for taking the time to complete this Transfer Student Survey. The Iowa State University administration greatly appreciates your contributions toward improving the university academic environment.

Frankie Santos Laanan, Ph.D.
Associate Professor, Educational Leadership and Policy Studies
College of Human Sciences
email: laanan@iastate.edu

IOWA STATE UNIVERSITY

APPENDIX B. E-TSQ SURVEY INSTRUMENT

Iowa State University

Engineering Transfer Student Questionnaire (ETSQ)

Thank you for your willingness to complete this survey.

Please answer the following questions based on your experience as a transfer student at Iowa State University. All information you provide will be kept completely confidential and will be used in summary to assist ISU administrators, faculty members, and student affairs professionals in developing resources and programs that will benefit transfer students. Your name will not be associated with your responses in any part of the reporting process.

The survey is divided into seven short sections. Scroll through each section to answer the questions.

If you submit your completed survey by Friday, April 29, 2011 you will be entered into a drawing to win one of Twenty (20) ISU bookstore gift certificates worth $25.

If you have any difficulty with this survey, please contact Carlos Lopez by email: clopez@iastate.edu or by telephone: 515-294-0598.

Background Information

First, please complete the following background questions.

Current place of residence (during academic year).

- ○ Residence hall or other university housing
- ○ Fraternity or sorority house
- ○ Private apartment or room within walking distance of the university
- ○ House,apartment, etc. (not walking distance from campus)
- ○ with parents or relatives

What is the highest academic degree that you intend to obtain at any college?

- ○ Bachelor (BA or BS)
- ○ Master (MA or MS)
- ○ Doctorate (Ph.D. or Ed.D.)
- ○ Medical (MD, DDS, DO, or DVM)

- Law (JD or LLB)
- Other _____

At Iowa State University?

- Bachelor (BA or BS)
- Master (MA or MS)
- Doctorate (Ph.D. or Ed.D.)
- Other _____

What is the highest level of education completed by your parents?

	Elementary school or less	Some High School	High School graduate	Some college	Associate's degree from two year	Bachelor's degree	Some graduate school	Graduate degree	Don't know
Mother									
Father									

What is your best estimate of your parents' total household income last year?

- If you are independent check here
- Less than $20,000
- $20,000-$39,999
- $40,000-$59,999
- $60,000-$79,999
- $80,000 or more

Gender

- Female
- Male

What is your age?

What is your ethnic background? (you may select more than one answer)

- African American or Black
- Asian American/Pacific Islander

- [ ] Hispanic or Latino/a
- [ ] Native American or Alaskan Native
- [ ] White (non-Hispanic)
- [ ] Other _____

Community College Experiences

The purpose of this section is to obtain information about your community college experiences prior to your transfer to ISU.

About how many hours a week did you usually spend on the community college campus, **not counting time attending classes**?

- ○ None
- ○ 1 to 3 hours
- ○ 4 to 6 hours
- ○ 7 to 9 hours
- ○ 10 to 12 hours
- ○ more than 12 hours

About how many hours a week did you usually spend studying or preparing for your classes?

- ○ 1 to 5 hours
- ○ 6 to 10 hours
- ○ 11 to 15 hours
- ○ 16 to 20 hours
- ○ more than 20 hours

During your time at the community college, about how many hours a week did you usually spend working on a job for pay?

- ○ None, I didn't have a job
- ○ 1-10 hours
- ○ 11-15 hours
- ○ 16-20 hours
- ○ 21-30 hours
- ○ more than 30 hours

What type of degree, diploma or certificate did you receive? **If multiple, please list each in 'Other'.**

- ○ None

- AA (Associate of Arts)
- AS (Associate of Science)
- AGS (Associate of General Studies)
- AAA (Associate of Applied Arts)
- AAS (Associate of Applied Science)
- Diploma
- Certificate
- Other _____

General Courses

The following questions addresses various aspects of your community college experience. For each item below, please indicate the extent to which you disagree or agree with the statement.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
The courses developed my critical and analytical thinking.				
The courses demanded intensive writing assignments and projects.				
Overall, the courses were intellectually challenging.				
The courses prepared me for the academic standards at ISU.				
The courses prepared me for my major at ISU.				
The courses required extensive reading and writing.				

Academic Advising/Counseling Services

The following items address your use of academic advising/counseling services at your community college. Please indicate the extent to which you disagree or agree with each statement

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I consulted with academic advisors/counselors regarding transfer.				
Information received from academic advisors/counselors was helpful in the transfer process.				
I met with academic advisors/counselors on a regular basis.				
I talked with an advisor/counselor about courses to take, requirements, education plans.				
I discussed my plans for transferring to a four-year college or university with an academic				

advisor/counselor.				
Advisors/counselors identified courses needed to meet the general education/major requirements of a four-year college or university I was interested in attending.	○	○	○	○

Transfer Process

These items pertain to your perceptions about the "transfer process" while you were enrolled at the community college. Please indicate the extent to which you disagree or agree with each statement.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I researched various aspects of ISU to get a better understanding of the environment and academic expectations.	○	○	○	○
I knew what to expect at ISU in terms of academics.	○	○	○	○
I visited the ISU campus to learn where offices and departments were located.	○	○	○	○
I spoke to academic counselors at ISU about transferring and major requirements.	○	○	○	○
I visited the admission office at ISU.	○	○	○	○
I spoke to former community college transfers students to gain insight about their adjustment experiences.	○	○	○	○

College Activities at Your Community College

Course Learning

In your experience at your community college, about how often did you do each of the following?

	Never	Occasionally	Often	Very Often
Took detailed notes in class.	○	○	○	○
Participated in class discussions.	○	○	○	○
Tried to see how different facts and ideas fit together.	○	○	○	○
Thought about practical applications of the material.	○	○	○	○
Worked on a paper or project where I had to integrate ideas from various sources.	○	○	○	○
Tried to explain the material to another student or friend.	○	○	○	○

Experience with Faculty

How often did you do each of the following at your community college?

	Never	Occasionally	Often	Very Often
Visited faculty and sought their advice on class projects such as writing assignments and research papers.	○	○	○	○
Felt comfortable approaching faculty outside class.	○	○	○	○
Asked my instructor for information related to a course I was taking (grades, make-up work, assignments, etc.)	○	○	○	○
Visited informally and briefly with an instructor after class.	○	○	○	○
Discuss my career plans and ambitions with a faculty member.	○	○	○	○
Asked my instructor for comments and criticisms about my work.	○	○	○	○

Engineering Activities:

While at the Community College:

For the items listed below, please indicate the services or programs that you participated in at the community college by selecting NO or YES . If you select "YES", please indicate the extent to which they influenced your transfer preparation using the following scale:

	Participation		Please Rate			
	No	Yes	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Participated in the Engineering Admissions Partnership Program (EAPP)	○	○	○	○	○	○
Attended ISU's College of Engineering Transfer Student Career Fair Event	○	○	○	○	○	○
Participated in the EAPP Online Professional Network	○	○	○	○	○	○
Interacted with an ISU Engineering Transfer Peer Mentor	○	○	○	○	○	○
Interacted with an ISU Engineering Advisor	○	○	○	○	○	○
Participated at an Engineering 100 course in your community college	○	○	○	○	○	○
Interacted with an ISU Engineering faculty member	○	○	○	○	○	○
Attended an ISU campus event/activity	○	○	○	○	○	○
	No	Yes	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Obtained an ISU student ID	○	○	○	○	○	○
Obtained an ISU email account	○	○	○	○	○	○
Used ISU's College of Engineering Career						

	No	Yes	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Management System (CMS)						
Attended "Experience Iowa State Days"						
Attended Transfer Visit Days						
Attended Admissions Partnership Program (APP) Days						
Came to ISU campus during a prospective student visit						
Developed a Transfer Plan						
Utilized ISU's TRANSIT (transfer credit system) to develop an ISU Transfer Plan						
Participated in an ISU student organization						
Participated in a community college learning community						
Interacted with community college advisors						
Interacted with community college pre-engineering faculty						
Interacted with ISU's College of Engineering website						
Lived in ISU Residence Hall						

Learning and Study Skills

To what extent do you agree or disagree that your academic experiences at your community college gave you the skills you needed to prepare you for the standards and academic rigor at ISU?

	Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly
Computer skills					
Mathematical skills					
Note taking skills					
Problem solving skills					
Reading skills					
Research skills					
Speaking and oral presentation skills					
Test taking skills					
Time management skills					
Writing skills					

ISU Experiences

The purpose of this section is to obtain information about your current experiences at Iowa State University.

About how many hours a week do you usually spend working on a job for pay?

- None, I don't have a job
- 1 to 10 hours
- 11 to 15 hours
- 16 to 20 hours
- 21 to 30 hours
- more than 30 hours

What is the most important reason for attending ISU?

- To obtain a bachelor's degree
- To gain skills necessary to enter a new job or occupation
- To pursue graduate or professional school
- To satisfy a personal interest (cultural, social)

Listed below are some reasons that might have influenced your decision to attend ISU. How important was each reason in your decision to come here?

	Not important	Somewhat Important	Important	Very Important
ISU has a very good academic reputation.				
ISU has a very good reputation for its social activities.				
I was offered financial assistance.				
ISU has affordable tuition.				
Academic counselor(s) at my previous college advised me.				
A friend suggested attending.				
A ISU representative recruited me.				
ISU's graduates gain admission to top graduate/professional schools.				
ISU's graduates get good jobs.				
ISU's ranking in national magazines.				
Parents recommended that I attend ISU.				
My brother(s)/sister(s) attended ISU.				
Convenience and location.				
Size of ISU.				
Cost of ISU.				

Did you attend a ISU-sponsored Transfer Student Orientation?

- Yes
- No

If you answered **yes** to the question above, how helpful was the orientation program in facilitating your transition to ISU?

- Very unhelpful
- Somewhat unhelpful
- Somewhat helpful
- Very helpful

Engineering Activities:

While at ISU:

For the items listed below, please indicate the services or programs that you have participated in while being a student at ISU by selecting NO or YES. If you select "YES", please indicate the extent to which they influenced your transfer process using the following scale:

	Participation		Please Rate			
	No	Yes	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Participated in On-line Orientation						
Participation in an ISU Learning Community						
Participation in an engineering scholarship program [Engineer of the year (E2020), Engineering Talent in Every County (ETEC), Engineering Leadership Program (ELP), etc.]						
Participation in Engineering Admisions Partnership Program (EAPP) transition lunches						
Interaction with an academic advisor						
Interaction with engineering faculty						
Interaction with academic support services (tutoring, Supplemental Instruction (SI), Academic Success Center Faculty Office Hours, etc.)						

College Activities at ISU

Course Learning

During the past year at ISU, about how often did you do each of the following?

	Never	Occasionally	Often	Very Often
Took detailed notes in class.				
Participated in class discussions.				

Tried to see how different facts and ideas fit together.				
Thought about practical applications of the material.				
Worked on a paper or project where I had to integrate ideas from various sources.				
Tried to explain the material to another student or friend.				

Experience with Faculty

During the past year at ISU, about how often did you do each of the following?

	Never	Occasionally	Often	Very Often
Visited faculty and sought their advice on class projects such as writing assignments and research papers.				
Felt comfortable approaching faculty outside class.				
Asked my instructor for information related to a course I was taking (grades, make-up work, assignments,etc.)				
Visited informally and briefly with an instructor after class.				
Discussed my career plans and ambitions with a faculty member.				
Asked my instructor for comments and criticisms about my work.				

General Perceptions of ISU

The following are statements about your general perceptions, adjustment process, and opinion of you overall satisfaction at ISU. Please indicate the extent to which you agree or disagree.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
ISU faculty are easy to approach.				
ISU faculty tend to be accessible to students.				
It was difficult learning the "red tape" when I started.				
Because I am a "community college transfer," most students tend to underestimate my abilities.				
Because I am a "community college transfer," most faculty tend to underestimate my abilities.				
There is a stigma at ISU among students for having started at a community college.				

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Generally, students are more concerned about "getting the grade" instead of learning the material.				
Many students feel like they do not "fit in" on this campus.				
Professors are strongly interested in the academic development of undergraduates.				
Most students are treated like a "number."				
Student services are responsive to student needs.				
If students expect to benefit from what ISU has to offer, they have to take the initiative.				

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I feel the courses I have taken at ISU have been interesting and worthwhile.				
ISU is an intellectually stimulating and often exciting place to be.				
I would recommend to other transfer students to come to ISU.				
If I could start over again, I still would go to ISU.				

Adjustment Process

Please indicate the extent to which you agree or disagree with the following statements.

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
Adjusting to the academic standards or expectations at ISU has been easy.				
Adjusting to the social environment at ISU has been easy.				
I often feel (felt) overwhelmed by the size of the student body.				
Upon transferring I felt alienated at ISU.				
I am very involved with social activities at ISU.				

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
I am meeting as many people and making as many friends as I would like at ISU.				
The large classes intimidate me.				
It is easy to find my way around campus.				
My level of stress increased when I started ISU.				
I experienced a dip in grades				

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
(GPA) when I started at ISU.				
It is easy to make friends at ISU.				
I feel comfortable spending time with friends that I made at the community college I attended.				
I feel more comfortable making friends with transfer students than non-transfers.				
There is a sense of competition between/among students at ISU that is not found in community colleges.				

College Satisfaction

Please rate your satisfaction with each of the aspects of campus life listed below.

	Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied	Not Applicable
Sense of belonging at ISU.					
Decision to transfer to ISU.					
Overall quality of instruction.					
Sense of community on campus.					
Academic advising.					
Career counseling and advising.					
Student housing.					
Courses in your major field.					
Financial aid services.					
Amount of contact with faculty.					
Opportunities for community service.					
Job placement services for students.					
Class Size.					
Interaction with other students.					
Ethnic/racial diversity of the faculty.					
Leadership opportunities.					
Overall college experience.					

Open-Ended Questions

What factors **helped you adjust** to ISU? Please explain what factors contributed to your successful transfer (or

unsuccessful transfer) to ISU. Feel free to include factors at both your community college and ISU.

What might the community college have done to enhance your success or ease the transition to ISU?

If you could give some advice to community college students who will be transferring to ISU, what would that advice be?

What have we **NOT** asked that you would like us to know about your experiences at the community college or ISU?

Focus Group Participation

We would like to solicit your participation in a focus group to obtain in depth information about your overall educational experiences. The focus group will last 1.5 hours. If you are interested in participating in a focus group, please provide the following information.

First Name _____

Last Name _____

Best number to call _____

E-Mail _____

If you participate in the focus group, please be advised that your responses will remain "CONFIDENTIAL."

Findings will be reported in the aggregate and no personal identifiable information will be associated with your responses.

If you have any questions about the survey, please contact Carlos Lopez by email: clopez@iastate.edu or by telephone: 515-294-0598.

Thank you

Thank you very much for taking the time to complete this Transfer Student Survey. The Iowa State University administration greatly appreciates your contributions toward improving the university academic environment.

Frankie Santos Laanan, Ph.D.
Associate Professor, Educational Leadership and Policy Studies
College of Human Science
email: laanan@iastate.edu

IOWA STATE UNIVERSITY

APPENDIX C. CORRESPONDANCE WITH PARTICIPANTS L-TSQ

ISU IRB # 1 10-515
Approved Date: 6 April 2011
Expiration Date: 13 December 2011

EMAIL LETTER

Dear

We are conducting a study that focuses on the experiences of transfer students at Iowa State University. This research study consists of a brief web survey that asks about the academic and social experiences of transfer students both at their community college and at ISU. The main objective is to learn how well ISU and Iowa community colleges are meeting the needs of transfer students. The results from this study will assist Iowa State University and Iowa community colleges with information that is essential to the continued success of providing resources to community college transfer students.

As a recent transfer student, you have been selected to participate in this study. The survey will take approximately 15-20 minutes to complete. This is your opportunity to help us anticipate the needs of future transfer students and to help us serve you better during the rest of your time at ISU.

To thank you for your time and assistance, you will have a chance to win one of 30 gift certificates worth $25.00 to the University Book Store. Submit your completed survey on or before _____ and you will be automatically entered into a lottery for a random drawing. If you are selected as one of the winners in the lottery, you will be required to sign a receipt documenting receipt of the gift certificate.

Your participation in this study is voluntary, and your willingness to participate will have no effect on your ISU status. Your responses will remain completely confidential and secured and your name will never be associated with the answers you provide. Also, to ensure confidentiality, the data collected from the research study will be stored on a password protected computer and in a locked office.

There are no foreseeable risks at this time from participating in this study.

If you decide to participate in a one-hour interview or focus group, the benefit will be that you will have the opportunity to further provide useful input that will aid in ensuring a successful experience for future transfer students.

To access the survey, you must follow the instructions below:

When you click on the above link, you will be automatically logged on to the survey. Your participation is voluntary and you may skip any questions you don't want to answer. Your responses will only be publicly reported as group data (e.g., "20% of sophomores said…").

At the close of study, all unique identification (your email address) will be deleted, and your responses will be stored in a password protected computer file. The ISU Human Subjects Research Office has approved this research study and survey.

ISU IRB # 1 10-515
Approved Date: 6 April 2011
Expiration Date: 13 December 2011

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality, all personal identifiers will be removed from the transcripts and notes, and all materials will be destroyed by July 1, 2018. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study.

- For further information about the study contact Dr. Frankie Santos Laanan, at 515-294-7292 or via email at laanan@iastate.edu
- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

If you would like more information about this research project, feel free to contact Dr. Frankie Santos Laanan at Laanan@iastate.edu or via telephone at (515) 294-7292. If you have difficulty accessing the web survey, please contact my Research Associate, Carlos Lopez at clopez@iastate.edu or via telephone at (515) 294-0598.

Thank you for your time and attention and for supporting our efforts to improve the quality of undergraduate education for transfer students at ISU.

Sincerely,

Frankie Santos Laanan

Associate Professor

APPENDIX D. CORRESPONDANCE WITH PARTICIPANTS L-TSQ

1st EMAIL FOLLOW-UP LETTER

Dear

Please do not forget to complete your on-line survey regarding your experiences as a transfer student at Iowa State University.

We are conducting a study that focuses on the experiences of transfer students at Iowa State University. This research study consists of a brief web survey that asks about the academic and social experiences of transfer students both at their community college and at ISU. The main objective is to learn how well ISU and Iowa community colleges are meeting the needs of transfer students. The results from this study will assist Iowa State University and Iowa community colleges with information that is essential to the continued success of providing resources to community college transfer students.

As a recent transfer student, you have been selected to participate in this study. The survey will take approximately 15-20 minutes to complete. This is your opportunity to help us anticipate the needs of future transfer students and to help us serve you better during the rest of your time at ISU.

To thank you for your time and assistance, you will have a chance to win one of 30 gift certificates worth $25.00 to the University Book Store. Submit your completed survey on or before and you will be automatically entered into a lottery for a random drawing. If you are selected as one of the winners in the lottery, you will be required to sign a receipt documenting receipt of the gift certificate.

Your participation in this study is voluntary, and your willingness to participate will have no effect on your ISU status. Your responses will remain completely confidential and secured and your name will never be associated with the answers you provide. Also, to ensure confidentiality, the data collected from the research study will be stored on a password protected computer and in a locked office.

There are no foreseeable risks at this time from participating in this study.

If you decide to participate in a one-hour interview or focus group, the benefit will be that you will have the opportunity to further provide useful input that will aid in ensuring a successful experience for future transfer students.

To access the survey, you must follow the instructions below:

When you click on the above link, you will be automatically logged on to the survey. Your participation is voluntary and you may skip any questions you don't want to answer. Your responses will only be publicly reported as group data (e.g., "20% of sophomores said…").

At the close of study, all unique identification (your email address) will be deleted, and your responses will be stored in a password protected computer file. The ISU Human Subjects Research Office has approved this research study and survey.

ISU IRB # 1 10-515
Approved Date: 6 April 2011
Expiration Date: 13 December 2011

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality, all personal identifiers will be removed from the transcripts and notes, and all materials will be destroyed by July 1, 2018. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study.

- For further information about the study contact Dr. Frankie Santos Laanan, at 515-294-7292 or via email at laanan@iastate.edu
- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

If you would like more information about this research project, feel free to contact Dr. Frankie Santos Laanan at Laanan@iastate.edu or via telephone at (515) 294-7292. If you have difficulty accessing the web survey, please contact my Research Associate, Carlos Lopez at clopez@iastate.edu or via telephone at (515) 294-0598.

Thank you for your time and attention and for supporting our efforts to improve the quality of undergraduate education for transfer students at ISU.

Sincerely,

Frankie Santos Laanan

Associate Professor

APPENDIX E. CORRESPONDANCE WITH PARTICIPANTS E-TSQ

ISU IRB # 1 10-515
Approved Date: 6 April 2011
Expiration Date: 13 December 2011

EMAIL LETTER – ENGINEERING TRANSFER STUDENTS

Dear

We are conducting a study that focuses on the experiences of engineering transfer students at Iowa State University's College of Engineering. Through the collaboration between the College of Engineering and the Office of Community College Research and Policy (OCCRP), we are very interested in learning about your experiences as an engineering transfer student.

This research study consists of a brief web survey that asks about the academic and social experiences of engineering transfer students both at their community college and at ISU. The main objective is to learn how well ISU and Iowa community colleges are meeting the needs of transfer students. The results from this study will assist Iowa State University and Iowa community colleges with information that is essential to the continued success of providing resources to community college transfer students.

You have been selected to participate in this study because you entered Iowa State as an engineering transfer student and we are interested in the experiences of all of our current and former engineering transfer students. The survey will take approximately 15-20 minutes to complete. This is your opportunity to help us anticipate the needs of future engineering transfer students and to help us serve you better during the rest of your time at ISU.

To thank you for your time and assistance, you will have a chance to win one of 20 gift certificates worth $25.00 to the University Book Store. Submit your completed survey on or before_____ and you will be automatically entered into a lottery for a random drawing. If you are selected as one of the winners in the lottery, you will be required to sign a receipt documenting receipt of the gift certificate.

Your participation in this study is voluntary, and your willingness to participate will have no effect on your ISU status. Your responses will remain completely confidential and secured and your name will never be associated with the answers you provide. Also, to ensure confidentiality, the data collected from the research study will be stored on a password protected computer and in a locked office.

There are no foreseeable risks at this time from participating in this study.

If you decide to participate in a one-hour interview or focus group, the benefit will be that you will have the opportunity to further provide useful input that will aid in ensuring a successful experience for future transfer students.

To access the survey, you must follow the instructions below:

When you click on the above link, you will be automatically logged onto the survey. Your participation is voluntary and you may skip any questions you don't want to answer. Your responses will only be publicly reported as group data (e.g., "20% of sophomores said…").

ISU IRB # 1 10-515
Approved Date: 6 April 2011
Expiration Date: 13 December 2011

At the close of study, all unique identification (your email address) will be deleted, and your responses will be stored in a password protected computer file. T he ISU Human Subjects Research Office has approved this research study and survey.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality, all personal identifiers will be removed from the transcripts and notes, and all materials will be destroyed by July 1, 2018. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study.

- For further information about the study contact Dr. Frankie Santos Laanan, at 515-294-7292 or via email at laanan@iastate.edu
- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

If you would like more information about this research project, feel free to contact Dr. Frankie Santos Laanan at Laanan@iastate.edu or via telephone at (515) 294-7292. If you have difficulty accessing the web survey, please contact my Research Associate, Carlos Lopez at clopez@iastate.edu or via telephone at (515) 294-0598.

Thank you for your time and attention and for supporting our efforts to improve the quality of undergraduate education for transfer students at ISU.

Sincerely,

Gary Mirka
Associate Dean for Undergraduate and Graduate Education
College of Engineering

Frankie Santos Laanan
Associate Professor

APPENDIX F. CORRESPONDANCE WITH PARTICIPANTS E-TSQ

ISU IRB # 1 10-515
Approved Date: 6 April 2011
Expiration Date: 13 December 2011

1st EMAIL FOLLOW-UP LETTER
ENGINEERING TRANSFER STUDENTS

Dear

Please do not forget to complete your on-line survey regarding your experiences as a transfer student at Iowa State University. Through the collaboration between the College of Engineering and the Office of Community College Research and Policy (OCCRP), we are very interested in learning about your experiences as an engineering transfer student.

This research study consists of a brief web survey that asks about the academic and social experiences of engineering transfer students both at their community college and at ISU. The main objective is to learn how well ISU and Iowa community colleges are meeting the needs of transfer students. The results from this study will assist Iowa State University and Iowa community colleges with information that is essential to the continued success of providing resources to community college transfer students.

You have been selected to participate in this study because you entered Iowa State as an engineering transfer student and we are interested in the experiences of all of our current and former engineering transfer students. . The survey will take approximately 15-20 minutes to complete. This is your opportunity to help us anticipate the needs of future engineering transfer students and to help us serve you better during the rest of your time at ISU.

To thank you for your time and assistance, you will have a chance to win one of 20 gift certificates worth $25.00 to the University Book Store. Submit your completed survey on or before and you will be automatically entered into a lottery for a random drawing. If you are selected as one of the winners in the lottery, you will be required to sign a receipt documenting receipt of the gift certificate.

Your participation in this study is voluntary, and your willingness to participate will have no effect on your ISU status. Your responses will remain completely confidential and secured and your name will never be associated with the answers you provide. Also, to ensure confidentiality, the data collected from the research study will be stored on a password protected computer and in a locked office.

There are no foreseeable risks at this time from participating in this study.

If you decide to participate in a one-hour interview or focus group, the benefit will be that you will have the opportunity to further provide useful input that will aid in ensuring a successful experience for future transfer students.

To access the survey, you must follow the instructions below:

When you click on the above link, you will be automatically logged onto the survey. Your participation is voluntary and you may skip any questions you don't want to answer. Your responses will only be publicly reported as group data (e.g., "20% of sophomores said…").

ISU IRB # 1 10-515
Approved Date: 6 April 2011
Expiration Date: 13 December 2011

At the close of study, all unique identification (your email address) will be deleted, and your responses will be stored in a password protected computer file. T he ISU Human Subjects Research Office has approved this research study and survey.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality, all personal identifiers will be removed from the transcripts and notes, and all materials will be destroyed by July 1, 2018. If the results are published, your identity will remain confidential.

QUESTIONS OR PROBLEMS

You are encouraged to ask questions at any time during this study.

- For further information about the study contact Dr. Frankie Santos Laanan, at 515-294-7292 or via email at laanan@iastate.edu
- If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

If you would like more information about this research project, feel free to contact Dr. Frankie Santos Laanan at Laanan@iastate.edu or via telephone at (515) 294-7292. If you have difficulty accessing the web survey, please contact my Research Associate, Carlos Lopez at clopez@iastate.edu or via telephone at (515) 294-0598.

Thank you for your time and attention and for supporting our efforts to improve the quality of undergraduate education for transfer students at ISU.

Sincerely,

Gary Mirka
Associate Dean for Undergraduate and Graduate Education
College of Engineering

Frankie Santos Laanan
Associate Professor

APPENDIX G. PROPOSED INTERVIEW PROTOCOL

1. Please describe the early influences (people, family members, friends, school, etc.) in your life that have contributed to your choice to pursue a STEM degree?
2. How and why did you decide to go into a STEM major?
3. Describe the people, services and/or activities at your community college that:
    a. Influenced your decision to pursue a STEM area
    b. Supported you while pursuing a STEM area
4. Please describe your overall community college experience in your STEM area?
5. Name 3 specific community college experiences that were essential in your pursuit of a STEM degree.
6. Please describe your transfer experiences at ISU and how individuals during the process (faculty, advisors, peers, staff, etc.) did or did not provide support while pursuing a STEM degree.
7. Would you advise future students to pursue STEM areas/ careers? Why or why not? Please explain.

APPENDIX H. INSTITUTIONAL REVIEW BOARD APPROVAL FOR L-TSQ

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Resear
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 3/7/2011

To: Dr. Frankie Santos Laanan
N225A Lagomarcino

From: Office for Responsible Research

Title: Study of Transfer Students at Iowa State University

IRB Num: 08-541

Approval Date:	3/4/2011	**Continuing Review Date:**	2/25/2012
Submission Type:	Continuing Review	**Review Type:**	Expedited

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University. Please refer to the IRB ID number shown above in all correspondence regarding this study.

Your study has been approved according to the dates shown above. To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, **including the recruitment materials and informed consent documents that have the IRB approval stamp**.
- **Obtain IRB approval prior to implementing any changes** to the study by submitting the "Continuing Review and/or Modification" form.
- **Immediately inform the IRB** of (1) **all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems** involving risks to subjects or others.
- **Stop all research activity if IRB approval lapses**, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.
- **Complete a new continuing review form** at least three to four weeks prior to the **date for continuing review** as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Research investigators are expected to comply with the principles of the Belmont Report, and state and federal regulations regarding the involvement of humans in research. These documents are located on the Office for Responsible Research website http://www.compliance.iastate.edu/irb/forms/ or available by calling (515) 294-4566.

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 1138 Pearson Hall, to officially close the project.

APPENDIX I. INSTITUTIONAL REVIEW BOARD APPROVAL FOR E-TSQ

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Resear
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 4/6/2011

To: Dr. Frankie Santos Laanan
N225A Lagomarcino

From: Office for Responsible Research

Title: Experiences of Community College Transfer Students at Iowa State University

IRB Num: 10-515

Approval Date:	4/6/2011	**Continuing Review Date:**	12/13/2011
Submission Type:	Modification	**Review Type:**	Expedited

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University. Please refer to the IRB ID number shown above in all correspondence regarding this study.

Your study has been approved according to the dates shown above. To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, **including the recruitment materials and informed consent documents that have the IRB approval stamp**.
- **Obtain IRB approval prior to implementing any changes** to the study by submitting the "Continuing Review and/or Modification" form.
- **Immediately inform the IRB** of (1) **all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems** involving risks to subjects or others.
- **Stop all research activity if IRB approval lapses**, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.
- **Complete a new continuing review form** at least three to four weeks prior to the **date for continuing review** as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Research investigators are expected to comply with the principles of the Belmont Report, and state and federal regulations regarding the involvement of humans in research. These documents are located on the Office for Responsible Research website http://www.compliance.iastate.edu/irb/forms/ or available by calling (515) 294-4566.

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 1138 Pearson Hall, to officially close the project.

APPENDIX J. *t*-TEST COMMUNITY COLLEGE EXPERIENCES

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
CC Transfer GPA	STEM	200	2.9050	.79948	.05653
	ENG	80	3.0000	.79556	.08895

Independent Samples Test

CC Transfer GPA	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.315	.253	-.900	278	.369	-.09500	.10561	-.30291	.11291
Equal variances not assumed			-.901	146.243	.369	-.09500	.10539	-.30329	.11329

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
Transfer Semester Hours	STEM	200	63.40	18.826	1.331
	ENG	80	61.61	24.956	2.790

Independent Samples Test

Transfer Semester Hours	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	3.947	.048	.652	278	.515	1.791	2.745	-3.613	7.196
Equal variances not assumed			.579	116.658	.563	1.791	3.091	-4.331	7.914

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
How many hours a week did you usually spend studying or preparing for class	STEM	185	1.85	1.030	.076
	ENG	79	2.30	1.234	.139

Independent Samples Test

How many hours a week did you usually spend studying or preparing for class	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	4.518	.034	-3.058	262	.002	-.450	.147	-.739	-.160
Equal variances not assumed			-2.845	126.557	.005	-.450	.158	-.763	-.137

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
CC Academic Advising	STEM	182	2.6538	.95292	.07064
	ENG	75	2.7333	.91983	.10621

Independent Samples Test

CC Academic Advising	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.817	.367	-.614	255	.540	-.07949	.12945	-.33442	.17545
Equal variances not assumed			-.623	142.532	.534	-.07949	.12756	-.33163	.17266

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
CC Experience with Faculty	STEM	164	2.6799	.77296	.06036
	ENG	73	2.7260	.78487	.09186

Independent Samples Test

CC Experience with Faculty	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.181	.671	-.422	235	.673	-.04615	.10927	-.26143	.16913
Equal variances not assumed			-.420	136.360	.675	-.04615	.10992	-.26351	.17121

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
CC Course Learning	STEM	164	3.0976	.57525	.04492
	ENG	73	3.1826	.60039	.07027

Independent Samples Test

CC Course Learning	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.144	.704	-1.037	235	.301	-.08509	.08204	-.24671	.07653
Equal variances not assumed			-1.020	133.052	.309	-.08509	.08340	-.25005	.07988

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
CC General Courses	STEM	181	2.7569	.59873	.04450
	ENG	75	2.8533	.62359	.07201

Independent Samples Test

CC General Courses	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.043	.835	-1.159	254	.248	-.09643	.08323	-.26034	.06748
Equal variances not assumed			-1.139	133.334	.257	-.09643	.08465	-.26385	.07100

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
CC Transfer Process	STEM	181	2.8352	.63707	.04735
	ENG	74	2.7275	.65954	.07667

Independent Samples Test

CC Transfer Process	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.612	.435	1.213	253	.226	.10770	.08881	-.06720	.28260
Equal variances not assumed			1.195	131.553	.234	.10770	.09011	-.07056	.28596

APPENDIX K. *t*-TEST UNIVERSITY EXPERIENCES

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
Cumulative ISU GPA	STEM	200	2.4650	.92903	.06569
	ENG	80	2.4500	.89866	.10047

Independent Samples Test

Cumulative ISU GPA	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.280	.597	.123	278	.902	.01500	.12177	-.22471	.25471
Equal variances not assumed			.125	150.091	.901	.01500	.12004	-.22219	.25219

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
ISU Experience with Faculty	STEM	154	2.2944	.79641	.06418
	ENG	69	2.2754	.70758	.08518

Independent Samples Test

ISU Experience with Faculty	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.260	.263	.170	221	.865	.01901	.11157	-.20087	.23889
Equal variances not assumed			.178	146.173	.859	.01901	.10665	-.19177	.22979

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
ISU Course Learning	STEM	153	3.1187	.55760	.04508
	ENG	68	3.2132	.59771	.07248

Independent Samples Test

ISU Course Learning	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.611	.206	-1.137	219	.257	-.09450	.08310	-.25828	.06928
Equal variances not assumed			-1.107	120.884	.270	-.09450	.08536	-.26349	.07449

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
ISU Outside Influences	STEM	156	1.7607	.70715	.05662
	ENG	73	1.7352	.73063	.08551

Independent Samples Test

ISU Outside Influences	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.063	.802	.252	227	.801	.02552	.10135	-.17418	.22522
Equal variances not assumed			.249	136.752	.804	.02552	.10256	-.17728	.22833

Group Statistic

	STEM	N	Mean	Std. Deviation	Std. Error Mean
ISU Financial influences	STEM	158	2.9789	.87562	.06966
	ENG	73	2.8539	.93126	.10900

Independent Samples Test

ISU Financial Influences	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.391	.533	.989	229	.324	.12502	.12645	-.12412	.37417
Equal variances not assumed			.967	132.680	.336	.12502	.12935	-.13084	.38089

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
ISU Reputation	STEM	158	2.9051	.72474	.05766
	ENG	73	3.0000	.72648	.08503

Independent Samples Test

ISU Reputation	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.159	.690	-.925	229	.356	-.09494	.10264	-.29718	.10731
Equal variances not assumed			-.924	139.874	.357	-.09494	.10273	-.29805	.10818

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
Experiences as Transfer Student	STEM	150	2.3300	.71261	.05818
	ENG	69	2.1993	.68005	.08187

Independent Samples Test

Experience as Transfer Student	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.894	.346	1.279	217	.202	.13072	.10220	-.07070	.33215
Equal variances not assumed			1.302	137.979	.195	.13072	.10044	-.06787	.32932

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
ISU Gen Perception about Faculty	STEM	152	2.8509	.72462	.05877
	ENG	70	2.9190	.59638	.07128

Independent Samples Test

ISU Gen Perception about Faculty	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	4.958	.027	-.687	220	.493	-.06817	.09923	-.26374	.12740
Equal variances not assumed			-.738	160.761	.462	-.06817	.09239	-.25062	.11428

Group Statistics

	STEM	N	Mean	Std. Deviation	Std. Error Mean
ISU Overall Satisfaction	STEM	153	3.3431	.62755	.05073
	ENG	71	3.2852	.63569	.07544

Independent Samples Test

ISU Overall Satisfaction	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% CI of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.339	.561	.640	222	.523	.05793	.09049	-.12039	.23625
Equal variances not assumed			.637	134.923	.525	.05793	.09091	-.12188	.23773

APPENDIX L.

Hierarchical Regression Models

Negative Academic Adjustment Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.186[a]	.035	.025	.669	.035	3.680	2	205	.027
2	.323[b]	.104	.082	.649	.070	5.249	3	202	.002
3	.506[c]	.256	.223	.597	.152	10.109	4	198	.000

Cumulative ISU GPA Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.192[a]	.037	.028	.91498	.037	4.023	2	211	.019
2	.595[b]	.354	.332	.75852	.317	20.205	5	206	.000
3	.623[c]	.389	.362	.74136	.035	5.823	2	204	.003

Dependent Variable – Negative Academic Adjustment

		Academic Adjustment	Highest level of education completed by father	STEM	Associate's Degree Obtained	CCExperiencewithFaculty	CCGeneral Courses	ISUOutside Influences	ISUFinancialinfluences	ISUExperiencewithFaculty	ExperiencesasTransfer Student
Pearson Correlation	AcademicAdjustment	1.000	-.184	.027	.184	.188	.001	.184	.118	-.144	.406
	Highest level of education completed by father	-.184	1.000	.009	-.182	-.002	-.071	-.065	.065	.094	-.114
	STEM	.027	.009	1.000	-.246	.003	.063	.001	-.059	-.036	-.095
	Associate's Degree Obtained	.184	-.182	-.246	1.000	.055	.151	.194	.058	-.043	.155
	CCExperiencewithFaculty	.188	-.002	.003	.055	1.000	.328	.000	.020	.304	.258
	CCGeneralCourses	.001	-.071	.063	.151	.328	1.000	.058	-.010	.090	.094
	ISUOutsideInfluences	.184	-.065	.001	.194	.000	.058	1.000	.257	.093	.147
	ISUFinancialinfluences	.118	.065	-.059	.058	.020	-.010	.257	1.000	.089	.019
	ISUExperiencewithFaculty	-.144	.094	-.036	-.043	.304	.090	.093	.089	1.000	-.145
	ExperiencesasTransfer Student	.406	-.114	-.095	.155	.258	.094	.147	.019	-.145	1.000
Sig. (1-tailed)	AcademicAdjustment	.	.004	.351	.004	.003	.494	.004	.045	.019	.000
	Highest level of education completed by father	.004	.	.447	.004	.490	.155	.174	.176	.089	.050
	STEM	.351	.447	.	.000	.481	.183	.493	.198	.301	.087
	Associate's Degree Obtained	.004	.004	.000	.	.215	.015	.002	.203	.267	.013
	CCExperiencewithFaculty	.003	.490	.481	.215	.	.000	.499	.387	.000	.000
	CCGeneralCourses	.494	.155	.183	.015	.000	.	.204	.441	.099	.088
	ISUOutsideInfluences	.004	.174	.493	.002	.499	.204	.	.000	.092	.017
	ISUFinancialinfluences	.045	.176	.198	.203	.387	.441	.000	.	.102	.393
	ISUExperiencewithFaculty	.019	.089	.301	.267	.000	.099	.092	.102	.	.018
	ExperiencesasTransfer Student	.000	.050	.087	.013	.000	.088	.017	.393	.018	.
N	AcademicAdjustment	208	208	208	208	208	208	208	208	208	208
	Highest level of education completed by father	208	208	208	208	208	208	208	208	208	208
	STEM	208	208	208	208	208	208	208	208	208	208
	Associate's Degree Obtained	208	208	208	208	208	208	208	208	208	208
	CCExperiencewithFaculty	208	208	208	208	208	208	208	208	208	208
	CCGeneralCourses	208	208	208	208	208	208	208	208	208	208
	ISUOutsideInfluences	208	208	208	208	208	208	208	208	208	208
	ISUFinancialinfluences	208	208	208	208	208	208	208	208	208	208
	ISUExperiencewithFaculty	208	208	208	208	208	208	208	208	208	208
	ExperiencesasTransfer Student	208	208	208	208	208	208	208	208	208	208

Dependent Variable-Cumulative ISU GPA

		Cummulative ISU GPA	Highest level of education completed by father	STEM	Associate's Degree Obtained	CC Transfer GPA	CCAcademic Advising	CCGeneral Courses	Transfer Semester Hours	ISUCourse Learning	ISUOverall Satisfaction
Pearson Correlation	Cummulative ISU GPA	1.000	.187	-.037	-.124	.469	-.035	.290	.166	.255	.129
	Highest level of education completed by father	.187	1.000	.038	-.177	.040	-.078	-.063	.123	.031	.099
	STEM	-.037	.038	1.000	-.198	.020	.029	.076	-.014	.082	-.057
	Associate's Degree Obtained	-.124	-.177	-.198	1.000	.012	.178	.170	.156	.086	.021
	CC Transfer GPA	.469	.040	.020	.012	1.000	.003	.174	-.029	.076	-.114
	CCAcademicAdvising	-.035	-.078	.029	.178	.003	1.000	.365	-.029	.071	.124
	CCGeneralCourses	.290	-.063	.076	.170	.174	.365	1.000	.187	.299	.055
	Transfer Semester Hours	.166	.123	-.014	.156	-.029	-.029	.187	1.000	.098	.096
	ISUCourseLearning	.255	.031	.082	.086	.076	.071	.299	.098	1.000	.392
	ISUOverallSatisfaction	.129	.099	-.057	.021	-.114	.124	.055	.096	.392	1.000
Sig. (1-tailed)	Cummulative ISU GPA	.	.003	.295	.036	.000	.307	.000	.008	.000	.029
	Highest level of education completed by father	.003	.	.291	.005	.282	.128	.179	.036	.325	.074
	STEM	.295	.291	.	.002	.386	.336	.134	.420	.117	.203
	Associate's Degree Obtained	.036	.005	.002	.	.432	.005	.006	.011	.106	.381
	CC Transfer GPA	.000	.282	.386	.432	.	.483	.005	.337	.135	.048
	CCAcademicAdvising	.307	.128	.336	.005	.483	.	.000	.337	.152	.035
	CCGeneralCourses	.000	.179	.134	.006	.005	.000	.	.003	.000	.212
	Transfer Semester Hours	.008	.036	.420	.011	.337	.337	.003	.	.077	.082
	ISUCourseLearning	.000	.325	.117	.106	.135	.152	.000	.077	.	.000
	ISUOverallSatisfaction	.029	.074	.203	.381	.048	.035	.212	.082	.000	.
N	Cummulative ISU GPA	214	214	214	214	214	214	214	214	214	214
	Highest level of education completed by father	214	214	214	214	214	214	214	214	214	214
	STEM	214	214	214	214	214	214	214	214	214	214
	Associate's Degree Obtained	214	214	214	214	214	214	214	214	214	214
	CC Transfer GPA	214	214	214	214	214	214	214	214	214	214
	CCAcademicAdvising	214	214	214	214	214	214	214	214	214	214
	CCGeneralCourses	214	214	214	214	214	214	214	214	214	214
	Transfer Semester Hours	214	214	214	214	214	214	214	214	214	214
	ISUCourseLearning	214	214	214	214	214	214	214	214	214	214
	ISUOverallSatisfaction	214	214	214	214	214	214	214	214	214	214

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