Engagement of STEM and Non-STEM Students: A Comparison between International and American Undergraduate Students

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Engagement of STEM and Non-STEM Students: A Comparison between International and American Undergraduate Students

by

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Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy
Department of Education Leadership, Management and Policy
Seton Hall University
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COLLEGE OF EDUCATION AND HUMAN SERVICES
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ABSTRACT

The purpose of this study is to understand the relationship between the status and engagement of international students and whether this relationship varies by STEM and non-STEM fields for undergraduate students at American higher education institutions. 2015 NSSE (National Survey of Student Engagement) data was utilized for this study. Ordinary Least Squares (OLS) multiple regression with Huber-White clustered standard errors was used to account for the nested nature of the data at the institutional level, and interaction effect tests were used to analyze whether the relationship between international student status and engagement varies across STEM & non-STEM majors.

This study finds that American STEM students were more engaged in collaborative learning activities as compared to international STEM students, while American and international non-STEM students did not differ much in this outcome. The same is true for freshmen and senior students in collaborative learning; American STEM freshmen and seniors were more engaged in collaborative learning activities as compared to international STEM freshmen and seniors, while American freshmen and senior and international freshmen and senior non-STEM students were not so much different in this outcome. Additionally, international non-STEM seniors were more engaged in effective teaching practice activities as compared to American senior non-STEM students.

Keywords: International Students; Student Engagement; American and International Student Engagement; STEM vs. Non-STEM; Collaborative Learning; Effective Teaching Practices
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DEDICATION

I dedicate this dissertation to my husband, Vikram Panwar, for his unconditional love and support; my parents, Hukum Singh Negi and Roshni Negi, for inculcating in me a love for lifelong learning; and my 7-year old daughter, Navya Panwar, for letting me study numerous hours during this process while she eagerly waited for this dissertation to conclude.
# TABLE OF CONTENTS

ABSTRACT ................................................................................................................................. iv
ACKNOWLEDGMENTS ............................................................................................................... v
DEDICATION ............................................................................................................................... vii
LIST OF TABLES .......................................................................................................................... x
LIST OF FIGURES ...................................................................................................................... xi
CHAPTER 1 – INTRODUCTION ................................................................................................. 1
  Problem Statement .................................................................................................................. 2
  Student Engagement .............................................................................................................. 5
  Research Questions .............................................................................................................. 10
  Significance of the Study ...................................................................................................... 11
CHAPTER 2 – LITERATURE REVIEW ....................................................................................... 15
  Defining & Measuring Student Engagement ..................................................................... 16
  Review of Theories Guiding Student Engagement Research ........................................ 21
  Review of Literature on International Status and Student Engagement ...................... 27
  Review of Literature on STEM & Non-STEM Major and Student Engagement ........... 30
  Review of Literature on Other Determinants of Student Engagement ......................... 33
  Proposed Conceptual Framework ..................................................................................... 40
  Conclusion ......................................................................................................................... 42
CHAPTER 3 – RESEARCH DESIGN ......................................................................................... 43
  Data Source ......................................................................................................................... 43
  Why NSSE Data? .................................................................................................................. 45
  Data Reliability & Validity ................................................................................................. 46
  Data Variables ..................................................................................................................... 47
  Missing Value Analysis ...................................................................................................... 53
  Research Method ................................................................................................................. 53
  Limitations ........................................................................................................................... 55
CHAPTER 4 – RESULTS ............................................................................................................ 57
  Descriptive Statistics .......................................................................................................... 57
  Research Question 1 ........................................................................................................... 61
  Independent T-Test ............................................................................................................. 62
  Multiple Imputation ............................................................................................................ 67
CHAPTER 5 – CONCLUSIONS & IMPLICATIONS .......................................................... 94
  Summary of Findings .................................................................................. 95
  Implications for Policy and Practice .......................................................... 101
  Implications for Future Research ............................................................... 108
  Conclusion ................................................................................................. 111
  Concluding Thoughts ................................................................................. 113

REFERENCES .................................................................................................... 115

APPENDIX A: National Survey of Student Engagement (NSSE) Survey 2015 (Paper Version) ................................................................. 132
APPENDIX B: NSSE Data Sharing Agreement .................................................. 136
LIST OF TABLES

Table 1. Selected Student Characteristics of International and American Students………….60
Table 2. Selected Institutional Characteristics of International and American Students………..61
Table 3. Group Statistics Comparing Student Engagement Indicators for International & American Students………………………………………………………………………..62
Table 4. Independent Sample T-Test for International & American Students across Student Engagement Indicators………………………………………………………………………….63
Table 5. Variables by Missing Data Percentage in the Dataset before Multiple Imputation…….69
Table 6. Regression Analysis Summary for all Six Engagement Indicators………………….71
Table 7. Regression Analysis Summary for Collaborative Learning (CL)…………………….82
Table 8. Regression Analysis Summary for Discussion with Diverse Other (DD)…………….84
Table 9. Regression Analysis Summary for Student-Faculty Interaction (SF)………………….85
Table 10. Regression Analysis Summary for Effective Teaching Practice (ET)……………….88
Table 11. Regression Analysis Summary for Quality of Interactions (QI)…………………..90
Table 12. Regression Analysis Summary for Supportive Environment (SE)………………….91
LIST OF FIGURES

Figure 1. Conceptual Framework ...................................................................................... 41

Figure 2. Missing Data Patterns .......................................................................................... 68

Figure 3. Interaction of International Status & STEM Field was Statistically Significant for Collaborative Learning (CL) ......................................................................................... 74

Figure 4. Interaction of International and STEM for collaborative learning (CL) for Senior Students ................................................................................................................................. 79

Figure 5. Interaction of International & STEM for collaborative learning (CL) for Freshmen Students ................................................................................................................................. 81

Figure 6. Interaction of International & STEM for Effective Teaching Practice (ET) for Senior Students ................................................................................................................................. 87
CHAPTER 1 – INTRODUCTION

As internationalization and globalization continue to induce cross-border student mobility around the world (Altbach & Knight, 2007), the number of foreign students studying within the American higher education system remains quite high. International student enrollment in the United States increased by 10% during the academic year 2014-2015: a record high of 974,926 international students were enrolled in colleges and universities across America (Institute of International Education, 2015). According to Andrade & Evans (2009), “The United States hosts the largest number of student sojourners globally – 22% of all internationally mobile students study here, and the international students make approximately $14.5 billion contributions annually for their living expenses in the United States.” In 2015, international students contributed $35.8 billion to the U.S. economy (Institute of International Education, 2016). In addition to monetary benefits to the host country, international students coming from different geographies bring diversity on campus and in the classroom, enriching the academic environment and educational values.

While students choose the United States as their place of study because it has an international reputation for providing state of the art higher education, most international students prefer Science, Technology, Engineering, and Mathematics (STEM) programs in America over other streams (Andrade & Evans, 2009). In 2014-2015, 44% of international students were enrolled in STEM, 20% were enrolled in Business & Management, 8% were enrolled in Social Science, 6% enrolled in Intensive English, and 17% were enrolled in undeclared and other programs (Institute of International Education, 2015). In 2000-2001, 40% of all international students were in STEM fields, and their numbers increased further to 44% of
all international students in 2014-2015 coming to the United States. While the percentage of STEM major international students among all American college students has been consistently high over the last 15 years, the absolute number of international students in STEM fields has also increased substantially from 2000-2001 to 2014-2015. Specifically, international student enrollment in STEM fields increased from 219,037 to 429,215 during the 15-year period of 2000-2001 to 2014-2015. International student enrollment in other fields also increased: Business and Management enrollment increased from 106,043 to 197,258, Education enrollment increased from 14,053 to 17,675, Fine & Applied Arts enrollment increased from 34,220 to 56,758, Intensive English enrollment increased from 23,011 to 49,233, Social Science enrollment increased from 42,367 to 75,951, and Other Field of Study enrollment increased from 57,235 to 73,176 (Institute of International Education, 2015). Since the percentage of international student enrollment in STEM and other fields is higher than ever before, this dissertation examines the international student population based on majors, to determine whether student learning and developmental experiences differ in STEM fields as compared to non-STEM fields.

**Problem Statement**

In the United States, higher education institutions currently face a shortage of American citizens with skill sets in STEM fields (Council of Post-Secondary Education, 2007), thus there is a need for effective and efficient recruitment plans to enroll and retain international students in STEM fields. Based on the estimates provided as part of economic forecasts, approximately 1 million graduates are required in the STEM programs to keep up with the ever-increasing demand for STEM professionals in the United States (President’s Council of Advisors on Science and Technology (PCAST, 2012). Keeping in mind the current growth rate observed in
STEM graduate students, there is a need for an annual increase of 34% in undergraduate STEM graduates to fulfill the target of 1 million more STEM professionals in the United States (PCAST, 2012). Recruitment of qualified international students in STEM programs would allow American universities to remain competitive in scientific research and maintain the cutting edge in innovation that currently America claims to have. Despite this claim, the majority of students who receive doctorates in STEM fields are international students. International students constitute more than half of those receiving doctorates in engineering and computer science fields (64.8%), mathematics (57.2%), and physics (58.0%) (NSF, 2007). Undergraduate international students constitute 36.4% of enrollments in STEM fields (Cantwell & Lee, 2010).

Also, international students in STEM fields have a higher completion rate compared to U.S. citizens and permanent resident students (Bowen & Rudenstine, 1992; Council of Graduate Schools, 2004). As there is a shortage of STEM skills amongst U.S. citizen students, universities and colleges do not have other alternatives but to rely more and more on international student researchers to keep up with advances in and maintain a competitive edge in scientific knowledge (Cantwell & Lee, 2010).

International student researchers enrolled in STEM programs engage in various activities in scientific research labs, write grant proposals, lead scientific research team projects, and work as teaching assistants or instructors. They have come to constitute a majority of graduate student population in STEM fields, hence furthering the recognition and reputation of several elite universities. (Lee, 2015, book chapter). Overall, international students who become scientists, engineers, teachers, and researchers end up contributing significantly to the overall educational, scientific, and business environment. (Brain Mobility, 2006)
Two of the countries, the United States and the United Kingdom, that are considered global leaders in scientific research, continue to face a shortage of domestic students with skills in STEM fields. Hence, there is a growing reliance on international students for post-doctoral research (Ackers & Gill, 2005; Corley & Sabharwal, 2007). However, the United States is not alone in facing a shortfall of skilled workers in STEM fields, but other countries around the world also face a similar deficit. Cartwell and Lee (2010) noted that academic advancement in today’s socioeconomic environment is quite globalized and hence relies on the cross-border mobility of people with desirable skill sets to address the needs of advancement (Castells, 2000; Held, McGrew, Goldblatt & Perraton, 1999). Thus, it becomes even more critical to ensure that international students in STEM fields are not only recruited by American higher education institutions, but are also retained in their respective programs at such institutions. This emphasizes the importance of student engagement, and highlights the need for institutions to plan and create a productive and positive environment to engage international students within their sociocultural and academic surroundings. As a result, international student engagement in their major or field of study becomes more critical in this context.

Despite the U.S. shortage in STEM fields, American colleges and universities enroll the largest number of international students compared to other countries in the world (U.S. News and World Report, 2000). With rising international student enrollment in the United States, there is an ever-increasing competition between higher education institutions in the United States for qualified international students. Thus, it has become critical for such institutions to analyze and understand the needs of international students in an effort to create a reflective campus environment that ensures minimal challenges during student transition into their universities. (International Student Retention, NAFSA 2013). Recruitment of international students to study
in American universities and colleges becomes meaningless if not enough attention is paid to the services provided to them along with an emphasis on their retention and graduation (Korobova, 2012).

International students add great value to academic, social, and cultural aspects of American institutions that it is becoming even more important to focus on aspects of their engagement. There have been a few studies comparing American student engagement with international student engagement, but no studies comparing international student engagement in STEM & non-STEM majors. Studying international student engagement by major or program will shed light whether their engagement is different based on their field of major or study. With the increasing number of international students in higher education in the United States and around the world, it becomes very important to look deeper into their engagement. A comparison of international and American college students will help faculty, academic advising, student affairs, international services, and other administrators to understand similarities and dissimilarities between these two student populations better. This paper make an important contribution to the field by providing an in-depth analysis and comparison of these two populations by the field of study.

**Student Engagement**

In developing the student engagement theory in the 1970s, C. R. Pace was a pioneer in looking at student experience and development based on test scores and grades, thereby measuring student learning. Pace focused on the “quality of effort” students put in and how student learning greatly depends on it. Following C. R. Pace, Alexander Astin’s theory of student involvement in the 1980s had a major influence on student engagement theory. It focused on the
amount of time spent on task; the more students spend their physical, emotional and social energy on various educational tasks and activities within the institution, the more positive influence it will have on their overall personal development. More recent literature on student engagement/involvement reveals that student engagement impacts student academic outcome. However, student involvement in activities such as student-faculty interaction, academics, athletics, student government and honors programs etc., influences student’s learning and development differently (Astin’s, 1999).

In the 1980s, Vincent Tinto’s retention model focused on the social and academic integration of undergraduate college students. Both academic and social integration are defined as the degree to which students share the academic values and social norms and culture of the institution. In their study, “Seven Principles for Good Practice in Undergraduate Education,” Chickering and Gamson (1987) highlighted potentially the best known and extensively utilized seven indicators of student engagement. In the 1990s, George Kuh formally introduced the idea of student engagement based on “what students do” and “what institutions do.” “What students do” pertains to students’ efforts and time they spend on their academic studies and other extracurricular activities, which impacts the success of outcomes and experiences they have. “What institutions do” refers to the higher education institutions and their policies that provide for necessary resources in creating and organizing proper learning avenues and services for students to take part in and benefit from (Kuh, 2001a).

Researchers have extensively studied student engagement as it relates to the academic success of American students (Astin, 1977 & 1993; Chickering, 1969; Chickering & Gamson, 1987; Ewell & Jones, 1996; Pascarella & Tenenzini; 2005). There is decidedly less research available on the extent to which international students engage in American universities &
colleges (Zhoa, Kuh, & Carini, 2005; Yebei, 2011; Korobova, 2012). In the United States, international students face academic, cultural, and financial challenges. These challenges pertain to adjusting to the new roles, academic demands, homesickness, language barriers, financial problems, lack of social skills, and lack of assertiveness (Barratt & Huba, 1994; Charles & Steward, 1991; Hayes & Lin, 1994; Poyrazli et al., 2002). International students face both the common campus experience that may also be experienced by American students, and unique challenges due to the differences in culture, language limitations, perceived discrimination, and much more. The only existing study on international student engagement is focused on their academic achievement at American institutions (Zhoa, Kuh, & Carin, 2005).

Most studies of the transition to foreign universities focus on difficulties adapting to a foreign way of living as well as a new learning environment. Naidoo (2007) suggested that factors such as increasing tuition fees and foreign exchange rate movement affected international student enrollment at American higher education institutions. Students aspiring to study in foreign graduate institutions may have different expectations when selecting their university of choice (Shah & Latino, 2006). Thus, instead of trying to create a common approach to attract international students, institutions may be better served to develop international student recruitment based on students’ socio-economic backgrounds. Also, even after the student is already in the United States enrolled into a program of their choice, universities must continue to provide them not only with a campus experience that will facilitate their overall socio-economic and academic development, but also should emphasize specific experiences they can offer based on the field of study, since expectations and needs of students can vary by their specializations. Researchers have noted that many non-native, English-speaking international students who decide to move to new a country and new culture in order to progress in their field of study, tend
to face and experience challenges while they try to engage themselves in various social and academic activities within the university environment (Abe, Talbot, & Geelhoed, 1998).

According to the study done by Zhao, Kuh and Carini (2005), a comparison was made between international and American students in areas such as personal development, student learning, and their perception regarding whether the university environment is satisfactory enough in meeting their academic and social requirements. The study revealed that international students tend to focus more on academia compared to American students in their first year, and report more achievement in their desired college outcomes, though their engagement tends to show a similar pattern to that of American students as they reach their senior year. Korobova & Starobin (2015) found that as compared to American students, international students scored somewhat higher on reporting a supportive campus environment and enriching educational experiences. Studies done by Zhao, Kuh, and Carini (2005), Korobava (2012), and Korobova and Starobin (2015) find that “by their senior year, international students tend to be more adapted to the cultural milieu and generally do not differ from American seniors in their patterns of student engagement” (Zhao, Kuh, and Carini, 2005).

International students are vital constituents of a student community; they bring diversity and socio-cultural richness to the campus environment and the academy (Tan, 1994). However, since international students come from such diverse backgrounds, they have dual experiences to go through, unlike American students. Not only do they face the typical campus experience and challenges that a domestic student encounters, but international students experience additional challenges on account of differences in their background arising from to their home culture, language skills, race, ethnicity, and other factors. In the United States, international students face academic, cultural, and financial difficulties. These challenges pertain to the new roles, academic
demands, homesickness, language barriers, financial problems, lack of social skills, and lack of assertiveness (Barratt & Huba, 1994; Charles & Steward, 1991; Hayes & Lin, 1994; Poyrazli et al., 2002). Thus, beyond the adjustment challenges faced by international students, this study intends to understand international students’ engagement at American universities and colleges and to uncover whether their engagement varies based on the program/field they selected – STEM or non-STEM majors.

As per the report prepared by the National Math & Science Initiative, it is expected that job creation in STEM areas over the next ten years will have significantly higher growth as compared to non-STEM jobs: STEM jobs are expected to show 17 percent growth, which far outpaces non-STEM job growth of 9.8 percent. It is expected that only 20 percent of the workforce will possess the skill set required for almost 60 percent of jobs in the 21st century (National Math & Science Initiative). In the year 2018, the United States is expected to have a shortfall of around 3 million high-skilled workers needed in the job market. And two-thirds of these jobs will require candidates to have some form of post-secondary education (National Math & Science Initiative). We note two programs that have been designed and launched to enhance the ability to hire, recruit and retain STEM students: Educate to Innovate Campaign in 2009 and a five-year plan named “Federal Stem Education 5-Year Strategic Plan” (National Science and Technology Council, 2013; The White House, 2009).

A number of important studies focus on both STEM as well as non-STEM undergraduate students, because in order to increase enrollment of STEM graduates, it not only requires recruiting more and more students in STEM programs, it is equally important to retain existing STEM students (Brown et al 2015a; Brown et. Al 2015b). In order for U.S. colleges and universities to maintain their cutting edge and lead in scientific research and knowledge, they are
compelled to rely more and more on the international student community in STEM programs and retain them as researchers as there is a noticeable shortage of skilled domestic students in STEM areas (Cantwell & Lee, 2010). Most of the international students choose to study in STEM fields, but not little research has been done on the overall involvement and engagement of these students. Though recent data identifies a pattern of an increasing STEM enrollment (Council of Graduate Schools, 2007), little is yet known about the real experiences faced by STEM major international students (Le & Gardner, 2010). Thus, the present study advances the literature and focuses on international student engagement based on their field of study, i.e., STEM vs. non-STEM programs. 2015 National Survey of Student Engagement (NSSE) data will be utilized to better understand American and international students in STEM vs. non-STEM programs. The comparison between American and international students can provide insight into how much these two student populations are similar and different. These findings can help counselors, professors, advisors, and international student offices to understand better and assist these students, so that specific engagement issues of each group can be addressed adequately.

**Research Questions**

1. How is the engagement level distributed among international and American students?

2. Does the relationship between international student status and engagement differ by STEM vs. Non-STEM majors?

3. How is the relationship pattern different or similar across the freshmen and senior cohorts?

For the first research question, descriptive statistics will be used to examine the engagement distribution among international and American students. For the second research
question, multiple regression analysis with interaction effects will be used. The relationship between international student status and engagement will be examined to understand whether student engagement significantly differs for STEM and non-STEM majors. Subsequently, other determinants of engagement will also be examined, including whether student attributes (gender, race, GPA, student employment status, and residential status) and institutional characteristics (institutional control, size, and classification) impact international student engagement. For the third research question, the relationship between international student status and engagement for the 2015 NSSE freshmen and senior cohorts will be examined.

**Significance of the Study**

International student enrollment in American universities, especially in STEM programs, is of importance to the United States for various reasons (Le & Gardner, 2010). First, the monetary contribution such students make helps America retain cutting edge advantage in scientific research and innovation over other nations (Vaughan, 2007); second, international students who acquire advanced skills in STEM fields can provide further development efforts in their home countries and advance their home economies, which in-turn benefits the United States in terms of foreign trade and investment (The National Academies, 2005); and finally, the familiarity of international students with democratic ideals and free market principles plays a key role in U.S. foreign diplomacy and international relations, as they become future leaders (Kotkin, 1993; Waters, 2006). Thus, it is essential to examine international student status and engagement at American universities and colleges and determine whether they vary by STEM and non-STEM majors. It is important to study international students in STEM and non-STEM majors as separate groups; this knowledge can help counselors, professors, advisors, and
international student offices to understand better and assist these students, so the specific involvement and engagement issues of each group can be addressed adequately. Thus, one of the key objectives of this study is to understand better the status and engagement of international students, and whether they vary by STEM and non-STEM fields at American higher education institutions.

Given the persistently high enrollment of international students across different majors, American universities and colleges are developing an awareness of the challenges faced by students in a variety of fields, and thus should ensure that effective and enriching experience is provided to all international students. According to research done by Schmitt et al. (2003), where there is a perceived sense of rejection observed by international students in their host college environment, it was noticed that such students tend to develop a group-based identity for themselves based on the shared rejection they experience. As a result, it becomes critical that apart from the overall social and academic development of the students, educational institutions also need to pay attention to mental health needs of international students (Schmitt et al., 2003). International student services and counselors have also realized that international students enrolled in different programs/fields may be differently engaged in their academic field and hence they may need to be counseled differently. Specifically, we still do not have a good understanding of whether, and if so, how international students in STEM and non-STEM fields may experience differences in their engagement in colleges.

The university environment can be made more receptive and welcoming for international students. International student experiences can be distressing for some students who face social exclusion, language and cultural barriers, racism, lack of interaction with nationals, and other challenges, such as homesickness. International students who are unable to find social, cultural,
and economic support become more vulnerable to social exclusion (Sherry et al., 2010).

Universities that only focus on the academic needs and requirements of international students, tend to ignore the other potential factors affecting the adjustment of these students in educational institutions (Tidwell & Hanassab, 2007; Sherry et al., 2010). A welcoming college and university, therefore, is a crucial factor in the mental and psychological well-being of an international student (Sümer et al., 2008; Sherry et al., 2010). Special programs and initiatives are required to help international students cope with perceived discrimination and establish a good relationship with American students. Establishment of cultural and social exchange-based campus programs between international students and American students could facilitate bridging the social and psychological gaps between international and host country students.

This study looks at the engagement of international STEM and non-STEM students and compares those results with American STEM and non-STEM students, since engagement is of equal importance and significance to both international and American students. Engagement further improves student retention, which eventually contributes positively towards a skilled and better-prepared workforce in STEM and non-STEM fields. Looking at earlier studies focusing on American STEM students, I find that student enrollment in most STEM programs has gradually increased over the past decade (NSF, 2017). However, research also highlights the fact that amongst the undergraduate American student population, only 28% of undergraduates seek out STEM majors (Chen, 2013). Also, if we dig deeper, attrition is observed to be high amongst American students who decide initially to choose a STEM major: a study shows that almost 48% of such students either choose to change from a STEM to a non-STEM program, or decide to leave college altogether (Chen, 2013).
This study assesses the efforts of university and college faculty and administrative staff with regard to international student participation in the college setting, and compares it with that of American students in STEM and non-STEM fields, in order to provide guidance on how to engage and intervene to improve international student experiences while they pursue their educational goals in the United States. International students who stay and persist in their programs in U.S. colleges, tend to observe and convey elevated satisfaction levels with their educational experience. Critical factors impacting student satisfaction, listed in order of importance, are as follows: the quality of student relationships with other students or college faculty/staff, institutional practices with regard to international students, the level of academic challenges, and finally, an increasing and high level of student-faculty interaction (Korobova & Starobin, 2015).
CHAPTER 2 – LITERATURE REVIEW

Students who are deeply engaged in various activities offered by the institution tend to have a higher probability of persistence and graduation. Student persistence is more likely based on engagement in educational activities, irrespective of whether they participate in them inside the classroom or outside the classroom. This has been substantiated and documented by several researchers focused on higher education (Astin, 1975, 1993; Braxton, Milem, & Sullivan, 2000; Milem & Berger, 1997; Pascarella & Terenzini, 2005; Tinto, 1993, 2005). A direct, positive impact has been noted of student engagement on student outcomes (Astin, 1993; Pascarella & Terenzini, 2005; Tinto, 1993). Hence, student engagement can be used as an effective tool by colleges and higher education institutions to evaluate the efficacy of the educational practices currently in use by the institution and further fine-tune them to encourage students to be more engaged in the social and intellectual settings.

Based on the findings of research done on student engagement and the role it plays in student success and outcomes, it is important to explore what affects or leads to student engagement. With that perspective in mind, this study will focus on factors that can impact and lead to international student engagement in STEM and non-STEM fields. The objectives of this literature review are (a) to identify how student engagement is defined and measured; (b) to review theories that have been used to guide research on student engagement; (c) to critically review the literature and synthesize what factors have been found to predict student engagement; and (d) to identify gaps in the prior literature regarding research on international student engagement in STEM & non-STEM fields.
To rephrase these aims, this literature review will address five main areas that are significant to this study. First, define and measure student engagement; second, review the literature on international status and student engagement; third, review a conceptual framework of student engagement research and theories that have guided studies on student engagement; fourth, review the literature on STEM & non-STEM majors and student engagement; and fifth, review the literature on other determinants of student engagement and engagement as the outcome variable. In conclusion, the conceptual framework will be proposed to research international and American student engagement in STEM & non-STEM fields. Since this study concentrates on international students enrolled at 4-year institutions, the literature review will also emphasize and further provide research on student engagement at 4-year institutions.

**Defining & Measuring Student Engagement**

**Definition**

As broadly defined, different researchers can interpret engagement differently. According to research done by Wolf-Wendel, Ward & Kinzie (2009), there seems to be a significant overlap regarding the concepts of student involvement, engagement, and integration, and they have been used interchangeably while applying them in research and practice. In their 2005 book on the impact of college on students, Pascarella & Terenzini’s used the terms student engagement and involvement interchangeably, making little distinction between them. Vincent Tinto also suggested “it is hard to see how involvement and engagement differ. They are used together.” (Wolf-Wendel, Ward & Kinzie, 2009). For this study, the terms student engagement, involvement, and integration are used interchangeably to define the student engagement outcome.
Student engagement is defined as having two aspects; one is from the student's perspective, which relates to the vigor and intensity with which students spend their time on educational activities and tasks, either inside or outside of the classroom. The other aspect of engagement is from the institutional perspective, which concerns the various programs and educational policies that colleges put in place to attract more students to be more participative in such activities and encourage them to take full advantage of such programs (Kuh, 2003). Astin’s theory of involvement has been a seminal research study for over two decades on student engagement (Hernandez et al., 1999; Moore et al., 1998).

Irrespective of how engagement is defined, research shows that the more a student is engaged on campus, the more likely such a student will have positive experiences such as satisfaction, retention, etc. (Astin, 1993; Kuh et al., 2001a; 2008; Pascarella & Terenzini 1991, 2005; Tinto 1993). The concept of student engagement has emerged over several decades based on research done by several researchers on understanding how educational practices of an institution in conjunction with student behavior can have an impact on student learning. Initial research in this area was primarily focused on understanding several behavioral attributes shown by students and how such characteristics influence their overall learning and educational performance. Pace’s work (1980, 1984) emphasized that progress shown by students has a positive correlation with the time and quality of effort spent by the students on educational tasks. During the same time period, Astin’s student involvement theory stated that more involvement is better for positive student outcomes. But he also stated that there are “limits beyond which increasing involvement ceases to produce desirable results and can even become counterproductive” (Astin, 1984; 1999, p.528).
Measure

Student engagement can be measured by the extent to which students are getting involved in purposeful educational and informational tasks offered by the college and how well they can adjust to the educational institution’s social as well as intellectual settings (Astin, 1984, 1999; Khu, 2001b, 2003, 2009; Marti, 2009; Pace, 1984; Pascarella & Terenzini, 2005). In the “Seven Principles for Good Practice in Undergraduate Education” study done by Chickering and Gamson (1987), they highlighted possibly the best known and most extensively utilized seven indicators of student engagement, which are as follows:

1. Encouragement of contact between student and faculty
2. Encourage discussion and cooperation among students
3. Support for active learning
4. Provide necessary and timely feedback to students
5. Emphasizing the importance of time on task
6. Setting and communication of high expectations
7. Respect for diversity in talents as well different means of learning

NSSE engagement themes and indicators incorporate and confirm good practices in undergraduate education (Chikering & Gamson, 1999). The seven principles as proposed by Chickering and Gamson (1999) that reflect the best indicators of student engagement have been extensively utilized in various studies and research to formulate new research methods and build a repository to evaluate student engagement in higher educational institutions. First, the repository was a student inventory in which students were asked to judge themselves against each of the seven principles and provide their self-rating against each principle. Another
advanced method that still is utilized by multiple educational institutions is the Questionnaire to rate College Student experience that includes various factors and indicators that are easily modifiable to represent and provide a measure against seven principles of student engagement (Chickering & Gamson, 1999).

As effective measures of student engagement evolved through earlier and more recent studies, measures which can influence and provide predictions on student learning and outcomes, scholars of higher education institutions mutually agreed on building a “comprehensive assessment tool.” One big advantage this tool can provide is for colleges and institutions to make two-fold assessments: first, find a mechanism to measure student engagement levels, and second, evaluate and judge the usefulness of the educational policies and practices followed by the institutions. One key result of this massive undertaking by the educational leader in building an assessment tool came out to be the National Survey of Student Engagement (NSSE), a survey utilized by all four-year colleges in the nation to make a measure of student engagement (Kuh, 2001a). NSSE in recent times has been designed to evaluate and understand the level at which students are getting engaged in pragmatism-based education practices followed by colleges, and to understand what are the benefits students can derive from such engagement with the college environment and experience (Kuh, 2001a).

NSSE measured engagement based on four main themes and ten engagement indicators. These four themes are: academic challenge (which includes higher-order learning, reflective and integrative learning, learning strategies, quantitative reasoning); learning with peers (includes collaborative learning, discussion with diverse others); experience with faculty (includes student-faculty interaction, effective teaching practices); and campus environment (includes quality of interactions and supportive environment engagement indicators). NSSE states that “Student
engagement represents two critical features of collegiate quality… The first is the amount of time and effort students put into their studies and other educationally purposeful activities. The second is how the institution deploys its resources and organizes the curriculum and other learning opportunities to get students to participate in activities that decades of research studies show are linked to student learning” (NSSE, 2017). In the current study, student engagement is the dependent variable and how international student status and international student major (STEM vs. non-STEM) influence student engagement will be examined. In 2013, NSSE reorganized their questionnaire, and now ten engagement indicators fit within four engagement themes that were adapted from the previous five NSSE benchmarks of effective educational practice. Before the modification, the questionnaire included five NSSE benchmarks as the engagement variables, including Level of Academic Challenge (LAC), Active and Collaborative Learning (ACL), Student-Faculty Interaction (SFI), Enriching Educational Experiences (EEE), and Supportive Campus Environment (SCE).

There are other studies where researchers used student engagement as the dependent variable. For example, Ghusson (2016) examined the five NSSE benchmarks for transfer students to determine whether transfer student status and type matters for student engagement. In 2012, Galladia reviewed five student engagement benchmark indicators pertaining to students enrolled in a public university in an urban environment who do not stay at the campus. The results of that study indicated that seniors experienced a more enriching and fulfilling educational setting as compared to the first-year students at the university, which could be one of the reasons for seniors to persist and complete their program.

In 2008, Johnson sought to gauge and forecast persistence for students coming from private Midwestern colleges, utilizing the core element of recognizing and identifying the NSSE
socialization clusters. The dependent variables considered for this study were two of the NSSE benchmarks namely, “student-faculty interaction” and “supportive campus environment,” while persistence, which was reviewed in the study was taken as an independent variable. Lastly, O’Dair (2012) utilized the NSSE version meant for master’s degree students, namely MSSE (Master’s Survey of Student Engagement). In this study, the findings revealed that out of five NSSE benchmarks for engagement of master’s students, three of those dimensions, one being academic discipline, had a stronger correlation with student characteristics as compared to the other two.

**Review of Theories Guiding Student Engagement Research**

The birth of student engagement theory can be attributed primarily to the research work done by Pace (1979) and Astin (1984). Additional scholars provided further essential and significant contributions to the subject and study of student engagement, including George Kuh and Gary Pike (Pike & Kuh, 2005). Also, with time, there were subsequent terms that emerged from the research work became associated with student experience within the college environment, such as student engagement, student persistence, and student involvement. However, irrespective of the research term that is used, the core concept that each student’s learning is directly linked to what the student does and how he/she performs within the college environment (Pike & Kuh, 2005) remains the same for all the above terms. To maintain consistency amongst the practical/empirical and quantitative studies conducted by researchers, there seems to be an implied agreement to use the term student engagement. Therefore this study will also use the term student engagement. Student engagement theory has evolved by incorporating ideas from various theories and research such as Pace’s (1980) theory on the

Pace’s Quality of Effort

Pace’s Quality of Effort theory (1979, 1984) was one of the initial theories to get recognized in student engagement research. The College Student Experience Questionnaire (CSEQ) was constructed as part of this research and was an initial effort to assess student performance. According to Pace, “accountability for achievement and related student outcomes must consider both what the institution offers and what the students do with those offerings” (1992). Thus, it is a combined effort from both the institution and the student. Institutions need to provide enough opportunities for student development and growth, and students need to get more engaged and avail themselves of the opportunities offered. Pace also suggested that the individual characteristics shown by students, as well as achievements in their academics, do not have as much impact on their persistence when compared against student engagement with the college environment and experience, and how much they participate in college educational tasks and other activities.

Student learning at higher education institutions depends highly on the “quality of effort” they put in. Pace mentioned in his theory various types of academic and social engagement variables, such as library experiences, experiences in writing, participation at the student union, interactions with faculty, and other. Pace’s theory on the Quality of Effort enriched the understanding of student engagement.
Astin’s Student Involvement Theory

Astin’s (1984) theory of student involvement has had a noteworthy influence on the development of the student engagement theory. Expanding on Pace’s (1979) Quality of Effort theory, student involvement theory focused on the factors that impact student engagement, such as time on task, faculty interactions, interactions with peers, and how these factors favorably impact educational outcomes. Astin (1984) mentioned, “It is not so much what the individual thinks or feels, but what the individual does, how he or she behaves, that defines and identifies involvement.”

Astin’s theory of student involvement offered five basic postulates: (a) Student involvement can many times be referred to as the extent to which they expend their physical and psychosomatic vigor into various aspects of the college experience. These different facets of college experience could be sometimes very generic, such as overall experiences on campus, and sometimes be very specific, such as getting ready for their academic examinations; (b) Irrespective of which aspect we talk about, student involvement tends to occur over a range of facets. For example, the same set of students could showcase a varied level of involvement in different aspects over different times, and likewise a diverse collection of students would depict varied involvement levels for a given point; (c) Both qualitative as well as quantitative characteristics can be associated with involvement. As an example, a qualitative assessment of student involvement in academic assignments would be to assess whether a student is reading and reviewing and evaluating/analyzing the reading assignments given as compared to whether this student is just looking at the reading material while his/her mind is wandering on different thoughts. In contrast, there are characteristics by which involvement can be measured quantitatively, such as actual time a student spends on reading assignments; (d) Educational
programs that can report higher levels of learning for students and their personal development will show a direct correlation with the level of student involvement in that education program both in terms of qualitative and quantitative participation; and (e) The more an educational policy can enhance the level of student involvement, the more effective such educational policy can claim to be.

Astin’s theory on student involvement (1984) highlights that more students spend their physical, emotional, and social energy on various educational tasks and activities within the institution, the more it will have a positive impact on their learning and overall personal development. Involvement in institutional activities includes activities such as frequent interaction with faculty and peers and actively partaking in student groups and social organizations within the institution. Astin’s theory of involvement places emphasis on what an individual student does rather than on how he or she thinks or feels; it focuses on the actual time spent on curricular tasks like assignments, homework, etc., and extracurricular activities such as time spent on graduate clubs, fundraising activities. Extensive research has been done on the student involvement theory with different student populations and in different settings to understand why students get involved and whether such involvement improves their academic outcome and experiences at higher education institutions. According to the theory of student involvement by Astin, one of the most critical resources that an institution may have is student time. The more time students spend on and gets involved in college activities that are designed to assist the student achieve his/her academic and individual development goals; the more such students achieve those developmental and educational goals (Astin, 1984). This highlights the criticality and importance of college activities and programs designed by the college, which can encourage the student to be more involved and hence help them achieve greater success.
One of the most robust and influential college impact models is the input-environment-outcome (I-E-O) model proposed by Astin (1970a, 1970b). The Input-Environment-Outcome model aims to act as a most comprehensive model that provides a conceptual and a methodology-based guide to study college effects. “Inputs” comprises various characteristics that students natively bring to the college environment by their family background, cultural background, educational background, their social experiences, and other demographic characteristics such as region or country of origin. “Outcomes” are the skills, values, beliefs, attitudes, and other student characteristics such as behaviors, confidence, and social interaction ability that remains with the student after college. While it is certain that input factors have a direct influence on the outcomes, however, outcomes are also greatly influenced by the “environment” students experience within the institution. Anything and everything that happens in college that can help shape the outcomes is “environment” from the student’s perspective.

A vital feature of the institutional environment is that it not only includes typical institutional measures such as curriculum structure, majors offered, faculty mix, and other institutional characteristics, but it also includes other aspects that encourage students to get involved or engage with the institutional environment. Astin refers to these other aspects as individual involvement measures, which comprise student involvement in academics, involvement with faculty, interaction amongst peers, and involvement in work.

In the student departure model presented by Tinto (1993), two critical factors signify and characterize student involvement: academic integration and social integration. Both academic and social integration are denoted as the degree to which students share the academic values and social norms and culture of the institution. This social and academic internalization typically happens mostly through interaction of students with their peers and faculty members, which act
as socializing agents within the institution. Positive experiences of academic and social integration encourage a stronger commitment to the educational institution and hence lead to higher chances of student persistence. While, on the other hand, negative integration experience can weaken the morale of students, and therefore, students may feel less commitment toward the institution and may switch majors or decide to depart the institution.

How does a student endures his/her experience with college academic and educational policies, and communities can be defined as “academic integration.” The active participation of students in classroom tasks, as well as how effective their learning is within the classroom, greatly influences their “academic integration.” Thus “academic integration” should not be misconstrued and interchangeably used with students’ classroom participation and effective learning, as they are merely precursors to “academic integration,” and hence, can be important influences on “academic integration,” rather than being interpreted as “academic integration” itself (Braxton et al. 2000).

According to Tinto (1997), the classroom is one place that facilitates and ensures “social integration.” The classroom provides a conduit all students can use to get involved in various educational and academic activities, as well as provide a window for students to interact with other students, form social relations, and participate in college social settings (Tinto, Goodsell, & Russo, 1993). As a result, the classroom can be viewed as a great influence on the institutional approach towards setting up programs and practices and can also affect “social integration” and persistence.
Review of Literature on International Status and Student Engagement

An international student, as defined by the Council of Graduate Schools (2007) is a “person who is not a citizen, national, or permanent resident of the U.S. and who is in this country on a visa or temporary basis and does not have the rights to remain indefinitely.” America ranks top in the world in terms of enrolling the highest number of international students in American colleges and universities (U.S. News & World Report, 2000), however most of the studies and research reports primarily present views on various challenges these international students experience in adjusting to a foreign culture and new ways of learning offered by the educational institutions (Cadman, 2000; Perrucci & Hu, 1995; Ridley, 2004; Robertson, Line, Jones & Thomas, 2000). Simply because international students are enrolled and attend colleges abroad does not automatically indicate that there will be positive outcomes in the learning experience of international students. While the presence of international students at colleges and universities is perceived as an enriching factor (Araujo, 2011), not much is currently known about international student engagement and how they integrate and engage themselves into institutional social and academic practices (Korobova & Starobin, 2015). This lack of awareness about international student engagement may disguise any gaps that international students may perceive when they come in contact with various program structures as well as other educational policies and activities offered by the colleges.

It is noticed that international students who experience a robust social setting show a much smoother, quicker, and relatively less challenging adjustment to the foreign country’s cultural and academic environment (Al-Sharideh & Goe, 1998; Boyer & Sedlacek, 1988; Schram & Lauver, 1988). There is strong inclination noticed amongst international students to befriend other students who come from the same country as them, and they tend to make fewer friends
with students coming from other countries (Eurnham & Alibhai, 1985). But on the other hand, international students who manage to make their friend circle inclusive of international students show much ease in adjusting to the foreign college environment and adapt to the new surroundings (Bochner et al., 1977; Eurnham & Alibhai, 1985). Grayson (2008a) found that domestic and international students were equally engaged in campus activities, but international students were missing the additional academic support that domestic students received. It may be possible that international students compensate for less than fulfilling social life by getting deeply involved in academics and spending more significant time and effort in academic tasks. However, research has, thus far, shed little light on the degree to which these students tend to engage in other educational activities and practices offered by the institutions – educational practices that several studies show to have a positive impact on learning outcomes, and social and personal development of students (Chickering & Gamson, 1987; Ewell & Jones, 1993, 1996).

A small number of studies have addressed international student engagement, and among those, very few used a quantitative approach to understand the international student population (Korobova, 2012; Zhao, Kuh, & Carini, 2005). The study mentioned above by Zhao, Kuh, and Carini (2005) compared international and American students with regard to personal development, student learning, and their perceptions about whether the university environment is meets their academic and social requirements in a satisfactory way. The study revealed that international students tend to be more engaged in academics, student-faculty interaction, and technology usage, compared to American students. However, compared to American students, international students were less engaged in community services and socialization with other students (Zhao, Kuh, and Carini, 2005). In the Korobova (2012) study, international student
seniors as compared to American student seniors, scored higher in cultivating and enriching educational experiences as well as supportive campus environment.

As limited research is available about international student engagement in the United States, it challenging to know whether international students have a high degree of interaction with other students and faculty members and if they feel satisfied with the social and institutional setting of a foreign university and to what extent they participate in various meaningful academic and educational engaging tasks offered by the college. Also, it is possible that during their initial years abroad, international students could be challenged by an inability to interact with others or to adjust to a foreign institutional setting. It would be exciting to see whether the international student engagement pattern changes over time, from freshmen to senior years. It is plausible that with time international students could acclimatize themselves with their surroundings and people, and thus could potentially show different engagement behavior. Does students’ sociocultural background have an impact on their willingness to be more forthcoming or restrained in interacting with students from other cultures? If information such as this could be provided to the researchers at these institutions, as well as to the college administrative staff, faculty members, and student organization bodies, it could provide better insight and justification for refraining from a “one size fits all” approach. It could bring about changes in existing programs and activities to create a more positive experience and outcomes for freshmen and senior international students, and further improve the educational quality offered to all international and American undergraduate students.
Review of Literature on STEM & Non-STEM Major and Student Engagement

Lichtenstein et al. (2010) stated in their study that there is a significant dearth of studies that could highlight effects on student engagement and student outcomes based on academic majors, different curricula structures, and instructional methods being pursued by students. It is extremely rare to see a comparison in experiences of STEM versus non-STEM major students. Further research and exploration into student experiences based on their academic majors can provide useful insights and inputs to curriculum structure, and program features that either can attract or discourage students into such programs (Lichtenstein et al. 2010).

In a 2008 study by Ohland et al., a comparison was made in student engagement in undergraduate engineering and other college majors. Although engineering students rated themselves lower than the other majors regarding student personal and social development, general education awareness, and integrative as well as contemplative learning, however, when they rated their practical learning and competence, they rated themselves highest compared to other major students. While looking at all other engagement variables such as educational experience enrichment and time spent on various tasks, students from engineering majors do not stand out regarding the quality of their engagement level as well as the persistence rate when compared to students from other majors.

The findings of Lichtenstein et al. (2010) on student engagement were similar to the results of a study done by Ohland et al. (2008) on engagement based on students from different academic majors. Lichtenstein et al. (2010) study also relied on NSSE data along with additional analysis based on Academic Pathways Study of the Center for the Advancement of Engineering Education and the Multiple-Institution Database for Investigating Engineering Longitudinal Development. The Lichenstein study revealed that engineering students are as engaged as other
students from other majors, but as compared to other majors their engagement level was highest in “practical competence” and was lowest in “personal and social development, gains in general education, reflective learning, and integrative learning” (Lichtenstein et al., 2010, p. 274).

Based on analysis of National Survey of Student Engagement (NSSE) data, Lichtenstein, McCormick, Sheppard, and Puma (2010) found that most of the student engagement measures amongst engineering students and non-engineering students were similar, although the study highlights two glaring differences. The first significant difference was high levels of “Gains in Practical Competence” and “Practical Experience” amongst engineering and STEM major students vs. non-STEM major students. A second stark difference was noticed in low scores of engineering major students in “Gains in General Education” and “Gains in Personal and Social Development” (Lichtenstein, McCormick, Sheppard and Puma, 2010, p. 313). Thus, Lichtenstein et al. concluded that the rigor associated with engineering courses and curriculum design create an environment for students where they are forced to choose between building skills versus other “educationally enriching experiences” (p. 314). Participants of a nationwide study, which surveyed Black professors in STEM fields, stated that their success was heavily dependent on mentoring and advising (Griffin, Perez, Holmes, & Mayo, 2010).

A study done by Brint, Caswell and Henneman (2008) indicates that there are two notions of student engagement prevalent across college campuses – one that is associated with arts, humanities, and social sciences that lays more emphasis on student participation, interactivity, and fondness for the subject and ideas, versus a second notion, that of sciences and engineering, which focuses mainly on quantitative skill building achieved through a collaborative approach and intended to lead to eventual rewards in the labor market. In conclusion, the research indicates that the type of academic major does have an impact on
student educational experience and their level of engagement. Thus, more research in this field is necessary to further enable institutions to create program structures that could lead to a positive impact on student engagement and experience. Although survey data provided by NSSE may not directly assess student learning outcomes, it provides necessary and relevant inputs that every university can use to further its efforts in enhancing and improving the undergraduate student experience (Kuh, 2001a). The basic engagement concept is straightforward. The more students try to study and educate themselves in a subject, the better their learning tends to be. Similarly, the more students seek reviews and feedback on their writing and analysis, the more adroit they become. (Kuh, 2003).

Astin’s ongoing research focuses on the development of students pursuing higher education by utilizing wide-ranging surveys conducted on first- and fourth-year students over a period of forty years. It has revealed some conclusive details about engineering students. In his study “What Matters in College? Four Critical Years Revisited,” Astin (1993) concludes that a student’s major plays a very influential factor in the environment he/she experiences. Astin states that “engineering produces more significant effects on student outcomes than any other major field” (p. 371). There was a positive correlation between the engineering major and the strong analytical skills (p. 237) as well other job-related skills (p. 240). On the other hand, a negative correlation was noticed in terms of overall student satisfaction when it comes to the college experience, student contentment with the curriculum design and instruction methods, and also with the diversity-oriented developmental aspects (p. 306).

Typically, the research studies that do provide a comparison of student experience based on academic majors are either limited to a single institution or tend to include small sample sizes or may consider a limited number of majors (Lichtenstein et al., 2010). Therefore, there is a
dearth of research looking into student engagement of international students by field of study – STEM and non-STEM.

**Review of Literature on Other Determinants of Student Engagement**

The theoretical concepts discussed earlier on student engagement, which resulted in various practical frameworks, has streamlined the concept of student engagement. The new empirical frameworks on student engagement provide necessary proof and essential tools to measure student engagement and have indicated that international student status, STEM/non-STEM majors, along with other student and institutional characteristics, has an impact on student engagement. Student engagement factors consist of two main categories: the first includes student attributes, such as international student status, the major/field of study (STEM or non-STEM), GPA, employment status, and residential status; and the second, includes institutional characteristics such as institutional leadership, size, and Carnegie Classification. Astin (1993) noted that student characteristics correlate with the student engagement and education outcomes. Student engagement relates to how much time and effort each student dedicates to his/her studies and various other involvements and activities while at college, which can impact on their outcomes and success (NSSE 2017).

According to research findings since the early 1990s, a high level of student engagement is attributable to specific educational practices and college policies adopted by higher education institutions (Astin 1991; Chickering & Reisser, 1993; Pascarella & Terenzini, 1991). The following review of student engagement literature includes student attributes (gender, race & ethnicity, grade point average (GPA), employment status & residential status) and institutional characteristics (institutional leadership, size, and classification).
Student Attributes

Gender

Prior studies demonstrate that gender is an indicator in student engagement. Sontam & Gabriel (2012) analyzed differences in student engagement experiences based on background factors such as gender and race. This study revealed that the student engagement pattern does differ based on gender: females show higher student engagement compared to males. Astin (1993) studied gender differences to better understand people who come from diverse ethnic and racial backgrounds. The study revealed that females are more inclined to make themselves aware of the differences between cultures and to understand intricacies associated with different ethnicities and races, as compared to males. Several other studies substantiate the finding that men are more hesitant to engage themselves with others from a different race and religion, as compared to women who are more open to individuals from other races and ethnicities (Hu & Kuh, 2003). According to a study done by Hu and Kuh (2002), when all aspects are considered, female students show higher levels of engagement as compared to male students. The study, which designated gender (i.e., “male,” “female,” “transgendered,” and “other”) as a categorical variable, showed that male students achieved less than an average score based on CSEQ’s measures of student engagement.

Race & Ethnicity

A study by Sontam & Gabriel (2012) revealed that the engagement pattern differs based on background factors such as race and ethnicity and gender. For instance, their study revealed that African American descent students tend to be more engaged compared to all other races put together. There are also significant differences noticed regarding levels of engagement based on
what ethnicity student belongs to. Research has suggested that amongst various ethnicities, the highest level of engagement is demonstrated by African American students while Hispanic and Latino students demonstrate the lowest levels of engagement. The engagement levels for White and Asian students lies somewhere in-between African American and Latin/Hispanic students (Temkin, 2005).

Zhao, Kuh, and Carini (2005) examined the influence of race and ethnicity on student engagement amongst international students. Their study categorized ethnicities into Asian, White, and Black. The study revealed that in comparison to Black international students, Asian international students reported less satisfaction in their educational experiences and showed lower advancement in the field of general education. Also, Black international students showed greater gains when compared to their fellow White students concerning various aspects of student engagement such as “academic challenge, active and collaborative learning, student interactions with faculty, and service learning in the senior year” (Zhao, Kuh, & Carini, 2005).

One study, which included students from multiple races and ethnicities, found that amongst all races, students belonging to African American race experienced the most negative relationships in their faculty interactions, compared to students from Latino/a or Asian Pacific ethnicities. However, all three ethnicities -- African American, Latino, and Asian Pacific students combined, perceived more negative relations with faculty when compared to white students (Ancis, Sedlacek, & Mohr, 2000). African American students more frequently reported that faculty tended to undermine their academic ability and caliber (Fries-Britt & Turner, 2001) including the students who had shown higher levels of achievement (Fries-Britt, 1998). In contrast, Native American students indicated that their culture was not valued as much and was
undermined significantly, which resulted in them feeling disengaged from the campus setting and university (Garrod & Larimore, 1997).

As several studies have shown that race and ethnicity of students influences their perceived experiences of student-faculty interaction, and since college faculty is known to play a critical function in student integration with college life (both academically as well as socially), it is imperative to understand the variables that may affect the success criteria, especially for students of color, depending on the extent and quality of their interactions with faculty members.

GPA – Grade Point Average

According to Kuh (2001a), a positive linkage and correlation was observed between grade point averages (GPA) and benchmark scores at the national level. Hence, based on this positive correlation, students with higher engagement levels can potentially achieve better grades and scores. Many studies and data have shown a strong positive correlation between grade point averages (GPA), and the NSSE benchmark scores (Kuh 2001a; Carini, Kuh, and Klein 2006; Gordon, Ludlum, and Hoey 2008). Carini, Kuh, and Klein (2006) stated that there is a positive correlation between nine different NSSE student engagement indicators and grade point averages (GPA), but the impact of the student engagement indicators on cumulative GPA was weak.

In the NSSE survey, students self-reported their GPA. Data gathered through this survey could help researchers and institutions understand the relation between GPA scores and student engagement levels. The research methodology on which NSSE is based upon focuses on the contribution good institutional practices can make towards the expected and desirable student outcomes, and levels of engagement have shown to be correlated with various student outcomes, one of which is GPA.
Employment Status

As the tuition cost for studying at American institutions keeps on rising, more students find it imperative to work on campus. While working with others, students realized that they gained more practical and real-world knowledge as well as a deeper understanding of the labor market and employment opportunities (Cheng & Alcantara, 2007). International students who intend to work can only work on campus due to F1 visa regulation, which states that international students cannot accept off-campus jobs during their first year of enrollment. Even after the first year, off-campus jobs are limited to Curricular Practical Training (CPT), Optional Practical Training (OPT), and STEM OPT (USCIS, 2017). This could make it challenging for international students to find jobs appropriate for their skill set or aligned with their program/field of study as they can only choose from the on-campus jobs posted. However, studies show that one of the most noteworthy college environmental factors for students is having a part-time job on campus, which impacts their retention (Astin, 1984).

Numerous peer studies noted that there is a positive correlation amongst student part-time employment and their educational and social outcomes. They indicate that more students are kept linked and interconnected within the campus environment, and having employment opportunities could potentially improve their academic performance (Brint & Cantwell, 2010; Cheng & Alcántara, 2007; Dundes & Marx, 2006; Pascarella & Terenzini, 2005). However, some research shows conflicting results when it comes to student employment and academic performance. Students working off campus may have negative impact on their academic performance, particularly if their work hours are equal and greater than 20 hours per week (Dundes & Marx, 2006; Ehrenberg & Sherman, 1987; Lundberg, 2004). Thus, number of work hours and on-campus employment do affect student engagement.
Residential Status

Place of Residence is one of the significant college environment factors that impacts student engagement in college. By far, where the student resides (on campus or off campus) has the greatest impact on his/her engagement, specifically with regard to student-faculty interaction, participation in student government, and engagement in sororities and fraternities. Students living on campus have a higher probability of feeling attached to campus life as an undergraduate student since they expend most of their time within the college campus community setting (Astin, Green, Korn & Maier, 1984). According to the four-year study done by Astin (1993) “What Matters in College,” there is a definite impact noticed on student learning and overall personal development based on how well-engaged a student feels in their college, including the vigor and enthusiasm they devote to college life.

It is observed that students who reside on campus tend to have an advantage over off-campus students, as on-campus students have more campus resources at their disposal, they have better exposure to the campus social setting, and thus they feel more integrated into the campus environment. On-campus resident students maintain regular contact and collaboration with campus resources such as dealings with administrative staff, with the financial aid team, interacting with other students on academic class-related matters, going through the registration process, and other requirements of a college schedule. Thus, it can be said that students living on campus are well aware of their campus surroundings, and are “in the know” through the network and resources that are accessible to them, hence this knowledge can help them in their retention (Schudde, 2011).
Institutional Characteristics:

Institutional Control, Size & Classification

According to Pace (1984), students showed a stronger intellectual development and a higher degree of involvement if they were enrolled in liberal art colleges as compared to students who were enrolled in other types of institutions. Typically, colleges would look at key aspects about various student activities impacting student success outcomes and accordingly strategize and spend their resources in creating action plans that would encourage students to come forward and proactively participate and get enrichment experiences from such plans (Laird et al. 2008).

Research shows that student engagement continues to be impacted by institutional attributes such as size, programs offered, as well as the educational and learning students experience in campus and college life (Astin, 1993; Pascarella, 1985; Perna, 2004; Porter, 2006). In their study, Kuh and Hu (2001) reviewed relationships that may exist between student involvement and learning gains achieved as reported on the College Student Experiences Questionnaire (CSEQ) versus the traditional institutional mission such as Carnegie, while controlling for any possible variations due to student background characteristics. The study revealed that the differences noticed amongst students coming from different institution types concerning educational learning gains and student engagement can be mainly attributed to student background characteristics.

Educational institutions can positively affect and have sway on student engagement levels based on various characteristics that institutions have control over, such as programs being offered, college environment and cultural setting, educational policies, and other structural aspects (Astin 1985; Kuh et al. 2005; Pace 1984). Some of the critical institutional characteristics that can have much a more significant influence on student engagement and learning gains are
the institutional philosophy in terms of valuing undergraduate education, and extensive and
deliberate utilization of more pragmatic and practical approaches and practices in undergraduate
education (Kuh et al. 2005; Pascarella and Terenzini 2005)

Proposed Conceptual Framework

There are fewer research studies available on international student engagement, and especially on the relationship between international student status and engagement across STEM and non-STEM fields. Studies that focused on international student engagement did a comparative analysis of international students with American students (Zhao, Kuh, and Carini, 2005; Korobava, 2012; Korobova and Starobin, 2015). Astin’s Student Involvement Theory highlights the significance of various factors essential for student engagement at higher education institutions. As established by previous theories and research, the current study proposes a conceptual framework to test the relationship between international student engagement in STEM vs. non-STEM fields and to test the relationship between American and international student engagement using the latest NSSE data. Prior literature on student engagement shows that factors such as gender, race/ethnicity, GPA (Grade Point Average), employment status, and residential status significantly impact student engagement at higher education institutions in America. This model incorporates an examination of student attributes and institutional characteristics for international and American student engagement that empirical research has shown are essential.
Figure 1: Conceptual Framework

Conceptual Framework: International Student Engagement in STEM & Non-STEM Majors

Independent Variables
- Major/Field
- STEM vs. Non-STEM
- Enrollment Status
- International vs. American Student

Student Attributes
- Gender
- Race
- GPA
- Employment Status
- Residential Status

Institutional Characteristics
- Institutional Control
- Size
- Carnegie Classification

Dependent Variables
- Student Engagement Indicators:
  1. Collaborative Learning
  2. Discussion with Diverse Others
  3. Student-Faculty Interactions
  4. Effective Teaching Practices
  5. Quality of Interaction
  6. Supportive Environment
Conclusio

Student engagement plays a vital role in nurturing and encouraging interactions between peers and facilitating integration into college life and the campus environment (Braxton et a. 2004; Kuh and Hu 2001). Astin (1993) highlighted that student engagement in social and academic attributes of the campus environment could impact aspects of student learning and development. Students who tend to engage with college faculty whether in or outside the classroom also demonstrated improved learning patterns (Pascarella and Terezini 2005).

Earlier studies based on the NSSE data suggested that student engagement for engineering and non-engineering students are not significantly different or dependent on academic major. This study intends to further investigate whether that also holds for international students in not just engineering but in all STEM (Science, Technology, Engineering & Mathematics) fields and compare those results with international students in the non-STEM fields. There is dearth of research studies on international students in STEM vs. non-STEM fields and the variation or similarities they experience based on their academic major. This is a critical shortcoming given that 44% of international students enroll in the STEM fields and 56% of international students are enrolled in non-STEM fields (Institute of International Education, 2015). There is a need to study this, particularly because with the changing political and global factors, engaging international students has become more critical than ever before.
CHAPTER 3 – RESEARCH DESIGN

The purpose of this study is to examine how international student status is related to engagement and whether such a relationship varies across STEM and non-STEM fields. Furthermore, this study also examines whether the pattern is the same across the freshmen and senior cohorts. This chapter starts with an introduction of data sources used for this study, and explains “why NSSE data?” has been considered for this study. It also presents the conceptual model along with the different data variables that are involved in this research, followed by the research methods used, and ends with a summary of the limitations.

The following research questions guided and directed this study:

1. How is the engagement level distributed among international and American students?
2. Does the relationship between international student status and engagement differ by STEM vs. non-STEM majors?
3. How is the relationship pattern different or the same across the freshmen and senior cohorts?

Data Source

NSSE (National Survey of Student Engagement) data has been utilized for this study. NSSE gathers information on a regular basis from first-year freshmen and senior students about their undergraduate experiences at higher education institutions in the United States. The survey conducted by NSSE evaluates and determines the level of student engagement in impactful and efficient educational practices, practices that have functional linkages to student learning and their overall personal development, as well as the expected student outcomes such as persistence, student satisfaction, and graduation. Hence, data provided by NSSE could be invaluable when
researchers seek to assess student experiences in the college environment based on various factors such as academic major, background factors, etc. Thus, NSSE data can be used as an essential and reliable tool that higher education institutions can use to enhance their practices, as well as conduct self-analysis. At the same time, NSSE is also aimed at encouraging educational administrators to be more proactive about college and university quality and awareness. (Kuh, 2001a).

Since its introduction in 2000, more than 1,500 four-year institutions in the United States and Canada have partaken in the National Survey of Student Engagement. In 2015, 564 colleges and universities in the United States and 21 colleges and universities in Canada participated in the NSSE survey. Students are randomly selected during the spring semester to participate in the survey. This survey is managed and facilitated by NSSE along with other administrative offices of participating colleges, such as the Office of Institutional Research or Office of Student Affairs. Each college institutional structure may have different administrative offices and such offices work in conjunction with NSSE to conduct the survey. Also, any survey materials or other forms of communication to students by NSSE must be approved by the Institutional Research Board (IRB) before distribution to students. For research work and activities, NSSE provides a database for analysis purposes based on a 20% sample of randomly selected students. However, any personal information about the students, as well as relevant institutional identification factors are expunged before it is handed over to researchers for further analysis and exploration.

For this study, the 2015 NSSE survey, the most recently available NSSE data, will be utilized for analysis. In Spring 2015 over 315,000 freshmen and seniors from 585 U.S. and Canadian four-year public and private institutions participated in the survey (NSSE Annual
Results, 2015). The average response rate for institutions in 2015 was 29%. The data obtained from NSSE for the present study include a 20% stratified random sample of freshmen and senior international and American students. The final sample includes 743 freshmen and 861 senior international students. NSSE data for the current study includes 4% senior international students and 4% freshmen international students. Although these percentages in absolute terms may appear to be small in proportionate terms, these percentages do represent the proportionate average percentage of international students at higher education institution in America. According to the Open Doors 2016 (Institute of International Education, 2016), international students comprise 5.2% of all student populations in the United States higher education institutions. The 20% stratified random sample of freshmen and senior American students consists of 16347 freshmen and 23,476 senior American students.

Why NSSE Data?

Although the NSSE project’s primary focus is conducting surveys amongst college students, the NSSE project also envisions further encouraging and nurturing the quality of the college environment offered by institutions. The annual survey conducted by NSSE aims to evaluate the reach and participation of all students in college activities and educational practices adopted by their respective institutions and how it influences the overall personal and educational development and learning of students (Kuh, 2001a). NSSE data provide valuable inputs concerning any similarities or variations in student experiences based on academic major, which indeed can assist faculty, educators, administrators, and policymakers to improve their understanding of the relationship between college engagement and academic majors (Lichtenstein et al. 2010).
Student participation in various academic and other extracurricular activities in college campus not only cultivates a positive impact on educational outcomes like critical thinking ability and cognitive development, but it also increases a sense of belonging amongst students and makes them feel more connected to the campus community (Astin, 1993; Kuh, 2009; Moore, Lovell, McGann, & Wyrick, 1998; Parscarella & Terenzini, 2005). The efficacy of the university policy and practices could not be assessed if there was no student engagement data available or if there was no other comparable information providing details on the quality of student experiences in colleges or universities. NSSE is a reliable data source that can guide and provide direction as to whether student behavior and university policy and practices are aligned and heading into the desired direction (Kuh, 2003).

Data Reliability & Validity

NSSE data and instruments are frequently used in research studies. The validity of NSSE tools are often scrutinized in terms of soundness, dependability, and reliability. Due to NSSE’s growing popularity amongst colleges for research, it is important to validate the NSSE instruments and data provided. As research shows, NSSE stands out to as a reliable resource to measure student engagement, and the benchmarks prescribed by NSSE tend to act as good indicators of student learning across various kinds of institutions, irrespective of their classification or population.

There is a heavy reliance of NSSE on continuous improvement achieved through ongoing data collection, as well high quality output, and compelling content (Kuh, 2009). Internal consistency in NSSE to gauge the close relationship between a set of elements within a particular group are measured using Cronbach’s alpha. Cortina (1993) stated that for social science
research, a Cronbach’s alpha of 70% or above indicates a high level of reliability. 2015 NSSE data demonstrated a high level of reliability, as all student engagement indicators were above 70% Cronbach’s alpha. International student data also reported a high level of reliability, as all international student engagement indicators were above 70% Cronbach’s alpha (Collaborative Learning $\alpha = 79\%$, Discussion with Diverse Others $\alpha = 90\%$, Student-Faculty Interaction $\alpha = 85\%$, Effective Teaching Practices $\alpha = 87\%$, Quality of Interaction = 85% & Supportive Environment $\alpha = 89\%$). The NSSE Survey instrument was validated using seven different forms of validation and was also substantiated by studies related to NSSE. These seven forms are response process validity, content validity, construct validity, concurrent validity, predictive validity, known group validity and consequential validity (NSSE, 2017).

**Data Variables**

The conceptual framework laid out in the Chapter 2 literature review discussed the fundamental research variables for this study. The data variables used in this study originated from prior research, the literature review, and the variables and data available for this study. There are four main variable categories – dependent variables, independent variables, student attributes variables, and institutional characteristics variables. These variables are explained in detail below.

**Dependent Variables - Engagement Benchmarks**

NSSE engagement indicators include four broad themes: academic challenge (which includes higher-order learning, reflective and integrative learning, learning strategies, quantitative reasoning); learning with peers (includes collaborative learning, discussion with
diverse others); experience with faculty (includes student-faculty interaction, effective teaching practices); and campus environment (includes quality of interactions and supportive environment engagement indicators). In 2013, NSSE updated its questionnaire, and now 10 engagement indicators fit within four engagement themes that were improved from the prior five NSSE benchmarks of effective educational practice. Engagement indicators scores range from 0 to 60 and are computed for every student taking the NSSE survey. For this study, I focused on the three engagement themes: learning with peers, experiences with faculty, and campus environment, as these themes focus on social/emotional elements that are essential for international student engagement. NSSE’s engagement indicators within these three themes are explained below:

- **“Collaborative Learning”** - Learning achieved by student willingness to collaborate with others to get a better handle on difficult tasks as well as helping out others and explaining the materials to others and working jointly in group assignments. This includes items 1e-h: CLaskhelp, CLexplain, CLstudy, and CLproject.

- **“Discussion with Diverse Others”** – The extent to which student often interact with other students who come from other diverse backgrounds and thus do not have similarity regarding race, religion, economic and family background. This includes items 8a-d: DDrace, DDeconomic, Ddreligion, and DDPolitical.

- **“Student-Faculty Interaction”** – This pertains to level and frequency of meaningful student interactions with their faculty members and advisors. Learning can be achieved by students based on their substantive discussions with faculty around their academic performance, on clarifications/discussions around course materials and class notes,
engaging in student committee work, and discussing their future career plans. This includes items 3a-d: SFcareer, SFotherwork, SFdiscuss and SFperform.

- **“Effective Teaching Practices”** - The practices utilized by teaching faculty that facilitate and encourage student ability to understand and comprehend course material effectively and efficiently, such as by using various practical examples and providing constructive, timely, and useful feedback. This includes items 5a-e: ETgoals, ETorganize, ETexample, Etdraftfb, and ETfeedback.

- **“Quality of Interactions”** - This reflects the student assessment of how they rank their interaction experience with the key members in their academic and learning environment, such as faculty members they deal with, peer students from same or other courses, student bodies, and other colleges administrative staff. This includes items 13a-e: QIstudent, QIadvisor, QIfaculty, QIstaff, and QIadmin.

- **“Supportive Environment”** – How much the environment provided by the college supports and facilitates student learning and persistence. This support could come through various activities that institutions can provide such as tasks that would boost interactions amongst a diverse set of students, the academic programs, other activities on the campus, as well as organizing non-academic and social interactions within the college environment. This includes items 14b-i: SEacademic, SElearnsup, SEdiverse, SESocial, SEwellness, SENonacad, SEactivities and SEevents.

**Independent Variables**

- **International student status** – To classify a student as an international student, data from question number 31a “Are you an international student?” was used. Response
options were yes or no. The variable name for the question was “internat” and value and label used 0 = No and 1 = Yes. In the first research question, this variable was used for the descriptive statistics about the international students as compared to American students in engagement.

- **Academic Major: STEM vs. Non-STEM Major** – Academic major was measured to understand if selecting a STEM major vs. a non-STEM major affected the level of engagement of international and American students. Academic major was evaluated by question numbers 20a, 20b, and 20c. The variable name for question number 20b variable name was “MAJfirst” and “MAJsecond,” and the variable label was either “please enter your major or expected major” or “please enter up to two majors or expected majors (do not enter minors),” depending on 20a selection “How many majors do you plan to complete (do not enter minors)”. NSSE’s major categories for MAJfirst code and MAJsecond code were categorized under 11 categories: Arts & Humanities; Biological Science, Agriculture & Natural Resources; Physical Sciences, Mathematics & Computer Science; Social Science; Business; Communication, Media & Public Relations; Education; Engineering; Health professions; Social Services professions; and Other majors (not categorized).

For this study, academic majors were categorized as STEM and non-STEM majors. All variables used in MAJfirst codes were recoded, and new variable values were assigned as STEM = 1 and Non-STEM = 0.
Student Attributes

- **Gender** – Question number 29 “what is your gender identity?” was used for gender. The variable name was “gendered,” and values and labels used were Male = 0 and Female = 1.

- **Race & Ethnicity** – Question number 32 “what is your racial or ethnic identification (select all that apply)” was used for Race and Ethnicity. The response options were available in 32a-f: American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, White, Other, and I prefer not to respond, with values and labels as 0 = Not selected and 1 = Selected. Variables were recoded, and new variable values were given as 1 = Asian; 2 = Black or African American; 3 = Hispanic or Latino; 4 = White; and 5 = Other + American Indian or Alaska Native + Native Hawaiian or Other Pacific Islander + I prefer not to respond.

- **GPA** – Item 24 on the survey was GPA, variable name as “grades” asked the question “what have most of your grades been up to now at this institution?” value and labels used were 1 = Low (C+, C & C- or lower); 2 = Medium (B+, B & B-); and 3 = High (A & A-).

- **Employment status** – Item number 15 on the survey was “About how many hours do you spend in a typical 7-day week doing the following?” for on-campus employment, the variable name was “tmworkon”, item number was 15c, and question was “working for pay on campus”. On-campus employment values and labels were 1 = 0 hours per week; 2 = 1-5; 3 = 6-10; 4 = 11-15; 5=16-20; 6=21-25; 7=26-30; and 8 = More than 30. For the purpose of this study, employment status was categorized as working on-campus (1 On-campus (20 or less hours) = 1-5 + 6-10 + 11-15 + 16-20; 2 On campus (More than 20 hours) = 21-25 + 26-30 + More than 30). All variables used in “tmworkon” were recoded.
and new variable values were given as working on-campus = 1 and not working on-
campus = 0.

- **Residential status** – Question number 34 assessed this variable, variable name was
  “living,” and the question was “which of the following best describes where you are
  living while attending college?” The values and labels for this questions were 1 =
  Dormitory or other campus housing (not fraternity/sorority house); 2 = Fraternity or
  sorority house; 3 = Residence (house, apartment, etc.) within walking distance of the
  institution; 4 = Residence (house, apartment, etc.) farther than walking distance to the
  institution; and 5 = none of the above. Variables were recoded, and new variable values
  were given as 0 = Living On-campus and 1 = Living Off-campus.

**Institutional Characteristics**

- **Carnegie Classification** – 2015 NSSE institutional characteristics data was based on the
  2010 Carnegie Classification for colleges and universities. Carnegie basic classification
  was named as BASIC2010_CAT in NSSE 2015 data file and was labeled as “Created
  report categories from 2010 basics”. The values for this category are 1 = Research
  Universities (very high research activity); 2 = Research Universities (high research
  activity); 3 = Doctoral/Research Universities; 4 = Master’s Colleges and Universities
  (larger programs); 5 = Master’s Colleges and Universities (medium programs); 6 =
  Master’s Colleges and Universities (smaller programs); 7 = Baccalaureate Colleges –
  Arts and Sciences; 8 = Baccalaureate Colleges – Diverse Fields; 9 = Other – Not
  classified, Bacc/Assoc, and special focus institutions. Variables were recoded, and new
variable values were given as 1 = Research Institutions; 2 = Master’s Institutions; and 3 = Baccalaureate & Other Institutions.

- **Institutional Control** – Institutional control variable was based on the label “IPEDS13: Private Flag”. The variable name was PRIVATE with values 0 = Public and 1 = Private.

- **Size of the Institution** – Undergraduate enrollment size was given the variable name ENRL_LB and was labeled “Enrollment Categories”. The variable values were 1 = Fewer than 1,000; 2 = 1,000 – 2,000; 3 = 2,500 – 4,999; 4 = 5,000 – 9,999; 5 = 10,000 – 19,999; 6 = 20,000 or more. Variables were recoded, and new variable values were given as 1 = Fewer than 2,499; 2 = 2,500 – 9,999; and 3 = 10,000 or more.

**Missing Value Analysis**

Missing Value Analysis performed for the entire student population (20% international and 20% American students), and it was found that data was not missing completely at random because the EM (Expectation Maximization) Mean was statistically significant. Missing Value Analysis was also completed for all international students and had similar results; data was not missing completely at random because the EM (Expectation Maximization) Mean was statistically significant. Since Missing Value Analysis was significant for all populations and international students, multiple imputations method will be used to eliminate missing values from the dataset.

**Research Method**

The design of this study is set up as quantitative research, where the proposed variables and factors are measurable and used for comparisons. “A powerful research form, emerging in part from the positivist tradition, quantitative research, therefore, aims to determine the
relationship between one thing (an independent variable) and another (a dependent or outcome variable) in a population (Cohen, Manion, & Morrison, 2007).” This study will use descriptive statistics to show the engagement level distribution among international and American students. Descriptive analysis such as frequencies and cross-tabulations will be used.

As quantitative research involves forming a hypothesis, gathering data, and statistical analysis, multiple regression will be used to examine the relationship between STEM vs. non-STEM majors, a set of control variables, and student engagement. Inferential statistics allow inferring from the sample data and reaching conclusions that extend to the general population. Multilevel analysis (also known as hierarchical, clustered, or nested data analysis) was selected as the appropriate statistical method for this study because of the continuous nature of the dependent variables and because of the nested data structure where students are nested within institutions. Utilizing Ordinary Least Squares (OLS) regression with Huber-White clustered standard errors to capture the nested data structure will facilitate in analyzing institutional effects on students, and it will also support examining cross-level interactions. An interaction effect test will be used to analyze the relationship between international student status and engagement and whether it is different for STEM & non-STEM majors. The dataset for this study consisted of student and institution records. Student data variables (gender, race, GPA, employment status and residential status) will be used at the first level, and institutional data variables (institutional control, size, and Carnegie classification) will be used at the second level. To be able to answer the research questions, this study will utilize the Statistical Package for Social Sciences (SPSS) and R – Open Source Programming Language by R Foundation for Statistical Computing.

International and American students were identified in the 2015 NSSE SPSS data file in order to determine whether international student status was related to student engagement level.
Multiple imputations will be used for imputing missing cases in the dataset. Essential recoding of STEM & non-STEM variables was done so that descriptive and statistical analysis could be directed. The analysis in Chapter 4 will determine if the original hypothesis is sustained by the 2015 NSSE dataset or not.

**Limitations**

There are many limitations pertaining to this study. The first limitation is related to the NSSE survey as it only includes freshmen and senior students and excludes sophomores and juniors. A dataset that consists of the entire undergraduate student population could provide more valuable insight regarding the class level for STEM and non-STEM international student populations. Additionally, a dataset with undergraduate and graduate student populations could provide more valuable insight into the international student populations. A second limitation pertains to how students categorize themselves to be an international student or an American student. As also stated in Korobova & Starobin (2015), question 31 (a) asks, “Are you an international student or foreign national?” Students who are permanent resident alien might also respond to this question, as they might be foreign born but permanent residents by status. There is no differentiation of international students from foreign national students (permanent students) in this question.

The third limitation of this study is that the data is self-reported which often raises questions especially in quantitative research regarding the validity and reliability of the data collected. The students might not have enough experience with the higher education institution to respond to the questions accurately, especially freshmen international students. Also, the halo effect might affect a student’s response, and they might inflate their responses in reporting their
grades and other measured outcomes. Fourth, language proficiency is not measured by NSSE in the survey. For international students, earlier research work on student engagement has shown language proficiency as one of the key indicators for engagement. Research shows that when students who are proficient in the English language arrive in the United States, they tend to perform well and better adapt than those with little or no proficiency in English. (Barratt & Huba, 1994; Poyrazli et al., 2002). Based on prior studies, language proficiency can be linked to international student engagement and academic success in American higher education institutions.

Finally, the fifth limitation is the voluntary nature of the NSSE survey for participants and higher education institutions. The NSSE survey is completed voluntary for freshmen and senior students, so they can choose not to respond or to respond partially to the survey. This can be a limitation for small size institutions with smaller freshmen classes. Since the NSSE survey is also voluntary for higher education institutions, there might be a specific type of institution not participating and thus limiting the scope of the results. Irrespective of all these limitations, this study provides valuable insight in examining how international and American student status are related to engagement and whether such a relationship may vary across STEM and non-STEM fields. The existing limitations can provide opportunities for future research in higher education.
CHAPTER 4 – RESULTS

As stated in Chapter 3, the research questions to be analyzed for this study are as follows:

(1) How is the engagement level distributed among international and American students? (2) Is there a significant difference in international student engagement compared to American student engagement in STEM vs. non-STEM fields while controlling for student attributes (gender, race, GPA, employment status, and residential status) and institutional characteristics (institutional control, size, and Carnegie Classification)? (3) How is the pattern of engagement different or is it the same in the freshmen and senior years for international and American students? This chapter presents findings that address these research questions.

**Descriptive Statistics**

The sample size for international students was N = 1,604 and for American students was N = 39,823. The descriptive analyses were concluded after multiple imputations of the missing data to ensure that descriptive statistics were presented using the complete data for independent variables. Every variable that was in the analytical model was also included in the imputation model, and cases that were initially missing in the dependent variables were removed after multiple imputations. According to Schafer (1997) and White, et al. (2010), while imputing for missing values, the imputation model should include all variables. Table 1 summarizes the student characteristics for both international and American students, and Table 2 summarizes the institutional characteristics for both international and American students.

Table 1 presents the student characteristics of international and American students; it includes academic major, gender, race & ethnicity, grades, on-campus employment status,
residential status, and class level (IR). Grades, as reported by students, are the most frequent grades students received at the current institution, low grades include C+, C & C-; lower, medium grades include B+, B & B-; and high grades include A & A-. A total of 575 (36%) international and 14,928 (37%) American students were enrolled in STEM (Science, Technology, Engineering, and Math) majors, and 1,029 (64%) international and 24,895 (63%) American students were enrolled in non-STEM majors. Although the total numbers of international and American students are different, the STEM & non-STEM student proportions for both international and American students are very similar. The majority of students were female, 26,397 (66%) of American and 860 (54%) of international students were female.

Asian international students represented the largest majority (46%) among international students followed by White (21%), Other (13%), and Hispanic or Latino (10%). Black or African American represented 9% of the student population. For American students, White students were the largest group with 68% followed by Other at 10%, Hispanic or Latino at 9% and Black or African American at 8%. Asian students represented 5% of the student population. It is noteworthy that, the majority of international students are Asian, and the majority of American students are White. A majority of the American (51%) and international students (54%) reported High (A & A-) grades as most of their grades at their current institution, followed by Medium (B+, B & B-) grades reported by 42% of international and 43% of American students. Five percent of international and 6% American students reported Low (C+, C, & C- or lower) grades. Thus, in both groups, more students reported High (A & A-) grades as the grade they received the most at their current institution. More international students were employed on-campus (41%) compared to American students (28%). International students have a higher percentage of working on campus as compared to American students because international students on a
student visa are only allowed to work on-campus for a maximum of 20 hours a week. Residential status for both on-campus international and American students was the same: 38% international and American students were living on-campus, and 62% international and American students were living off-campus. It was interesting to see that a majority of both international and American students were living off-campus, because it is usually assumed that international students prefer living on-campus. The class level was well divided among international students: 46% were freshmen (1st year), and 54% were seniors (4th year) students, while 41% of American students were freshmen (1st year), and 59% were seniors (4th year) students.

Table 2 comprises the selected institutional characteristics for international and American students: it includes Carnegie Classification, institutional control, and size of the institution. Regarding Carnegie Classification, 42% of international and 38% of American students were enrolled at Research Institutions, 38% of international & 45% of American students were enrolled at Master’s Institutions, and 20% of international and 18% of American students were enrolled at Baccalaureate and other institutions. Thus, the majority of international students were enrolled at a Research institution, and the majority of American students were enrolled at a Master’s Institution. Of the students included in this study who were enrolled at a public institution, 52% were international and 58% were American students, while 48% of international and 42% of American students were enrolled at a private institution. Thus, both groups showed a slight preference for enrolling at a public institution over a private institution. Based on the size of the institution, 44% of international and 45% of American students were enrolled at an institution with 10,000 or more students, 34% of international and 37% of American students were enrolled at an institution with 2,500-9,999 students, and 22% international and 18% American students were enrolled at an institution with fewer than 2,499 students. In terms of size
of the institution, most International and American students were enrolled at institutions with
10,000 or more students enrolled.

Table 1
Selected Student Characteristics of International and American Students

<table>
<thead>
<tr>
<th>Student Characteristics</th>
<th>International Students</th>
<th>American Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 1604</td>
<td>N = 39823</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Academic Major</td>
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<td></td>
</tr>
<tr>
<td>STEM</td>
<td>575</td>
<td>14928</td>
</tr>
<tr>
<td>Non-STEM (reference group)</td>
<td>1029</td>
<td>24895</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>860</td>
<td>26397</td>
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<tr>
<td>Male (reference group)</td>
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<td>13426</td>
</tr>
<tr>
<td>Race &amp; Ethnicity</td>
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<td></td>
</tr>
<tr>
<td>Asian</td>
<td>743</td>
<td>2087</td>
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<tr>
<td>Black or African American</td>
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<td>2988</td>
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<tr>
<td>Hispanic or Latino</td>
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<td>3700</td>
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<tr>
<td>White (reference group)</td>
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<td>27078</td>
</tr>
<tr>
<td>Other</td>
<td>207</td>
<td>3970</td>
</tr>
<tr>
<td>Grades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (C+, C &amp; C- or lower)</td>
<td>76</td>
<td>2582</td>
</tr>
<tr>
<td>Medium (B+, B &amp; B-)</td>
<td>669</td>
<td>17083</td>
</tr>
<tr>
<td>High (A &amp; A-)</td>
<td>859</td>
<td>20158</td>
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<tr>
<td>On-Campus Employment status</td>
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<td></td>
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<tr>
<td>Working on-campus</td>
<td>653</td>
<td>11261</td>
</tr>
<tr>
<td>Not working on-campus (reference group)</td>
<td>951</td>
<td>28562</td>
</tr>
<tr>
<td>Residential Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On campus (reference group)</td>
<td>615</td>
<td>15017</td>
</tr>
<tr>
<td>Off campus resident</td>
<td>989</td>
<td>24806</td>
</tr>
<tr>
<td>Class level (IR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshmen (1st year)</td>
<td>743</td>
<td>16347</td>
</tr>
<tr>
<td>Senior (4th year)</td>
<td>861</td>
<td>23476</td>
</tr>
</tbody>
</table>

60
Table 2
Selected Institutional Characteristics of International and American Students

<table>
<thead>
<tr>
<th>Institutional Characteristics</th>
<th>International Students</th>
<th>American Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie Classification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Institutions (reference group)</td>
<td>671 42%</td>
<td>15008 38%</td>
</tr>
<tr>
<td>Master's Institutions</td>
<td>609 38%</td>
<td>17772 45%</td>
</tr>
<tr>
<td>Baccalaureate &amp; Other Institutions</td>
<td>324 20%</td>
<td>7043 18%</td>
</tr>
<tr>
<td>Institutional Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public (reference group)</td>
<td>837 52%</td>
<td>23278 58%</td>
</tr>
<tr>
<td>Private</td>
<td>767 48%</td>
<td>16545 42%</td>
</tr>
<tr>
<td>Size of the Institution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fewer than 2,499 (reference group)</td>
<td>353 22%</td>
<td>7304 18%</td>
</tr>
<tr>
<td>2,500 - 9,999</td>
<td>552 34%</td>
<td>14631 37%</td>
</tr>
<tr>
<td>10,000 or more</td>
<td>699 44%</td>
<td>17888 45%</td>
</tr>
</tbody>
</table>

Research Question 1

How is the engagement level distributed among international and American students?

\[ H_0: \mu_{\text{International}} - \mu_{\text{American}} = 0 \]

\[ H_1: \mu_{\text{International}} - \mu_{\text{American}} \neq 0 \]

\[ H_0: \text{The engagement level of International and American students is the same across the six engagement indicators} \]

\[ H_1: \text{The engagement level of International and American students is different across the six engagement indicators} \]
Independent T-Test

An Independent-sample T-Test was used to answer the first research question. Independent T-Tests were run for each engagement indicator: Collaborative Learning (CL), Discussion with Diverse Others (DD), Student-Faculty Interaction (SF), Effective Teaching Practices (ET), Quality of Interaction (QI), and Supportive Environment (SE) to compare the means between international and American students. Table 3 shows the group statistics comparing student engagement indicators for American and international students, and Table 4 shows the Independent Samples T-Test for international and American students across the student engagement indicators.

Table 3
Group Statistics Comparing Student Engagement Indicators for International & American Students

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaborative Learning (CL)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Students</td>
<td>39823</td>
<td>33.67</td>
<td>14.237</td>
<td>0.071</td>
</tr>
<tr>
<td>International Students</td>
<td>1604</td>
<td>33.69</td>
<td>13.370</td>
<td>0.334</td>
</tr>
<tr>
<td><strong>Discussion with Diverse Others (DD)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Students</td>
<td>39823</td>
<td>41.88</td>
<td>15.674</td>
<td>0.079</td>
</tr>
<tr>
<td>International Students</td>
<td>1604</td>
<td>40.37</td>
<td>16.563</td>
<td>0.414</td>
</tr>
<tr>
<td><strong>Student-Faculty Interaction (SF)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Students</td>
<td>39823</td>
<td>23.67</td>
<td>15.773</td>
<td>0.079</td>
</tr>
<tr>
<td>International Students</td>
<td>1604</td>
<td>26.18</td>
<td>15.551</td>
<td>0.388</td>
</tr>
<tr>
<td><strong>Effective Teaching Practices (ET)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Students</td>
<td>39823</td>
<td>40.86</td>
<td>13.456</td>
<td>0.067</td>
</tr>
<tr>
<td>International Students</td>
<td>1604</td>
<td>42.76</td>
<td>13.292</td>
<td>0.332</td>
</tr>
<tr>
<td><strong>Quality of Interaction (QI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Students</td>
<td>39823</td>
<td>42.45</td>
<td>12.003</td>
<td>0.060</td>
</tr>
<tr>
<td>International Students</td>
<td>1604</td>
<td>41.66</td>
<td>12.548</td>
<td>0.313</td>
</tr>
<tr>
<td><strong>Supportive Environment (SE)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Students</td>
<td>39823</td>
<td>35.69</td>
<td>14.204</td>
<td>0.071</td>
</tr>
<tr>
<td>International Students</td>
<td>1604</td>
<td>36.44</td>
<td>14.131</td>
<td>0.353</td>
</tr>
</tbody>
</table>
### Table 4

**Independent Sample T-Test for International & American Students across Student Engagement Indicators**

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>T-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F.</td>
<td>Sig.</td>
</tr>
<tr>
<td><strong>Collaborative Learning (CL)</strong></td>
<td>16.135</td>
<td>0.000</td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td>-0.051</td>
<td>1752.614</td>
</tr>
<tr>
<td><strong>Discussions with Diverse Others (DD)</strong></td>
<td>6.61</td>
<td>0.010</td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td>3.585</td>
<td>1720.638</td>
</tr>
<tr>
<td><strong>Student-Faculty Interaction (SF)</strong></td>
<td>0.203</td>
<td>0.652</td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td>-6.326</td>
<td>1738.465</td>
</tr>
<tr>
<td><strong>Effective Teaching Practices (ET)</strong></td>
<td>0.045</td>
<td>0.831</td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td>-5.608</td>
<td>1737.95</td>
</tr>
<tr>
<td><strong>Quality of Interactions (QI)</strong></td>
<td>8.739</td>
<td>0.003</td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td>2.486</td>
<td>1723.228</td>
</tr>
<tr>
<td><strong>Supportive Environment (SE)</strong></td>
<td>0.121</td>
<td>0.728</td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td>-2.106</td>
<td>1735.999</td>
</tr>
</tbody>
</table>
An Independent-sample T-Test was conducted at the .05 level of significance to answer the research question: How is the engagement level distributed among international and American students? The null hypothesis stated that the engagement level of international and American students is same across the six engagement indicators. The alternative hypothesis stated that the engagement level of international and American students is different across the six engagement indicators.

As depicted in Table 4, the independent T-Test indicates that the engagement through Collaborative Learning (CL) of American students was not statistically different from engagement through Collaborative Learning (CL) of international students (t = -0.051, p = .959). For Collaborative Learning, the Equal variance not assumed column was used as the equal variance test was not met. The P-Value (.000) was less than (0.05); P < 0.05, so I used Equal variance not assumed. The independent T-Test indicates that the engagement through Discussion with Diverse Others (DD) of American students was statistically different from engagement through Discussion with Diverse Others (DD) of International students (t = 3.585, p = .000). For Discussion with Diverse Others (DD), the Equal variance not assumed column as the equal variance test was not met. The P-Value (.010) was less than (0.05); P < 0.05, so I used Equal variance not assumed. The independent T-Test indicates that the engagement through Student-Faculty Interaction (SF) of American students was statistically different from the engagement through Student-Faculty Interaction (SF) of international students (t = -6.244, p = .000). For Student-Faculty Interaction (SF), I used the Equal variance assumed column as the equal variance test was met. The P-Value (.652) was greater than (0.05); P > 0.05, so the Equal variance assumed column was used. The independent T-Test indicates that the engagement through Effective Teaching Practices (ET) of American students was statistically different from
the engagement through Effective Teaching Practices (ET) of international students ($t = -5.545, p = .000$). For Effective Teaching Practices (ET), I used the Equal variance not assumed column as the equal variance test was met. The P-Value (.831) was greater than (0.05); $P > 0.05$, so I used Equal variance assumed. The independent T-Test indicates that the engagement through Quality of Interaction (QI) of American students was statistically different from the engagement through Quality of Interaction (QI) of International students ($t = 2.486, p = .013$). For Quality of Interaction (QI), the Equal variance not assumed column was used as the equal variance test was not met. The P-Value (.003) was less than (0.05); $P < 0.05$, so the Equal variance not assumed column was used. The independent T-Test indicates that the engagement through Supportive Environment (SE) of American students was statistically different from the engagement through Supportive Environment (SE) of International students ($t = -2.096, p = .036$). For Supportive Environment (SE), the Equal variance assumed column was used as the equal variance test was met. The P-Value (.728) was greater than (0.05); $P > 0.05$, so the Equal variance assumed column was used.

These T-Test results show that the engagement level of international and American students was not the same for five of the six engagement indicators: Discussion with Diverse Others (DD), Student-Faculty Interaction (SF), Effective Teaching Practices (ET), Quality of Interaction (QI), and Supportive Environment (SE). However, the engagement level of international and American students was the same for the Collaborative Learning (CL) engagement indicator. This indicates that when it comes to Collaborative Learning, which is learning achieved by a student’s willingness to collaborate with others or work jointly in group assignments, both international and American students have the same engagement level. However, when it comes to Discussion with Diverse Others, Student-Faculty Interaction,
Effective Teaching Practices, Quality of Interaction, and Supportive Environment, international and American students have different engagement levels.

The null hypothesis that the engagement level of international and American students is the same was rejected at the 0.05 level of significance for Discussion with Diverse Others (DD), Student-Faculty Interaction (SF), Effective Teaching Practices (ET), Quality of Interaction (QI), and Supportive Environment (SE). Only for the Collaborative Learning (CL) engagement indicator, the null hypothesis will not be rejected at the 0.05 level of significance. Comparing the Discussion with Diverse Others (DD) engagement variable, the American student mean score (41.88) was 1.51 points higher than the mean score of international students (40.37%).

Comparing the Student-Faculty Interaction (SF) engagement variable, the American student mean score (23.67%) was 2.51% lower than the mean score of international students (26.18%).

Comparing the Effective Teaching Practices (ET) engagement variable, the American student mean score (40.86 points) was 1.90 points lower than the mean score of international students (42.76). Comparing the Quality of Interaction (QI) engagement variable, American student mean score (42.45) was .79 higher than the mean score of the international students (41.66).

Comparing the Supportive Environment (SE) engagement variable, the American student mean score (35.69) was .75 points lower than the mean score of International students (36.44).

Results from this analysis showed that, compared with international students, the mean score for American students was statistically higher by 1.51 points for Discussion with Diverse Others (DD) and was statistically higher by .79 points for Quality of Interaction (QI) engagement. However, the mean score for International students was statistically higher by 2.51 points for Student-Faculty Interaction (SF), by 1.90 points for Effective Teaching Practices (ET), and by .75 points for Supportive Environment (SE).
Multiple Imputation

McKnight et al., 2007 indicated that missing data possibly could affect data reliability, validity, and the overall data analysis. A multiple imputation method was used in this study for handling missing data from the 2015 NSSE dataset. R – Open Source Programming Language by R Foundation for Statistical Computing was used for multiple imputations and for analyzing research question numbers 2 and 3. Figure 2 shows the amount of missing data from the 2015 NSSE final data set used for data analysis. Since while running the missing data plot, there was not enough vertical space to display all variables in R, Table 5 shows all the variables sorted by the percentage of missing data, from highest to lowest. The MICE (Multivariate Imputation by Chained Equations) package was used for multiple imputations. The data was imputed 25 times, each done with five iterations through the dataset. The data was aggregated at the end for data analysis.

1 R version 3.4.3 (2017-11-30) was used for this study. The external R packages that were used in the data analysis are haven (import and export ‘SPSS’, ‘Stata’& ‘SAS’ files) version 1.1.1; mice (multivariate imputation by chained equations) version 2.46.0; VIM (visualization and imputation of missing values) version 4.7.0, miceadds (some additional multiple imputation functions, especially for ‘mice’) version 2.9-15, and multiwayvcov (multi-way standard error clustering) version 1.2.3.
Figure 2: Missing Data Patterns
<table>
<thead>
<tr>
<th>Variable</th>
<th>Missing Data %</th>
</tr>
</thead>
<tbody>
<tr>
<td>QI (Quality of Interaction)</td>
<td>4.431%</td>
</tr>
<tr>
<td>Asian</td>
<td>4.070%</td>
</tr>
<tr>
<td>Black</td>
<td>4.070%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4.070%</td>
</tr>
<tr>
<td>Other_Race</td>
<td>4.070%</td>
</tr>
<tr>
<td>CL (Collaborative Learning)</td>
<td>2.861%</td>
</tr>
<tr>
<td>SF (Student-Faculty Interaction)</td>
<td>2.194%</td>
</tr>
<tr>
<td>Female</td>
<td>1.909%</td>
</tr>
<tr>
<td>DD (Discussion with Diverse Others)</td>
<td>1.806%</td>
</tr>
<tr>
<td>SE (Supportive Environment)</td>
<td>1.558%</td>
</tr>
<tr>
<td>Employment_Status</td>
<td>1.274%</td>
</tr>
<tr>
<td>STEM</td>
<td>1.144%</td>
</tr>
<tr>
<td>Size_2500to9999</td>
<td>1.037%</td>
</tr>
<tr>
<td>Size_10000orMore</td>
<td>1.037%</td>
</tr>
<tr>
<td>Age_20to23</td>
<td>0.832%</td>
</tr>
<tr>
<td>Age_24to39</td>
<td>0.832%</td>
</tr>
<tr>
<td>Age_Over40</td>
<td>0.832%</td>
</tr>
<tr>
<td>ET (Effective Teaching Practices)</td>
<td>0.582%</td>
</tr>
<tr>
<td>Residential_Status</td>
<td>0.534%</td>
</tr>
<tr>
<td>Interaction_Internat_STEM</td>
<td>0.311%</td>
</tr>
<tr>
<td>Medium_Grades</td>
<td>0.226%</td>
</tr>
<tr>
<td>High_Grades</td>
<td>0.226%</td>
</tr>
<tr>
<td>New_IRClass</td>
<td>0.168%</td>
</tr>
<tr>
<td>internat</td>
<td>0.000%</td>
</tr>
<tr>
<td>PRIVATE</td>
<td>0.000%</td>
</tr>
<tr>
<td>fauxpeds</td>
<td>0.000%</td>
</tr>
<tr>
<td>Master_Inst</td>
<td>0.000%</td>
</tr>
<tr>
<td>Bacc_Other_Inst</td>
<td>0.000%</td>
</tr>
</tbody>
</table>
Research Question 2

Does the relationship between international student status and engagement differ by STEM vs. non-STEM major?

This section presents the results of the relationship of an academic major (STEM) on student engagement and whether it is dependent on student status (international), and the relationship of student status (international) on engagement and whether it is dependent on academic major (STEM). The multiple linear regression equation for Collaborative Learning (CL) dependent variable is given below. Other multiple linear regression equations for the remaining five dependent variables will also include the same details, while the dependent variable name will change.

\[ CL = \beta_0 + \beta_1(\text{Interaction}\_\text{Internat}\_\text{STEM}) + \beta_2(\text{international}) + \beta_3(\text{STEM}) + \beta_4(\text{Female}) + \beta_5(\text{Asian}) + \beta_6(\text{Black}) + \beta_7(\text{Hispanic}) + \beta_8(\text{Other}\_\text{Race}) + \beta_9(\text{Medium}\_\text{Grades}) + \beta_{10}(\text{High}\_\text{Grades}) + \beta_{11}(\text{Employment}\_\text{Status}) + \beta_{12}(\text{Residential}\_\text{Status}) + \beta_{13}(\text{Master}\_\text{Inst}) + \beta_{14}(\text{Bacc}\_\text{Other}\_\text{Inst}) + \beta_{15}(\text{PRIVATE}) + \beta_{16}(\text{Size}\_\text{2500to9999}) + \beta_{17}(\text{Size}\_\text{10000orMore}) + \beta_{18}(\text{NewIRClass}) + \varepsilon \]
Table 6
Regression Analysis Summary for all Six Engagement Indicators

<table>
<thead>
<tr>
<th></th>
<th>CL (Collaborative Learning)</th>
<th>DD (Discussion with Diverse Other)</th>
<th>SF (Student-Faculty Interaction)</th>
<th>ET (Effective Teaching Practice)</th>
<th>QI (Quality of Interactions)</th>
<th>SE (Supportive Environment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td><strong>p-value</strong></td>
<td>Coefficient</td>
<td><strong>p-value</strong></td>
<td>Coefficient</td>
<td><strong>p-value</strong></td>
<td>Coefficient</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>32.381 ***</td>
<td>(1.212)</td>
<td>38.518 ***</td>
<td>(0.961)</td>
<td>20.546 ***</td>
<td>(0.902)</td>
</tr>
<tr>
<td>Interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>-3.028 ***</td>
<td>(0.709)</td>
<td>0.892 ***</td>
<td>(0.903)</td>
<td>-0.278</td>
<td>(0.777)</td>
</tr>
<tr>
<td>&amp; STEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>0.332</td>
<td>(0.451)</td>
<td>-1.960 ***</td>
<td>(0.575)</td>
<td>1.647 **</td>
<td>(0.526)</td>
</tr>
<tr>
<td>or not</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEM or not</td>
<td>3.489 ***</td>
<td>(0.210)</td>
<td>-0.389 *</td>
<td>(0.186)</td>
<td>-0.005</td>
<td>(0.193)</td>
</tr>
<tr>
<td>Female or not</td>
<td>-0.249</td>
<td>(0.178)</td>
<td>0.897 ***</td>
<td>(0.199)</td>
<td>-0.473 *</td>
<td>(0.188)</td>
</tr>
<tr>
<td>Asian or not</td>
<td>1.079 **</td>
<td>(0.339)</td>
<td>0.094</td>
<td>(0.494)</td>
<td>0.253</td>
<td>(0.380)</td>
</tr>
<tr>
<td>Black or not</td>
<td>-0.932 *</td>
<td>(0.381)</td>
<td>2.030 ***</td>
<td>(0.425)</td>
<td>1.979 ***</td>
<td>(0.407)</td>
</tr>
<tr>
<td>Hispanic or not</td>
<td>0.407</td>
<td>(0.344)</td>
<td>0.944</td>
<td>(0.513)</td>
<td>1.067 ***</td>
<td>(0.317)</td>
</tr>
<tr>
<td>Other Race or</td>
<td>0.377</td>
<td>(0.250)</td>
<td>3.305 ***</td>
<td>(0.334)</td>
<td>0.960 **</td>
<td>(0.300)</td>
</tr>
<tr>
<td>not</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Grades</td>
<td>2.947 ***</td>
<td>(0.320)</td>
<td>1.493 ***</td>
<td>(0.355)</td>
<td>2.493 ***</td>
<td>(0.310)</td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001
Table 6 Cont.
Regression Analysis Summary for all Six Engagement Indicators

<table>
<thead>
<tr>
<th></th>
<th>CL (Collaborative Learning)</th>
<th>DD (Discussion with Diverse Other)</th>
<th>SF (Student-Faculty Interaction)</th>
<th>ET (Effective Teaching Practice)</th>
<th>QI (Quality of Interactions)</th>
<th>SE (Supportive Environment)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (Std. Error)</td>
<td>p-value</td>
<td>Coefficient (Std. Error)</td>
<td>p-value</td>
<td>Coefficient (Std. Error)</td>
<td>p-value</td>
</tr>
<tr>
<td>High Grades or not</td>
<td>2.437 ***</td>
<td>2.249 ***</td>
<td>3.766 ***</td>
<td>4.877 ***</td>
<td>5.005 ***</td>
<td>3.683 ***</td>
</tr>
<tr>
<td></td>
<td>(0.333)</td>
<td>(0.352)</td>
<td>(0.347)</td>
<td>(0.305)</td>
<td>(0.277)</td>
<td>(0.308)</td>
</tr>
<tr>
<td>Working on-campus or not</td>
<td>2.925 ***</td>
<td>0.487</td>
<td>7.196 ***</td>
<td>-0.206 **</td>
<td>0.424 **</td>
<td>2.124 ***</td>
</tr>
<tr>
<td></td>
<td>(0.239)</td>
<td>(0.314)</td>
<td>(0.309)</td>
<td>(0.161)</td>
<td>(0.162)</td>
<td>(0.185)</td>
</tr>
<tr>
<td>Off-campus Resident or not</td>
<td>-3.293 ***</td>
<td>-1.386 ***</td>
<td>-2.098 ***</td>
<td>0.525 **</td>
<td>-0.182 **</td>
<td>-1.908 ***</td>
</tr>
<tr>
<td></td>
<td>(0.320)</td>
<td>(0.308)</td>
<td>(0.279)</td>
<td>(0.188)</td>
<td>(0.195)</td>
<td>(0.241)</td>
</tr>
<tr>
<td>Master’s Institutions or not</td>
<td>-1.134 ***</td>
<td>-0.123</td>
<td>0.773</td>
<td>1.470 ***</td>
<td>0.918 **</td>
<td>0.189</td>
</tr>
<tr>
<td></td>
<td>(0.586)</td>
<td>(0.523)</td>
<td>(0.443)</td>
<td>(0.264)</td>
<td>(0.332)</td>
<td>(0.374)</td>
</tr>
<tr>
<td>Bacc. &amp; Other Institutions or not</td>
<td>-1.184 ***</td>
<td>0.308</td>
<td>0.071</td>
<td>1.938 ***</td>
<td>1.426 **</td>
<td>0.048</td>
</tr>
<tr>
<td></td>
<td>(0.614)</td>
<td>(0.706)</td>
<td>(0.692)</td>
<td>(0.400)</td>
<td>(0.441)</td>
<td>(0.541)</td>
</tr>
<tr>
<td>Private or not</td>
<td>-1.071 **</td>
<td>0.258</td>
<td>-1.575 **</td>
<td>0.537 *</td>
<td>1.150 **</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td>(0.709)</td>
<td>(0.989)</td>
<td>(0.503)</td>
<td>(0.247)</td>
<td>(0.353)</td>
<td>(0.421)</td>
</tr>
<tr>
<td>Size 2,500 to 9,999 or not</td>
<td>-0.617 ***</td>
<td>0.269</td>
<td>-2.237 ***</td>
<td>-0.659 *</td>
<td>-0.803 *</td>
<td>-0.673</td>
</tr>
<tr>
<td></td>
<td>(0.473)</td>
<td>(0.605)</td>
<td>(0.465)</td>
<td>(0.327)</td>
<td>(0.343)</td>
<td>(0.413)</td>
</tr>
<tr>
<td>Size 10,000 or More or not</td>
<td>-1.702 ***</td>
<td>0.873</td>
<td>-4.307 ***</td>
<td>-0.992 *</td>
<td>-0.787 *</td>
<td>-0.292</td>
</tr>
<tr>
<td></td>
<td>(1.037)</td>
<td>(1.074)</td>
<td>(0.721)</td>
<td>(0.405)</td>
<td>(0.499)</td>
<td>(0.563)</td>
</tr>
<tr>
<td>Senior or not</td>
<td>1.630 ***</td>
<td>1.169</td>
<td>4.122 ***</td>
<td>0.235</td>
<td>0.782 **</td>
<td>-3.431 ***</td>
</tr>
<tr>
<td></td>
<td>(0.244)</td>
<td>(0.219)</td>
<td>(0.244)</td>
<td>(0.183)</td>
<td>(0.167)</td>
<td>(0.200)</td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001
Table 6 presents the coefficient, standard error, and significance for each variable used in the analysis for all six dependent variables. The results from Table 6 highlights that the interaction effect between international student status and STEM major was statistically significant for Collaborative Learning (CL) engagement outcome only.

**Collaborative Learning (CL).** For the Collaborative learning (CL) engagement outcome, the interaction effect between international student status and STEM major was statistically significant ($\beta=-3.028$, $P<0.001$), meaning that the relationship between international student status and collaborative learning varies by major. As demonstrated in Figure 3, the score of collaborative learning engagement outcome is calculated to show this significant interaction effect. It shows that, while international student status is negatively related to collaborative learning engagement, the gap in this outcome across the two groups of students seems to be mainly due to the difference in STEM fields. Specifically, collaborative learning engagement is similar for American students (30.1 points) and international students (30.4 points) in non-STEM fields, but this outcome was 3.5 points higher for American students (33.6) than for international students (30.9) in STEM fields. In another words, American STEM students are more engaged in Collaborative learning activities as compared to international STEM students, while American and international non-STEM students are not so different in this outcome. Control variables such as Asian, Black, Medium Grades, High Grades, Working on-campus, Off-campus Resident, and Senior were found significantly related to Collaborative Learning.
The interaction term for this model was statistically significant (see Table 6). In Figure 3, the dependent variable is \( Y = CL \) (Collaborative Learning), the independent variable is \( X_1 = \) Academic Major (STEM/Non-STEM), and the other independent variable is \( X_2 = \) Student Status (International/American). The effect of Student status (International/American) on collaborative learning engagement was dependent on Academic major (STEM/Non-STEM), and the effect of Academic major (STEM/Non-STEM) on collaborative learning engagement was dependent on Student status (International/American).

The standard deviation for \( CL \) (Collaborative Learning) was 14.204 and the Coefficient of Interaction of International and STEM = -3.028 (*** [Coefficient/S.D. of CL = -3.028/14.204 = -21.3%]. International STEM students are 21.3% of a standard deviation less engaged than American STEM students. Student status, whether international or American, was not statistically significant for the Collaborative learning engagement variable. The Coefficient

Figure 3: Interaction of International Status & STEM Field was Statistically Significant for Collaborative Learning (CL)
for STEM variable = 3.489 (***)[Coefficient/S.D. of CL = 3.489/14.204 = 24.6%]. STEM students are 24.6% of a standard deviation more engaged than Non-STEM students.

**Discussion with Diverse Other (DD).** For the Discussion with diverse other (DD) engagement outcome, the interaction effect between international student status and STEM major was not statistically significant, meaning that the relationship between international student status and the outcome is the same across STEM and non-STEM majors. Findings indicate that Student status (International or not) was statistically significant ($\beta=-1.960$, $P<0.001$), meaning that international students score 1.960 points lower than American students in discussion with diverse other engagement. Academic Major (STEM or not) was also statistically significant for discussion with diverse other ($\beta=-0.389$, $P<0.05$), meaning that STEM students score 0.389 points lower than non-STEM students in discussion with diverse other engagement. Control variables such as Female, Black, Other Race, Medium Grades, High Grades, Off-campus Resident, and Senior were found significantly related to Discussion with diverse other.

**Student-Faculty Interaction (SF).** For the Student-Faculty interaction (SF) engagement outcome, the interaction effect between International student status and STEM major was not statistically significant, meaning that the relationship between international student status and the outcome was the same across STEM and non-STEM majors. Findings indicate that Student status (International or not) was statistically significant ($\beta=1.647$, $P<0.01$), meaning that international students score 1.647 points higher than American students in student-faculty interaction engagement. Control variables such as Female, Black, Hispanic, Other Race, Medium Grades, High Grades, Working on-campus, Off-campus Resident, Private, (Institution) Size
2,500 to 9,999, (Institution) Size 10,000 or more, and Senior were found significantly related to Student-Faculty interaction.

**Effective Teaching Practice (ET).** For the Effective Teaching Practice (ET) engagement outcome, the interaction effect between international student status and STEM major was not statistically significant, meaning that the relationship between international student status and the outcome was the same across STEM and non-STEM majors. Findings indicate that Student status (International or not) was statistically significant ($\beta=2.101, P<0.001$), meaning that international students score 2.101 points higher than American students in effective teaching practice engagement. Academic Major (STEM or not) was also statistically significant for effective teaching practice ($\beta=0.671, P<0.001$), meaning that STEM students score .671 points lower than non-STEM students in effective teaching practice engagement. Control variables such as Female, Black, Hispanic, Medium Grades, High Grades, Off-campus Resident, Master’s Institutions, Bacc & Other Institutions, Private, (Institution) Size 2,500 to 9,999, and (Institution) Size 10,000 or more were found significantly related to Effective Teaching Practice.

**Quality of Interactions (QI).** For the Quality of Interaction (QI) engagement outcome, the interaction effect between International student status and STEM major was not statistically significant, meaning that the relationship between international student status and the outcome was the same across STEM and non-STEM majors. Findings indicate that Student status (International or not) and Academic Major (STEM or not) were both not statistically significant. Control variables such as Female, Asian, Hispanic, Other Race, Medium Grades, High Grades, Working on-campus, Master’s Institutions, Bacc & Other Institutions, Private, Size 2,500 to 9,999, and Senior were found significantly related to Quality of Interaction.
Supportive Environment (SE). For the Supportive Environment (SE) engagement outcome, the interaction effect between International student status and STEM major was not statistically significant, meaning that the relationship between international student status and the outcome was the same across STEM and non-STEM majors. Findings indicate that Student status (International or not) and Academic Major (STEM or not) were both not statistically significant. Control variables such as Female, Black, Hispanic, Medium Grades, High Grades, Working on-campus, Off-campus Resident, and Senior were found significantly related to Supportive Environment.

Findings from this research question showed that American STEM students were found to be more engaged in Collaborative learning activities as compared to international STEM students, while American and international non-STEM students are not so differently engaged in Collaborative learning activities. This can be especially alarming to American universities with an ever increasing number of prospective international students which typically tend to major in the STEM field more than in the non-STEM field.
Research Question 3

How is the relationship pattern different or the same across the freshmen and senior cohorts?

This section presents the results of the relationship of academic major (STEM or not) on student engagement and whether it is dependent on student status (international or not) and the relationship of student status (international or not) on engagement and whether it is dependent on academic major (STEM or not) and whether or not they are same for freshmen & senior students. The Multiple Linear Regression Equation for Collaborative Learning (CL) dependent variable is stated below for Senior & Freshmen students. Other multiple linear regression equations for the remaining five dependent variables for Senior & Freshmen students will also follow the same details in their equations, and the dependent variable name will change.

\[
CL = \beta_0 + \beta_1(\text{Interaction}_\text{ Internat}_\text{ STEM}) + \beta_2(\text{international}) + \beta_3(\text{STEM}) + \beta_4(\text{Female}) + \beta_5(\text{Asian}) + \beta_6(\text{Black}) + \beta_7(\text{Hispanic}) + \beta_8(\text{Other Race}) + \beta_9(\text{Medium Grades}) + \beta_{10}(\text{High Grades}) + \beta_{11}(\text{Employment Status}) + \beta_{12}(\text{Residential Status}) + \beta_{13}(\text{Master Inst}) + \beta_{14}(\text{Bacc Other Inst}) + \beta_{15}(\text{PRIVATE}) + \beta_{16}(\text{Size 2500 to 9999}) + \beta_{17}(\text{Size 10000 or More}) + \varepsilon
\]

Collaborative Learning (CL). For the Collaborative learning (CL) engagement outcome, the interaction effect between international student status and STEM major was statistically significant for both senior (\(\beta=-2.376, P<0.05\)) and freshmen students (\(\beta=-3.587, P<0.001\)) (see Table 7), meaning that the relationship between international student status and collaborative learning varies by major for both senior and freshmen students. Figure 4, the score of collaborative learning engagement outcome was calculated to demonstrate a significant interaction effect. Similar to what was found for the freshmen sample, it shows that, while
international senior student status was negatively related to collaborative learning engagement, such a gap in the outcomes across the two groups of senior students seems to be mainly due to the difference in STEM fields. Specifically, the collaborative learning engagement was similar for American senior students (30.0 points), and international senior students (30.9 points) in non-STEM fields, but this outcome was 3.6 points higher for American senior students (33.6) than for international senior students (32.1) in STEM fields. In another words, American senior STEM students are more engaged in Collaborative learning activities as compared to international senior STEM students. For Senior students, control variables such as Black, Medium Grades, High Grades, Working on-campus, and Off-campus Resident were found significantly related to Collaborative Learning.

**Figure 4:** Interaction of International and STEM for collaborative learning (CL) for Senior Students
The interaction term for this model CL (Senior Students) was statistically significant (see Table 7). In Figure 4, the dependent variable is \( Y = CL \) (Collaborative Learning), the independent variable is \( X_1 = \) Academic Major (STEM/Non-STEM), and the other independent variable is \( X_2 = \) Student Status (International/American). The effect of Student status (International/American) on collaborative learning engagement was dependent on Academic major (STEM/Non-STEM), and the effect of Academic major (STEM/Non-STEM) on collaborative learning engagement was dependent on Student status (International/American).

The Standard Deviation for CL (Collaborative Learning) was 14.204 and the Coefficient of Interaction of International and STEM = -2.376 (*) (see Table 7) \([\text{Coefficient/S.D. of CL} = -2.376/14.204 = -16.7\%]\). International STEM Senior students are 16.7% of a standard deviation less engaged than American STEM Senior students. The Coefficient for STEM variable = 3.565 (*** \([\text{Coefficient/S.D. of CL} = 3.565/14.204 = 25.1\%]\). STEM Senior students are 25.1% of a standard deviation more engaged than non-STEM Senior students. Student status (International or not) was not statistically significant for Senior students.

In Figure 5, the score of collaborative learning engagement outcome was calculated to demonstrate a significant interaction effect for freshmen students. It shows that, while international freshmen student status was negatively related to collaborative learning engagement, such a gap in this outcome across the two groups of freshmen students seems to be mainly due to the difference in STEM fields. Specifically, the collaborative learning engagement was similar for American freshmen students (27.8 points) and international freshmen students (27.5 points) in Non-STEM fields, but this outcome was 3.3 points higher for American freshmen students (31.1) than for international freshmen students (27.2) in STEM fields. In another words, American freshmen STEM students are more engaged in Collaborative learning.
activities as compared to international freshmen STEM students. For freshmen students, control variables such as Asian, Hispanic, Other Race, Medium Grades, High Grades, Working on-campus, Off-campus Resident, Master’s Institutions, and (Institution) Size 10,000 or more were found significantly related to Collaborative Learning.

**Figure 5:** Interaction of International & STEM for collaborative learning (CL) for Freshmen Students

![Collaborative Learning Engagement (Freshmen) vs. Student’s Status (American or Inter), Academic Major (STEM or not)](image)

The interaction term for this model CL (Freshmen Students) was statistically significant (see Table 7). In the Figure 5 the dependent variable (Y) = CL (Collaborative Learning), the independent variable (X1) = Academic Major (STEM/Non-STEM), and the other independent variable (X2) = Student’s Status (International/American). The effect of Student’s status (International/American) on collaborative learning engagement is dependent on Academic major (STEM/Non-STEM), and the effect of Academic major (STEM/Non-STEM) on collaborative learning engagement is dependent on Student’s status (International/American).
Standard Deviation for CL (Collaborative Learning) was 14.204 and Coefficient of Interaction of International and STEM = -3.587 (***)(see Table 7) [Coefficient/S.D. of CL = -3.587/14.204 = 25.3%] International STEM Freshmen students are 25.3% of standard deviation less engaged than American STEM Freshmen students. Student status whether international or American was not statistically significant for Collaborative learning engagement variable. Coefficient for STEM variable = 3.303 (***)[Coefficient/S.D. of CL = 3.303/14.204 = 23.3%] STEM Freshmen students are 23.3% of standard deviation more engaged than Non-STEM Freshmen students.

Table 7
Regression Analysis Summary for Collaborative Learning (CL)

<table>
<thead>
<tr>
<th></th>
<th>Senior</th>
<th>Freshmen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>33.555</td>
<td>1.607</td>
</tr>
<tr>
<td>Interaction Internat &amp; STEM</td>
<td>-2.376</td>
<td>0.969</td>
</tr>
<tr>
<td>International or not</td>
<td>0.886</td>
<td>0.618</td>
</tr>
<tr>
<td>STEM or not</td>
<td>3.565</td>
<td>0.292</td>
</tr>
<tr>
<td>Female or not</td>
<td>-0.266</td>
<td>0.247</td>
</tr>
<tr>
<td>Asian or not</td>
<td>0.598</td>
<td>0.481</td>
</tr>
<tr>
<td>Black or not</td>
<td>-1.157</td>
<td>0.508</td>
</tr>
<tr>
<td>Hispanic or not</td>
<td>0.193</td>
<td>0.411</td>
</tr>
<tr>
<td>Other Race or not</td>
<td>0.140</td>
<td>0.339</td>
</tr>
<tr>
<td>Medium Grades or not</td>
<td>2.314</td>
<td>0.455</td>
</tr>
<tr>
<td>High Grades or not</td>
<td>1.329</td>
<td>0.462</td>
</tr>
<tr>
<td>Working on-campus or not</td>
<td>3.655</td>
<td>0.323</td>
</tr>
<tr>
<td>Off-campus Resident or not</td>
<td>-1.840</td>
<td>0.333</td>
</tr>
<tr>
<td>Master’s Institutions or not</td>
<td>-0.899</td>
<td>0.795</td>
</tr>
<tr>
<td>Bacc &amp; Other Institutions or not</td>
<td>-1.084</td>
<td>0.776</td>
</tr>
<tr>
<td>Private or not</td>
<td>-1.361</td>
<td>0.958</td>
</tr>
<tr>
<td>Size 2,500 to 9,999 or not</td>
<td>-0.700</td>
<td>0.634</td>
</tr>
<tr>
<td>Size 10,000 or More or not</td>
<td>-1.838</td>
<td>1.396</td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001
Discussion with Diverse Other (DD). For the discussion with Diverse Other (DD) engagement outcome, the interaction effect between International student status and STEM major was not statistically significant for both senior and freshmen students (see Table 8), meaning that the relationship between international student status and the outcome was the same across STEM and Non-STEM majors for both senior and freshmen. Findings indicate that Student status (International or not) for both senior (β=-1.442, P<0.05) and freshmen (β=-2.547, P<0.01) were both statistically significant, meaning that international senior students score 1.442 points lower than American senior students and international freshmen students score 2.547 points lower than American freshmen students on discussion with diverse other engagement indicators. Academic Major (STEM or not) was not statistically significant for senior and freshmen students. For Senior students control variables such as Female, Black, Hispanic, Other Race, Medium Grades, and High Grades were found significantly related to Discussion with diverse other. For Freshmen students control variables such as Female, Black, Other Race, Medium Grades, High Grades, Working on-campus, and Off-campus Resident were found significantly related to Discussion with diverse other.
### Table 8

**Regression Analysis Summary for Discussion with Diverse Other (DD)**

<table>
<thead>
<tr>
<th></th>
<th>Senior</th>
<th>Freashmen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coefficients</strong></td>
<td><strong>Std. Error</strong></td>
<td><strong>p-value</strong></td>
</tr>
<tr>
<td>(Intercept)</td>
<td>39.057</td>
<td>1.213 ***</td>
</tr>
<tr>
<td>Interaction Internat &amp; STEM</td>
<td>1.586</td>
<td>1.056</td>
</tr>
<tr>
<td>International or not</td>
<td>-1.442</td>
<td>0.695 *</td>
</tr>
<tr>
<td>STEM or not</td>
<td>-0.385</td>
<td>0.235</td>
</tr>
<tr>
<td>Female or not</td>
<td>0.984</td>
<td>0.279 ***</td>
</tr>
<tr>
<td>Asian or not</td>
<td>0.500</td>
<td>0.638</td>
</tr>
<tr>
<td>Black or not</td>
<td>2.375</td>
<td>0.506 ***</td>
</tr>
<tr>
<td>Hispanic or not</td>
<td>1.313</td>
<td>0.626</td>
</tr>
<tr>
<td>Other Race or not</td>
<td>3.523</td>
<td>0.430 ***</td>
</tr>
<tr>
<td>Medium Grades or not</td>
<td>1.117</td>
<td>0.522 *</td>
</tr>
<tr>
<td>High Grades or not</td>
<td>2.029</td>
<td>0.519 ***</td>
</tr>
<tr>
<td>Working on-campus or not</td>
<td>0.521</td>
<td>0.393 ***</td>
</tr>
<tr>
<td>Off-campus Resident or not</td>
<td>-0.592</td>
<td>0.465</td>
</tr>
<tr>
<td>Master’s Institutions or not</td>
<td>0.257</td>
<td>0.584</td>
</tr>
<tr>
<td>Bacc &amp; Other Institutions or not</td>
<td>0.796</td>
<td>0.860</td>
</tr>
<tr>
<td>Private or not</td>
<td>-0.411</td>
<td>1.136</td>
</tr>
<tr>
<td>Size 2,500 to 9,999 or not</td>
<td>0.373</td>
<td>0.716</td>
</tr>
<tr>
<td>Size 10,000 or More or not</td>
<td>0.931</td>
<td>1.193</td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001

**Student-Faculty Interaction (SF).** For the Student-Faculty Interaction (SF) engagement outcome, the interaction effect between international student status and STEM major was not statistically significant for both senior and freshmen students (see Table 9), meaning that the relationship between international student status and the outcome was the same across STEM and non-STEM majors for both seniors and freshmen. Findings indicate that Student status (International or not) was statistically significant for senior students ($\beta$=2.103, P<0.01), meaning that international senior students score 2.103 points higher than American senior students on the student-faculty interaction engagement indicator. Student status was not statistically significant for freshmen students, and Academic Major (STEM or not) was also not statistically significant.
for both senior and freshmen students. For senior students, control variables such as Black, Medium Grades, High Grades, Working on-campus, Off-campus Resident, Private, Size 2,500 to 9,999, and Size 10,000 or more were found significantly related to Student-Faculty interaction.

For freshmen students control variables such as Female, Black, Hispanic, Other Race, Medium Grades, High Grades, Working on-campus, Off-campus Resident, Size 2,500 to 9,999, Size 10,000 or more, and Senior were found significantly related to Student-Faculty interaction.

Table 9
Regression Analysis Summary for Student-Faculty Interaction (SF)

<table>
<thead>
<tr>
<th></th>
<th>Senior</th>
<th>Freshmen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>24.167</td>
<td>1.305</td>
</tr>
<tr>
<td>Interaction Internation &amp; STEM</td>
<td>-1.072</td>
<td>1.111</td>
</tr>
<tr>
<td>International or not</td>
<td>2.103</td>
<td>0.724</td>
</tr>
<tr>
<td>STEM or not</td>
<td>0.192</td>
<td>0.262</td>
</tr>
<tr>
<td>Female or not</td>
<td>-0.017</td>
<td>0.251</td>
</tr>
<tr>
<td>Asian or not</td>
<td>-0.076</td>
<td>0.474</td>
</tr>
<tr>
<td>Black or not</td>
<td>1.152</td>
<td>0.548</td>
</tr>
<tr>
<td>Hispanic or not</td>
<td>0.498</td>
<td>0.443</td>
</tr>
<tr>
<td>Other Race or not</td>
<td>0.709</td>
<td>0.403</td>
</tr>
<tr>
<td>Medium Grades or not</td>
<td>3.578</td>
<td>0.452</td>
</tr>
<tr>
<td>High Grades or not</td>
<td>5.322</td>
<td>0.498</td>
</tr>
<tr>
<td>Working on-campus or not</td>
<td>8.069</td>
<td>0.382</td>
</tr>
<tr>
<td>Off-campus Resident or not</td>
<td>-2.875</td>
<td>0.416</td>
</tr>
<tr>
<td>Master’s Institutions or not</td>
<td>0.777</td>
<td>0.589</td>
</tr>
<tr>
<td>Bacc &amp; Other Institutions or not</td>
<td>-0.138</td>
<td>0.925</td>
</tr>
<tr>
<td>Private or not</td>
<td>-2.013</td>
<td>0.669</td>
</tr>
<tr>
<td>Size 2,500 to 9,999 or not</td>
<td>-2.511</td>
<td>0.640</td>
</tr>
<tr>
<td>Size 10,000 or More or not</td>
<td>-4.979</td>
<td>0.981</td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001
**Effective Teaching Practice (ET).** For the Effective Teaching Practice (ET) engagement outcome, the interaction effect between international student status and STEM major was statistically significant for only senior students (see Table 10), \( \beta = -2.127, P<0.05 \), meaning that the relationship between international student status and effective teaching practice varies by major for senior students. Figure 6, the score of effective teaching practice engagement outcome was calculated to demonstrate this significant interaction effect. It shows that, while international senior student status was negatively related to effective teaching practice engagement, such a gap in this outcome across the two groups of senior students seems to be mainly due to the difference in STEM fields. Specifically, effective teaching practice engagement was similar for American senior students (41.4 points) and international senior students (42.0 points) in STEM fields, but this outcome was 3.0 points higher for international senior students (45.0) than for American senior students (42.3) in non-STEM fields. In another words, international senior non-STEM students are more engaged in effective teaching practice activities as compared to American senior non-STEM students. For Senior students control variables such as Female, Black, Hispanic, Medium Grades, High Grades, Master’s Institutions, Bacc & Other Institutions, and Size 10,000 or more were found significantly related to Effective Teaching Practice. For Freshmen students control variables such as Black, Hispanic, Medium Grades, High Grades, Off-campus Resident, Master’s Institutions, Bacc & Other Institutions, and Private were found significantly related to Effective Teaching Practice.
Figure 6: Interaction of International & STEM for Effective Teaching Practice (ET) for Senior Students

The interaction term for this model ET (Senior Students) was statistically significant (see Table 10). In Figure 6, the dependent variable is \( Y = \text{ET (Effective Teaching Practice)} \) the independent variable is \( X_1 = \text{Academic Major (STEM/Non-STEM)} \), and the other independent variable is \( X_2 = \text{Student’s Status (International/American)} \). The effect of Student status (International/American) on effective teaching practice engagement is dependent on Academic major (STEM/Non-STEM), and the effect of Academic major (STEM/Non-STEM) on effective teaching practice engagement is dependent on Student status (International/American).

The Standard Deviation for ET (effective teaching practice) was 13.454 and the Coefficient of Interaction of International and STEM = -2.127 (*) (see Table 10) [Coefficient/S.D. of ET = -2.127/13.454 = 16%]. International STEM Senior students are 16% of a standard deviation less engaged than American STEM Senior students. The Coefficient for the International variable = 2.685 (***)[Coefficient/S.D. of ET = 2.685/13.454 = 20%].

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87
International Senior students are 20% of a standard deviation more engaged than American Senior students. The Coefficient for the STEM variable = -0.934 (***). STEM Senior students are 7% of a standard deviation less engaged than Non-STEM Senior students.

Table 10
Regression Analysis Summary for Effective Teaching Practice (ET)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>p-value</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>36.237</td>
<td>0.704</td>
<td>***</td>
<td>35.492</td>
<td>0.729</td>
<td>***</td>
</tr>
<tr>
<td>Interaction Internation &amp; STEM</td>
<td>-2.127</td>
<td>0.970</td>
<td>*</td>
<td>0.588</td>
<td>0.937</td>
<td></td>
</tr>
<tr>
<td>International or not</td>
<td>2.685</td>
<td>0.558</td>
<td>***</td>
<td>1.313</td>
<td>0.630</td>
<td>*</td>
</tr>
<tr>
<td>STEM or not</td>
<td>-0.934</td>
<td>0.222</td>
<td>***</td>
<td>-0.285</td>
<td>0.230</td>
<td></td>
</tr>
<tr>
<td>Female or not</td>
<td>1.046</td>
<td>0.190</td>
<td>***</td>
<td>0.067</td>
<td>0.229</td>
<td></td>
</tr>
<tr>
<td>Asian or not</td>
<td>-0.255</td>
<td>0.430</td>
<td></td>
<td>0.333</td>
<td>0.456</td>
<td></td>
</tr>
<tr>
<td>Black or not</td>
<td>2.813</td>
<td>0.387</td>
<td>***</td>
<td>1.734</td>
<td>0.458</td>
<td>***</td>
</tr>
<tr>
<td>Hispanic or not</td>
<td>2.305</td>
<td>0.370</td>
<td>***</td>
<td>1.645</td>
<td>0.398</td>
<td>***</td>
</tr>
<tr>
<td>Other Race or not</td>
<td>0.422</td>
<td>0.297</td>
<td></td>
<td>-0.010</td>
<td>0.363</td>
<td></td>
</tr>
<tr>
<td>Medium Grades or not</td>
<td>3.171</td>
<td>0.469</td>
<td>***</td>
<td>2.788</td>
<td>0.421</td>
<td>***</td>
</tr>
<tr>
<td>High Grades or not</td>
<td>4.906</td>
<td>0.464</td>
<td>***</td>
<td>4.852</td>
<td>0.414</td>
<td>***</td>
</tr>
<tr>
<td>Working on-campus or not</td>
<td>-0.115</td>
<td>0.192</td>
<td></td>
<td>-0.402</td>
<td>0.253</td>
<td></td>
</tr>
<tr>
<td>Off-campus Resident or not</td>
<td>-0.081</td>
<td>0.253</td>
<td></td>
<td>1.076</td>
<td>0.267</td>
<td>***</td>
</tr>
<tr>
<td>Master’s Institutions or not</td>
<td>1.357</td>
<td>0.299</td>
<td>***</td>
<td>1.587</td>
<td>0.365</td>
<td>***</td>
</tr>
<tr>
<td>Bacc &amp; Other Institutions or not</td>
<td>1.830</td>
<td>0.476</td>
<td>***</td>
<td>1.973</td>
<td>0.521</td>
<td>***</td>
</tr>
<tr>
<td>Private or not</td>
<td>0.302</td>
<td>0.287</td>
<td></td>
<td>0.887</td>
<td>0.340</td>
<td>**</td>
</tr>
<tr>
<td>Size 2,500 to 9,999 or not</td>
<td>-0.702</td>
<td>0.388</td>
<td></td>
<td>-0.522</td>
<td>0.429</td>
<td></td>
</tr>
<tr>
<td>Size 10,000 or More or not</td>
<td>-1.130</td>
<td>0.479</td>
<td>*</td>
<td>-0.617</td>
<td>0.546</td>
<td></td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001

Quality of Interactions (QI). For the Quality of Interactions (QI) engagement outcome, the interaction effect between international student status and STEM major was not statistically significant for both senior and freshmen students (see Table 11), meaning that the relationship between international student status and the outcome was the same across STEM and non-STEM
majors for both seniors and freshmen. Findings indicate that Student status (International or not) was statistically significant for freshmen students ($\beta=-1.392$, $P<0.05$), meaning that international freshmen score 1.392 points lower than American freshmen in quality of interaction engagement. Student status was not statistically significant for senior students, and Academic Major (STEM or not) was also not statistically significant for both senior and freshmen students. For Senior students control variables such as Asian, Black, Other Race, Medium Grades, High Grades, Working on-campus, Off-campus Resident, Master’s Institutions, and Bacc & Other Institutions were found significantly related to Quality of Interaction. For Freshmen students, control variables such as Female, Asian, Black, Hispanic, Other Race, Medium Grades, High Grades, Off-campus Resident, Private, and Size 2,500 to 9,999 were found significantly related to Quality of Interaction.
Table 11
Regression Analysis Summary for Quality of Interactions (QI)

<table>
<thead>
<tr>
<th></th>
<th>Senior</th>
<th></th>
<th>p-value</th>
<th>Freshmen</th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>38.304</td>
<td>0.800</td>
<td>***</td>
<td>38.908</td>
<td>0.702</td>
<td>***</td>
</tr>
<tr>
<td>Interaction Internation &amp; STEM</td>
<td>-0.423</td>
<td>0.980</td>
<td></td>
<td>0.089</td>
<td>1.089</td>
<td></td>
</tr>
<tr>
<td>International or not</td>
<td>0.315</td>
<td>0.574</td>
<td>-1.392</td>
<td>0.586</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>STEM or not</td>
<td>-0.249</td>
<td>0.192</td>
<td>0.100</td>
<td>0.206</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female or not</td>
<td>-0.059</td>
<td>0.162</td>
<td>-1.418</td>
<td>0.189</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Asian or not</td>
<td>-1.014</td>
<td>0.404</td>
<td>*</td>
<td>-1.636</td>
<td>0.429</td>
<td>***</td>
</tr>
<tr>
<td>Black or not</td>
<td>1.357</td>
<td>0.381</td>
<td>***</td>
<td>-0.918</td>
<td>0.392</td>
<td>*</td>
</tr>
<tr>
<td>Hispanic or not</td>
<td>0.253</td>
<td>0.280</td>
<td>-1.391</td>
<td>0.383</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Other Race or not</td>
<td>-0.732</td>
<td>0.280</td>
<td>**</td>
<td>-0.911</td>
<td>0.300</td>
<td>**</td>
</tr>
<tr>
<td>Medium Grades or not</td>
<td>2.348</td>
<td>0.392</td>
<td>***</td>
<td>3.406</td>
<td>0.388</td>
<td>***</td>
</tr>
<tr>
<td>High Grades or not</td>
<td>4.571</td>
<td>0.399</td>
<td>***</td>
<td>5.322</td>
<td>0.395</td>
<td>***</td>
</tr>
<tr>
<td>Working on-campus or not</td>
<td>0.614</td>
<td>0.201</td>
<td>**</td>
<td>0.399</td>
<td>0.253</td>
<td></td>
</tr>
<tr>
<td>Off-campus Resident or not</td>
<td>0.550</td>
<td>0.239</td>
<td>*</td>
<td>-0.637</td>
<td>0.287</td>
<td>*</td>
</tr>
<tr>
<td>Master’s Institutions or not</td>
<td>1.296</td>
<td>0.401</td>
<td>**</td>
<td>0.416</td>
<td>0.366</td>
<td></td>
</tr>
<tr>
<td>Bacc &amp; Other Institutions or not</td>
<td>1.904</td>
<td>0.547</td>
<td>***</td>
<td>0.825</td>
<td>0.488</td>
<td></td>
</tr>
<tr>
<td>Private or not</td>
<td>0.708</td>
<td>0.454</td>
<td>1.896</td>
<td>0.341</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Size 2,500 to 9,999 or not</td>
<td>-0.619</td>
<td>0.425</td>
<td>-1.110</td>
<td>0.393</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Size 10,000 or More or not</td>
<td>-0.859</td>
<td>0.632</td>
<td>-0.660</td>
<td>0.512</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001

**Supportive Environment** (SE). For the Supportive Environment (SE) engagement outcome, the interaction effect between international student status and STEM major was not statistically significant for both senior and freshmen students (see Table 12), meaning that the relationship between international student status and the outcome was the same across STEM and non-STEM majors for both seniors and freshmen. Findings indicate that Student status (International or not) was statistically significant for senior students (β=1.593, P<0.05), meaning that international senior students score 1.593 points higher than American senior students in supportive environment engagement. Student status was not statistically significant for freshmen. Academic Major (STEM or not) was statistically significant for freshmen students (β=0.512,
P<0.05), meaning that STEM freshmen score 0.512 points higher than non-STEM freshmen on supportive environment engagement indicator. For Senior students, control variables such as Female, Black, Hispanic, Medium Grades, High Grades, Working on-campus, and Off-campus Resident were found significantly related to Supportive Environment. For Freshmen students, control variables such as Female, Black, Hispanic, Medium Grades, High Grades, Working on-campus, Off-campus Resident, and Size 2,500 to 9,999 were found significantly related to Supportive Environment.

### Table 12

**Regression Analysis Summary for Supportive Environment (SE)**

<table>
<thead>
<tr>
<th></th>
<th>Senior</th>
<th></th>
<th></th>
<th>Freshmen</th>
<th></th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Std. Error</td>
<td>p-value</td>
<td>Coefficient</td>
<td>Std. Error</td>
<td>p-value</td>
<td></td>
</tr>
<tr>
<td>(Intercept)</td>
<td>30.557</td>
<td>0.816</td>
<td>***</td>
<td>33.952</td>
<td>0.778</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Interaction Internation &amp; STEM</td>
<td>-0.823</td>
<td>1.063</td>
<td>-</td>
<td>0.689</td>
<td>1.110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International or not</td>
<td>1.593</td>
<td>0.639</td>
<td>*</td>
<td>-0.871</td>
<td>0.716</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEM or not</td>
<td>-0.400</td>
<td>0.217</td>
<td>*</td>
<td>0.512</td>
<td>0.244</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Female or not</td>
<td>1.412</td>
<td>0.216</td>
<td>***</td>
<td>1.634</td>
<td>0.224</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Asian or not</td>
<td>0.213</td>
<td>0.452</td>
<td>-</td>
<td>-0.523</td>
<td>0.503</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black or not</td>
<td>2.313</td>
<td>0.446</td>
<td>***</td>
<td>1.827</td>
<td>0.439</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Hispanic or not</td>
<td>2.211</td>
<td>0.421</td>
<td>***</td>
<td>1.475</td>
<td>0.426</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Other Race or not</td>
<td>-0.232</td>
<td>0.312</td>
<td>-</td>
<td>-0.210</td>
<td>0.353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Grades or not</td>
<td>2.941</td>
<td>0.446</td>
<td>***</td>
<td>2.544</td>
<td>0.431</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>High Grades or not</td>
<td>3.583</td>
<td>0.455</td>
<td>***</td>
<td>3.824</td>
<td>0.417</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Working on-campus or not</td>
<td>2.886</td>
<td>0.230</td>
<td>***</td>
<td>0.935</td>
<td>0.260</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Off-campus Resident or not</td>
<td>-1.682</td>
<td>0.295</td>
<td>***</td>
<td>-1.979</td>
<td>0.322</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Master’s Institutions or not</td>
<td>0.069</td>
<td>0.446</td>
<td></td>
<td>0.458</td>
<td>0.399</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacc &amp; Other Institutions or not</td>
<td>-0.228</td>
<td>0.628</td>
<td></td>
<td>0.525</td>
<td>0.582</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private or not</td>
<td>-0.109</td>
<td>0.481</td>
<td></td>
<td>0.498</td>
<td>0.416</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size 2,500 to 9,999 or not</td>
<td>-0.368</td>
<td>0.501</td>
<td></td>
<td>-1.029</td>
<td>0.445</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Size 10,000 or More or not</td>
<td>-0.458</td>
<td>0.644</td>
<td></td>
<td>0.091</td>
<td>0.595</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Significance: *p < 0.05; **p < 0.01; ***p < 0.001
Findings based on this research question revealed that both American senior and freshmen STEM students were more engaged in Collaborative learning activities as compared to international senior and freshmen STEM students, while both American seniors and freshmen and international freshmen and senior non-STEM students are not so differently engaged in Collaborative learning activities. This shows that STEM international students were not engaged in collaborative learning activities in their freshman year, but they continue to show less inclination to be more involved in collaborative learnings even in their senior years. Additionally, international senior non-STEM students were found to be more engaged in Effective Teaching Practice activities as compared to American senior non-STEM students, while American and international senior STEM students were not so differently engaged in Effective Teaching Practice activities.

Conclusion

This chapter summarized the findings of this study and details and explains the outcomes. American STEM students were found to be more engaged in Collaborative learning activities as compared to international STEM students, while American and international non-STEM students were not so different in Collaborative learning activities. Both American senior and freshmen STEM students were also more engaged in Collaborative learning activities as compared to international senior and freshmen STEM students. International senior STEM students were found to be more engaged in Effective Teaching Practice activities as compared to American senior STEM students, while American and International non-STEM students were not so different in Effective Teaching Practice activities.
These findings could have significant policy and procedure implications for higher education leaders and provide insight on student engagement for both STEM and non-STEM international and American students. These findings could become more useful when disseminated further in the college community among staff and faculty members. Student affairs staff members, international student offices, advisors, professors, and counselors could better serve and engage students and work on specific issues for these groups of students. The following chapter, Conclusion and Implications will include the summary of findings, policy implications, and implications for future research.
CHAPTER 5 – CONCLUSIONS & IMPLICATIONS

It is evident that international students are now an essential constituent of the overall student population amongst U.S. higher education colleges and universities. This puts a shared responsibility amongst U.S. higher education institutions to make a concerted effort in providing an educational experience to international students that serves them well and encourages them to stay and persist in their programs and eventually graduate (Byrd, 1991). One of the key practical influence outcomes of this study would be to raise awareness among the faculty, administrators, and other university staff about the needs and expectations of international students enrolled in STEM and non-STEM programs in American universities. Thus, guiding them in making more tailor-made changes to the policies and program that potentially could encourage positive outcomes for international students. This study can help relevant university personnel and authorities make informed decisions on necessary changes they could make to bring further improvement in experiences faced by international students while they pursue higher education in the United States.

This study examined the relationship between international student status and student engagement with the goal of gaining insight into whether this relationship differs significantly across STEM & non-STEM majors. This study also examined the relationship between international student status and engagement for freshmen and senior students as well. Additionally, several other determinants of engagement were discussed, such as student attributes (gender, race, GPA, student employment status, and residential status) and institutional characteristics (institutional control, size, and classification) were also examined. Also, for comparative purposes, the relationship between American student status (STEM vs. non-STEM
major) and their engagement was also studied. The comparison between American and international students can provide valuable insights on similarities and differences, if any, between these two groups, which in turn can provide useful inputs to the university on how to cater to and address the specific needs of each group. The findings can help counselors, professors, advisors, and international program offices to improve policies and programs to better understand better, engage, and serve these students effectively.

**Summary of Findings**

The descriptive analyses provided the makeup of the student population sample used in this study. The data obtained from NSSE for the present study included more non-STEM students than STEM students for both international and American student populations. The majority of students were female in both groups, American and international students. Regarding race and ethnicity, Asian international students constituted the most substantial majority among international students, while amongst American students, the largest majority was White students. A majority of the American and international students reported High (A & A-) grades as most of their grades at their current institution. More international students were employed on-campus as compared to American students. More international and American students were living off-campus as compared to on-campus. Regarding the Carnegie classification of institutions, the majority of international students were enrolled at a Research Institution, and the majority of American students were enrolled at a Master’s Institution.

An independent-sample T-Test was conducted at the .05 level of significance to answer the research question: How is the engagement level distributed among international and American students? The engagement level of international and American students was not same
for five engagement indicators: Discussion with Diverse Others (DD), Student-Faculty Interaction (SF), Effective Teaching Practices (ET), Quality of Interaction (QI), and Supportive Environment (SE). The engagement level of international and American students was the same only for Collaborative Learning (CL). This indicates that when it comes to Collaborative Learning, the learning achieved by student willingness to collaborate with others or work jointly in group assignments, both international and American students have the same engagement level. However, when it comes to Discussion with Diverse Others, Student-Faculty Interaction, Effective Teaching Practices, Quality of Interaction, and Supportive Environment, both international and American students have different engagement levels. The average Discussion with Diverse others engagement factor for American students was statistically higher by 1.509 points than the average Discussion with Diverse others engagement factor for international students. The average Quality of Interaction engagement factor for American students was statistically higher by 0.793 points than the average Quality of Interaction engagement factor for international students. The average Student-Faculty Interaction engagement factor for international students was statistically higher by 2.507 points than the average Student-Faculty Interaction engagement factor for American students. The average Effective Teaching Practices engagement factor for international students was statistically higher by 1.899 points than the average Effective Teaching Practices engagement factor for American students. The average Supportive Environment engagement factor for international students was statistically higher by .758 points than the average Supportive Environment engagement factor for American students.

The Ordinary Least Squares (OLS) regression with Huber-White clustered standard errors was used to capture the nested data structure, facilitating analysis of institutional effects on students and examining cross-level interactions for the whole sample in research question
number two, does the relationship between international student status and engagement differ by STEM vs. non-STEM majors? Moreover, for freshmen and senior students separately in research question number three, how is the relationship pattern different or the same across the freshmen and senior cohorts? In the findings of research question number two, the Interaction effect for collaborative learning (CL) engagement variable was statistically significant. The collaborative learning engagement indicator comes under the learning with peers theme, and it includes survey questions “Asked another student to help you understand course material”, “Explained course material to one or more students”, “Prepared for exams by discussing or working through course material with other students”, “Worked with other students on course projects or assignments”. The effect of Student status (International/American) on collaborative learning engagement was dependent on Academic major (STEM/Non-STEM), and the impact of Academic major (STEM/Non-STEM) on collaborative learning engagement was dependent on Student’s status (International/American). Collaborative learning engagement outcome demonstrated a significant interaction effect; it shows that, while international student status was negatively related to collaborative learning engagement, such a gap in this outcome across the two groups of students is more evident for students in the STEM fields. Specifically, the collaborative learning engagement was similar for American students and international students in non-STEM fields, but this outcome was higher for American students than for international students in STEM fields. In another words, American STEM students were more engaged in Collaborative learning activities as compared to international STEM students. Control variables such as Asian, Black, Medium Grades, High Grades, Working on-campus, Off-campus Resident, and Senior were also found significantly related to Collaborative Learning. Additionally, for Collaborative Learning
engagement, international STEM students were 21.7% of a standard deviation less engaged than American STEM students.

When looking at the results of research question number three for freshmen and senior students separately, the interaction effect for the collaborative learning (CL) engagement variable was statistically significant for senior students. The Collaborative learning engagement outcome demonstrated a significant interaction effect. It shows that, while international senior student status was negatively related to collaborative learning engagement, such a gap in this outcome across the two groups of senior students seems to be more evident for students in the STEM field. Specifically, the collaborative learning engagement was similar for American senior students and international senior students in non-STEM fields, but this outcome was higher for American senior students than for international senior students in STEM fields. In another words, American senior STEM students were more engaged in Collaborative learning activities compared to international senior STEM students. For senior students, control variables such as Black, Medium Grades, High Grades, Working on-campus, and Off-campus Resident were found significantly related to Collaborative Learning. Additionally, for Collaborative Learning engagement, international STEM Senior students were 18.9% of a standard deviation less engaged than American STEM Senior students.

The interaction effect for the collaborative learning (CL) engagement variable was also statistically significant for freshmen students. The collaborative learning engagement outcome demonstrated a significant interaction effect for freshmen students. It shows that, while international freshmen student status was negatively related to collaborative learning engagement, such a gap in this outcome across the two groups of freshmen students seems to be more evident for students in STEM fields. Specifically, the collaborative learning engagement
was similar for American freshmen students and international freshmen students in non-STEM fields, but this outcome was higher for American freshmen students than for international freshmen students in STEM fields. In another words, American freshmen STEM students were more engaged in Collaborative learning activities as compared to international freshmen STEM students. For Freshmen students, control variables such as Asian, Hispanic, Other Race, Medium Grades, High Grades, Working on-campus, Off-campus Resident, Master’s Institution, and Size 10,000 or more were found significantly related to Collaborative Learning. Additionally, for Collaborative Learning engagement, international STEM freshmen students were 23% of a standard deviation less engaged than American STEM freshmen students.

The interaction effect for the effective teaching practice (ET) engagement variable was not statistically significant for the whole student population (freshmen and senior students together) but was statistically significant for senior students only. The effective teaching practice engagement indicator comes under the experiences with faculty theme and it includes survey questions “during the current school year, to what extent have your instructors done the following”, “Clearly explained course goals and requirements”, “Taught course sessions in an organized way”, “Used examples or illustrations to explain difficult points”, “Provided feedback on a draft or work in progress”, and “Provided prompt and detailed feedback on tests or completed assignments”. The effective teaching practice engagement outcome demonstrated a significant interaction effect. It shows that, while international senior student status was negatively related to effective teaching practice engagement, the gap in this outcome across the two groups of senior students seems to be more evident for students in the non-STEM fields. Specifically, the effective teaching practice engagement was similar for American senior students and international senior students in STEM fields, but this outcome was higher for
international senior students than for American senior students in non-STEM fields. In another words, international senior non-STEM students were more engaged in effective teaching practice activities as compared to American senior non-STEM students. For senior students, control variables such as Female, Black, Hispanic, Medium Grades, High Grades, Master’s Institutions, Bacc & Other Institutions, and Size 10,000 or more were found significantly related to Effective Teaching Practice. For freshmen students, control variables such as Black, Hispanic, Medium Grades, High Grades, Off-campus Resident, Master’s Institutions, Bacc & Other Institutions, and Private were found to be significantly related to Effective Teaching Practice. Additionally, for Effective Teaching Practice engagement, international STEM senior students were 16.3% of a standard deviation less engaged than American STEM senior students.

Major trends found in this study were: first, international and American student engagement levels were not same for Discussion with Diverse Others (DD), Student-Faculty Interaction (SF), Effective Teaching Practices (ET), Quality of Interaction (QI) and Supportive Environment (SE). The engagement level of international and American students was the same only for the Collaborative Learning (CL) engagement indicator. Second, American STEM students were more engaged in Collaborative learning activities than international STEM students. Third, looking at the collaborative Learning activity for freshmen and senior students, I found that American freshmen and Senior STEM students were more engaged in Collaborative learning activities than international freshmen and senior STEM students. This contradicts the studies by Zhao, Kuh, and Carini (2005) and Korobova, and Starobin (2015), which found that by the senior year, both international and American student engagement patterns were very similar. Fourth, international senior non-STEM students were more engaged in effective teaching practice activities as compared to American senior non-STEM students.
Implications for Policy and Practice

The level of satisfaction reported by international students in their educational experience had a profound influence on whether they would continue to stay and pursue their education in U.S. universities. Also, with an ever-growing influx of international students in American universities, a sense of dissatisfaction and discontinuation of studies can send wrong signals to the future generation of prospective international students, and hence, potentially could become a matter of concern for American universities. As a result, American universities are expected to lay growing emphasis and importance on several key factors, such as increased level of student-faculty interaction, the quality of relationships that these students experience, a collaborative environment that promotes cross-cultural student interaction, an institutional focus on students and the academic challenges they perceive that play a vital role in their satisfaction level with respect to their educational experience. In order to facilitate a higher level of international student academic engagement and integration, there are several strategies universities could look at deploying, such as setting up counseling programs on an individual basis, setting up online tools for students’ easy access, pairing students with others, or creating a mentorship program, as well as setting up specialized workshops.

Collaborative Learning Engagement: one of the findings from this study showed that American STEM students were found to be much more engaged in Collaborative learning activities than international STEM students. This can be especially concerning to American universities, not from the perspective of influx of prospective international students into American universities, who tend to major in the STEM fields more often than in the non-STEM fields, but because any dissatisfaction and frustration among the international STEM students
could have a ripple effect in the future in terms of maintaining a skilled labor market needed to keep the U.S. leading edge in innovation. As described in Chapter 1, in 2014-2015, 44% of international students were enrolled in STEM fields, 20% were enrolled in Business & Management, 8% in Social Science, 6% Intensive English, and 17% were enrolled in undeclared and other programs (Institute of International Education, 2015). Collaborative learning is based on a process wherein students cooperate and make collective efforts in learning while working together and collaborating with other students. This helps in facilitating problem-solving and understanding difficult material, as well as encourages student interaction and social integration. Rather than students spending hours to understand a concept, they can, instead, collaborate with other students in class and can have support groups within the institution that reinforce learning such ideas (NSSE 2017). The results show that American STEM students were more engaged in Collaborative learning activities than international STEM students. Thus, additional support could be offered to international students by promoting collaboration and teamwork to ensure they are increasingly engaged in collaborative learning activities. In order to increase student engagement, universities need to find different ways of facilitating student interaction among diverse others, be it through focus groups or assigning mentors to students, which can provide a starting platform for international students and lead to better student retention. Research shows that students who collaborate, create social ties and interactions with other students are considered more engaged than those who do not collaborate with other students, because they are not reaching out to other students for help and support (NSSE 2017). Thus, it is evident that additional support is needed for international students, and necessary changes could be brought to the programs and structure in STEM fields to promote further collaboration and teamwork to ensure that they too are increasingly engaged in collaborative learning activities.
Collaborative Learning Engagement of Freshmen and Senior Students: both American freshmen and senior STEM students were also more engaged in Collaborative learning than international freshmen and senior STEM students. Not only were STEM international freshmen not engaged in collaborative learning activities, but they continued to show less inclination to be involved in collaborative learning even in their senior year. One could potentially assume that in the freshman year, due to the new college environment and interaction within a new culture, race, and/or ethnicities less collaboration might be expected, however, institutional support and policies could have a desirable impact on increased involvement in collaborative learning, as international student progress through their program toward their senior year. This study shows a significant gap in the services provided to international STEM students in colleges across America, as international students do not show much improvement in collaborative learning, even in their senior year. Establishing cultural and social exchange-based campus programs between international students and American students could facilitate bridging the social and psychological gap between international and host country students. As stated in the collaborative learning definition from NSSE, reaching out for academic support is essential for an individual's success, especially if students have opted for STEM fields. Students face a lot of pressure and limited time to work on their various assignments, lecture notes, and tests. Students who begin to tutor or explain concepts to other students also revise their own concepts, which can help them clarify their ideas and create a higher level of engagement with the institution (NSSE 2017).

Effective Teaching Practice Engagement of Senior Students: International senior non-STEM students were found much more engaged in effective teaching practice activities than American senior non-STEM students. Effective Teaching practice includes “organized
instruction, clear explanations, illustrative examples, and effective feedback” (NSSE 2017). Students learn better when a faculty member is organized in their instructional activity, and it is essential for students’ engagement in the classroom as it keeps their focus in classes and makes learning more structured (NSSE 2017). This shows that teachers and educators need to understand that every student, whether local or international, has a different pace of learning in the classroom; all students cannot be taught in the same manner. Additionally, it can also be assumed that international students, who are new to the international college environment and culture, could hesitate or be inhibited from coming forward proactively to clarify their doubts and confusion with fellow students and faculty. Thus, as part of effective teaching practices, teachers would do well to consider the needs of both the domestic and international student communities and promote discussion and facilitate constructive feedback. Students value teacher feedback as it provides them guidelines to apply to future work or assignments. Constructive feedback can help students better understand the concepts and coursework that faculty are presenting (NSSE 2017).

The literature indicates that various factors affect international student engagement in the host country. The university environment can and should be made more receptive and welcoming for international students. International student experiences can be distressing for students who face social exclusion, language and cultural barriers, racism, lack of interaction with nationals, and other factors such as homesickness, and many more. International students who are unable to find any social, cultural, or economic support become more vulnerable to social exclusion (Sherry et al., 2010). Universities that only focus on the academic needs of international students tend to ignore the other potential factors affecting the engagement and adjustment of these students in the education institution (Tidwell & Hanassab, 2007; Sherry et
A welcoming college or university, therefore, is a crucial factor in the mental and psychological well-being of international students (Sümer et al., 2008; Sherry et al., 2010).

**International Student Services:** colleges and universities provide international student services to assist international students’ transition smoothly into the program and get accustomed to the campus culture, however, many students face adjustment difficulties in their initial years. Based on a study by Zhao et al. (2005), to enable a smooth and effective transition for international students on U.S. campuses, special programs such as focused orientation sessions or summer campus programs have shown to be effective. Other arrangements such as grouping international students from the same country and assigning them to the same accommodation facilities such as dorms, buildings, or potentially the same rooms could enhance their satisfaction levels at the new college campus. However, it could increase their social isolation from other groups and achieving a balance might be tricky for the International student services Office.

Staff responsible for student affairs must ensure the creation of focused programs and other collaborative tasks that facilitate the interaction of international students with other students from diverse backgrounds. For instance, it is commonly noticed that most campuses today observe festivities and celebrations relating to different cultures. For such events, one could look at involving students from other communities to be part of the event planning process, which could further encourage international students from diverse backgrounds to participate in such events and festivities on college campuses.

A key aspect to be kept in mind by international educators and other professionals is to place a significant emphasis on the quality of relationships between international students and academic and non-academic staff members, and the associations these international students build with other international and American students. Also, it is essential for these professionals
to highlight the fact that the institution they work with also understands the importance of the non-academic responsibilities of international students, and how they can make easier for students to manage their non-academic duties such as family, work, etc., so they can thrive socially as well.

**Internationalization of College Campuses:** In order to make university campuses more attractive to prospective international students and be more versatile for domestic students, one approach is that colleges and universities could focus on the internationalization of college campuses. This will help both STEM & non-STEM students to be more engaged in various activities across the college campus. To understand this better, it is essential to know what internationalization means and how it would impact international and domestic students on campus. “Internationalization of higher education is the process of integrating an international dimension into the teaching/learning, research, and service function of a university or college. An international dimension means a perspective, activity or service which introduces or integrates an interaction/intercultural/global outlook into this major function of an institution of higher education” (Knight, 1994). Thus, internationalization of college campus could provide an opportunity for students who usually would not come forward and actively participate in tasks or activities a familiar environment to act upon, and thus can participate more effectively and lead to interactions with other students, faculty, and staff. This could also provide them with a chance for opening up to the new culture and learning environment, which would have generally required greater effort to do on their own.

**Role of Academic Affairs:** One of the critical roles Academic Affairs plays is in providing faculty development to facilitate working effectively with the diverse student population. Student engagement is an important consideration today and plays a pivotal role
because the student population is more diverse than ever before (Laird et al. 2008). This definitely puts further pressure on the teaching staff to be more proactive in their practices, and hence makes their job more challenging and arduous (Laird et al. 2008). Universities and institutions can directly influence the methods and practices adopted by faculty while they try to induce proactive learning and influence student behavior. When the faculty create teaching plans based on best practices that include designing assignment work as well as more collaborative and team-based tasks, be it inside the class or out-of-class, students tend to bring their best effort forward (Laird et al. 2008). Thus, it becomes essential for academic affairs offices to provide training and development to all faculty members that facilitate working with and teaching a diverse student population.

**Role of Student Affairs:** researchers have also emphasized the role of student affairs staff in providing a higher level of student engagement across campus (Kinzie & Kuh, 2004; Kuh 2008, 2009; Kuh et al., 2005; Manning, Kinzie & Schuh, 2006). Student affairs staff need to understand that their international students face more challenges and might need more support than domestic students. For example, working on campus can make it is easier for an international student to understand the working culture and can lead to a smoother adaptation to the higher education system and overall American culture. Kuh (2008 & 2009) emphasized the importance of campus job opportunities and how student affairs staff members can capitalize on this to create high impact engagement activities for all students. The international student affairs offices can pick on these high impact engagement activities and customize them for international students. Also student affairs committees and its associated members should also look at these high impact engagement activities that can be further tailored for STEM and non-STEM international students, such as administrative work pertaining to research laboratory work versus
a job at the library counter; offering relevant jobs could not only encourage collaboration and engagement, but would also allow for students to share relevant ideas and learning.

With this era of modern technology and various means available to universities for information dissemination as well as information gathering, the faculty could also channel technology to help engage students more. Universities can look at establishing specific blogs and online portals that allow students to share concerns, get constructive feedback, and provide an opportunity to share back with the college community openly. Although universities today do deploy various technical methods to work on student assignments and academic tasks, however, informal technical platforms could also be facilitated such as online focus groups and online blogs where students could share ideas on how to improve their experiences and address challenges faced by the student of the same ethnicity, status, or other characteristics. This would allow the student to be more free and open, as each student may have inhibitions to talk freely in one-on-one counseling sessions. Using the same platform, the university can then disseminate information to each group about the special programs created to address those needs and incorporate feedback and inputs at the same time. Information collected through this means can also serve as valuable inputs for future research.

**Implications for Future Research**

This study focused on the relationship between international student status and student engagement and examined whether student engagement significantly differs for STEM and non-STEM majors. The present research builds on the current literature and focuses on international student engagement based on their field of study, i.e., STEM vs. non-STEM programs. The comparison between American and international students can provide insight into how much
these two student populations are similar and are different, and whether custom programs and
counseling based on student status and background factors would further lead to retention at the
American universities. The findings of this study offers potential in assisting counselors,
professors, advisors, and international student offices to understand better and assist with the
needs of American and international students, so the specific engagement issues of each group
can be addressed adequately. That said, there is still a need for further research and discussion
about international student experiences in several other areas.

First, a mixed method study using qualitative data could contribute significantly to the
student engagement literature and research. Since qualitative research results have been used for
validating quantitative research outcomes (Creswell et al., 2006), mixed method studies are
required in this field. These types of studies where both qualitative and quantitative methods are
used can provide valuable insight into student perspectives. A qualitative study can provide an
opportunity for students to respond to various other nonsocial and nonacademic characteristics,
which potentially get ignored by a quantitative study, and hence can further substantiate or
contradict the findings of a study. Mixed method study will provide responders an opportunity to
elaborate further on student experiences. Mason (2006) stated that using either qualitative or
quantitative methods alone does not justify social research studies, however using mixed
methods can refine and validate research inquiry and directions; qualitative research can help in
identifying and developing relevant quantitative measures.

Second, a longitudinal study of international and American STEM and non-STEM
students could provide insight on student engagement levels over time, from freshman to senior
year. This study found that student engagement amongst American freshmen and seniors
remained high, while international students, although they started at low level of engagement in
freshmen year, continued to show lower engagement levels in their freshmen year. One could expect engagement levels to improve as time goes by, as students acclimatizes to the college and social-cultural environment. Thus, it will be valuable to see if American and international freshmen STEM and non-STEM students’ level of engagement changes over time, and if it does, what are the drivers and influences of this change in engagement. If we followed the experiences of the same set of students over some time, as part of a longitudinal study, the data would become more meaningful as student engagement across the ten engagement variables could be measured, along with the impact of institutional activities and campus involvement of American and international students. Longitudinal data could provide valuable insight into the institution’s leadership, mainly the academic and student affairs offices, for making better student-focused decisions and identifying gaps in academic and non-academic student engagement indicators across campus.

Third, looking at the data by country/region of origin of international students could provide us valuable insight about engagement patterns based on where the students come from. For example, studies show that Asian international students face more academic and non-academic challenges as compared to other international students on American college campuses. Previous research suggests that there are various other factors, such as limited exposure to the U.S. academic and social environment, as well as substantial dissimilarities between languages, cultural values, socioeconomic and academic life, as well as differences in communication patterns that aggravate challenges faced by Asian international students compared to international students from other regions. (Fritz, Chin, & DeMarinis, 2008; Li & Gasser, 2005; Nilsson, Butler, Shouse, & Joshi, 2008; Poyrazli, Kavanaugh, Baker, & Al-Timimi, 2004; Sato & Hodge, 2009; Trice, 2004). International students coming from Western Europe can
communicate well in English and are able to easily establish social contact with American students (Trice, 2004). This type of data for international students based on their country or region of origin can provide valuable insight to different offices across campus to be better prepared to assist international students and create a new and innovative customized program for international students.

Fourth, future studies could also look at international and American STEM student engagement separately. Looking at these two student populations separately might provide additional insight into how their engagements differ across NSSE’s engagement indicators. Understanding the engagement of international students on its own is important, as this student population not only brings monetary and financial benefits, but also brings diversity to the American college campus, and still at times faces social isolation and exclusion. Thus, using American students’ data/results as the baseline to compare international students’ engagement can highlight the differences between these two groups and provide valuable insight into factors to focus on.

**Conclusion**

American education is ranked amongst the top educational systems in the international community. It has attracted foreign students, delegates, and scholars who want to study in its diverse and dynamic culture and enriching learning environment and seek insights that they can implement in their home country for its advancement. However, just because international students are enrolled in and attend colleges abroad does not readily translate into positive outcomes in the educational experience of international students. Looking at the collaborative learning engagement of international STEM students, it is evident that they are less engaged in
collaborative learning activities than American students. This is true not only as a whole group but also when we break international students in freshmen and senior groups. Collaborative learning activities include learning achieved by a student’s willingness to collaborate with others to get a better handle on difficult tasks, as well as helping and explaining the materials to others and working jointly in group assignments. These skills are essential for individuals working in any field, but particularly for individuals working in STEM fields. This is a skill that is instilled in American students’ upbringing starting in elementary school, such as building community projects/science projects in teams, but this might not be a common practice in many countries or cultures across the world. Thus, it becomes the responsibility of the higher education institutions to instill these skill sets in international students as they progress in their educational endeavors here in America. Programs that are built to support peer interactions amongst local students and international students could have a positive impact on students given there is enough participation and cross-cultural training provided to local U.S. American and international students (Geelhoed, Abe, & Talbot, 2003).

Looking at the Effective Teaching Practices, the study found that international senior non-STEM students were more engaged in effective teaching practice activities than American senior non-STEM students. Effective teaching practices include the techniques utilized by the teaching faculty that facilitate and encourages a student’s ability to understand and comprehend course material effectively and easily, such as by using various practical examples and providing constructive, timely, and useful feedback. These skills are equally important and required for effective learning for non-STEM and STEM students alike. As a result, unless international students experience comfort and satisfaction with the academic or nonacademic experiences offered by American universities, it could subsequently have a damaging effect in the long run.
on international student enrollment and may create a future lag in terms of availability of a highly skilled labor force to the American job market as well as to other parts of the world. As stated earlier, unawareness about international student engagement may conceal any gaps that international students may experience while participating in various programs, policies, and activities offered by colleges. Revealing insights about what makes international students more engaged and achieve satisfaction and success in American university STEM or non-STEM programs can increase students’ overall experience and lead to positive outcomes for these students. This could also create a ripple effect regarding word-of-mouth publicity where satisfied international students act as ambassadors on behalf of universities to influence future generations of prospective international students in why they should choose to attend an American university and its programs for success and advancement.

Concluding Thoughts

In today’s academic environment when colleges are competing to recruit even one domestic student, and at the same time, must make sure that accepted/registered international students can clear immigration at the U.S. border, it is imperative to engage and retain continuing and new domestic and international students. It would be unwise to assume a “one size fits all” approach now, as college campuses have become increasingly become diverse at American universities. As a result, there is a critical need to treat the needs of each group separately and create programs that allow cross-collaboration. Also, gone are the days when student engagement was the sole responsibility of student affairs or academic affairs offices; colleges now need to adopt a more holistic and institution-wide approach toward student engagement. Everyone at the institution that a student comes in contact has an impact on student experiences,
and innovative, engaging activities for STEM international students are crucial as they can assist in keeping these students engaged at the institution.
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APPENDIX A: National Survey of Student Engagement (NSSE) Survey 2015 (Paper Version)

1. During the current school year, about how often have you done the following?
   Response options: Very often, Often, Sometimes, Never
   a. Asked questions or contributed to course discussions in other ways
   b. Prepared two or more drafts of a paper or assignment before turning it in
   c. Come to class without completing readings or assignments
   d. Attended an art exhibit, play, or other arts performance (dance, music, etc.)
   e. Asked another student to help you understand course material
   f. Explained course material to one or more students
   g. Prepared for exams by discussing or working through course material with other students
   h. Worked with other students on course projects or assignments
   i. Given a course presentation

2. During the current school year, about how often have you done the following?
   Response options: Very often, Often, Sometimes, Never
   a. Combined ideas from different courses when completing assignments
   b. Connected your learning to societal problems or issues
   c. Included diverse perspectives (political, religious, racial/ethnic, gender, etc.) in course discussions or assignments
   d. Examined the strengths and weaknesses of your own views on a topic or issue
   e. Tried to better understand someone else’s views by imagining how an issue looks from his or her perspective
   f. Learned something that changed the way you understand an issue or concept
   g. Connected ideas from your courses to your prior experiences and knowledge

3. During the current school year, about how often have you done the following?
   Response options: Very often, Often, Sometimes, Never
   a. Talked about career plans with a faculty member
   b. Worked with a faculty member on activities other than coursework (committees, student groups, etc.)
   c. Discussed course topics, ideas, or concepts with a faculty member outside of class
   d. Discussed your academic performance with a faculty member

4. During the current school year, how much has your coursework emphasized the following?
   Response options: Very much, Quite a bit, Some, Very little
   a. Memorizing course material
   b. Applying facts, theories, or methods to practical problems or new situations
   c. Analyzing an idea, experience, or line of reasoning in depth by examining its parts
   d. Evaluating a point of view, decision, or information source
   e. Forming a new idea or understanding from various pieces of information

5. During the current school year, to what extent have your instructors done the following?
   Response options: Very much, Quite a bit, Some, Very little
   a. Clearly explained course goals and requirements
   b. Taught course sessions in an organized way
   c. Used examples or illustrations to explain difficult points
   d. Provided feedback on a draft or work in progress
   e. Provided prompt and detailed feedback on tests or completed assignments

6. During the current school year, about how often have you done the following?
   Response options: Very often, Often, Sometimes, Never
   a. Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.)
   b. Used numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)
   c. Evaluated what others have concluded from numerical information

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National Survey of Student Engagement

7. During the current school year, about how many papers, reports, or other writing tasks of the following lengths have you been assigned? (Include those not yet completed.)
   Response options: None, 1-2, 3-5, 6-10, 11-15, 16-20, More than 20 papers
   a. Up to 5 pages
   b. Between 6 and 10 pages
   c. 11 pages or more

8. During the current school year, about how often have you had discussions with people from the following groups?
   Response options: Very often, Often, Sometimes, Never
   a. People of a race or ethnicity other than your own
   b. People from an economic background other than your own
   c. People with religious beliefs other than your own
   d. People with political views other than your own

9. During the current school year, about how often have you done the following?
   Response options: Very often, Often, Sometimes, Never
   a. Identified key information from reading assignments
   b. Reviewed your notes after class
   c. Summarized what you learned in class or from course materials

10. During the current school year, to what extent have your courses challenged you to do your best work?
    Response options: 1=Not at all to 7=Very much

11. Which of the following have you done or do you plan to do before you graduate?
    Response options: Done or in progress, Plan to do, Do not plan to do, Have not decided
    a. Participate in an internship, co-op, field experience, student teaching, or clinical placement
    b. Hold a formal leadership role in a student organization or group
    c. Participate in a learning community or some other formal program where groups of students take two or more classes together
    d. Participate in a study abroad program
    e. Work with a faculty member on a research project
    f. Complete a culminating senior experience (capstone course, senior project or thesis, comprehensive exam, portfolio, etc.)

12. About how many of your courses at this institution have included a community-based project (service-learning)?
    Response options: All, Most, Some, None

13. Indicate the quality of your interactions with the following people at your institution.
    Response options: 1=Poor to 7=Excellent, Not Applicable
    a. Students
    b. Academic advisors
    c. Faculty
    d. Student services staff (career services, student activities, housing, etc.)
    e. Other administrative staff and offices (registrar, financial aid, etc.)

14. How much does your institution emphasize the following?
    Response options: Very much, Quite a bit, Some, Very little
    a. Spending significant amounts of time studying and on academic work
    b. Providing support to help students succeed academically
    c. Using learning support services (tutoring services, writing center, etc.)
    d. Encouraging contact among students from different backgrounds (social, racial/ethnic, religious, etc.)
    e. Providing opportunities to be involved socially
    f. Providing support for your overall well-being (recreation, health care, counseling, etc.)
    g. Helping you manage your non-academic responsibilities (work, family, etc.)
    h. Attending campus activities and events (performing arts, athletic events, etc.)
    i. Attending events that address important social, economic, or political issues

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15. About how many hours do you spend in a typical 7-day week doing the following?
   Response options: 0, 1-5, 6-10, 11-15, 16-20, 21-25, 26-30, More than 30 (Hours per week)
   a. Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)
   b. Participating in co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.)
   c. Working for pay on campus
   d. Working for pay off campus
   e. Doing community service or volunteer work
   f. Relaxing and socializing (time with friends, video games, TV or videos, keeping up with friends online, etc.)
   g. Providing care for dependents (children, parents, etc.)
   h. Commuting to campus (driving, walking, etc.)

16. Of the time you spend preparing for class in a typical 7-day week, about how much is assigned reading?
   Response options: Very little, Some, About half, Most, Almost all

17. How much has your experience at this institution contributed to your knowledge, skills, and personal development in the following areas?
   Response options: Very much, Quite a bit, Some, Very little
   a. Writing clearly and effectively
   b. Speaking clearly and effectively
   c. Thinking critically and analytically
   d. Analyzing numerical and statistical information
   e. Acquiring job- or work-related knowledge and skills
   f. Working effectively with others
   g. Developing or clarifying a personal code of values and ethics
   h. Understanding people of other backgrounds (economic, racial/ethnic, political, religious, nationality, etc.)
   i. Solving complex real-world problems
   j. Being an informed and active citizen

18. How would you evaluate your entire educational experience at this institution?
   Response options: Excellent, Good, Fair, Poor

19. If you could start over again, would you go to the same institution you are now attending?
   Response options: Definitely yes, Probably yes, Probably no, Definitely no

20a. How many majors do you plan to complete? (Do not count minors.)
   Response options: One, More than one

20b. [If answered “One”] Please enter your major or expected major: [Text box]

20c. [If answered “More than one”] Please enter up to two majors or expected majors (do not enter minors): [Text box]

21. What is your class level?
   Response options: Freshman/first-year, Sophomore, Junior, Senior, Unclassified

22. Thinking about this current academic term, are you a full-time student?
   Response options: Yes, No

23a. How many courses are you taking for credit this current academic term?
   Response options: 0, 1, 2, 3, 4, 5, 6, 7 or more

23b. Of these, how many are entirely online?
   Response options: 0, 1, 2, 3, 4, 5, 6, 7 or more

24. What have most of your grades been up to now at this institution?
   Response options: A, A-, B+, B, B-, C+, C, C- or lower
25. Did you begin college at this institution or elsewhere?
Response options: Started here, Started elsewhere

26. Since graduating from high school, which of the following types of schools have you attended other than the one you are now attending? (Select all that apply.)
Response options: Vocational or technical school, Community or junior college, 4-year college or university other than this one, None, Other

27. What is the highest level of education you ever expect to complete?
Response options: Some college but less than a bachelor's degree, Bachelor's degree (B.A., B.S., etc.), Master's degree (M.A., M.S., etc.), Doctoral or professional degree (Ph.D., J.D., M.D., etc.)

28. What is the highest level of education completed by either of your parents (or those who raised you)?
Response options: Did not finish high school, High school diploma or G.E.D., Attended college but did not complete degree, Associate's degree (A.A., A.S., etc.), Bachelor's degree (B.A., B.S., etc.), Master's degree (M.A., M.S., etc.), Doctoral or professional degree (Ph.D., J.D., M.D., etc.)

29. What is your gender identity?
Response options: Men, Women, Another gender identity, please specify; I prefer not to respond

30. Enter your year of birth (e.g., 1994):

31a. Are you an international student?
Response options: Yes, No

31b. [If answered “yes”] What is your country of citizenship?

32. What is your racial or ethnic identification? (Select all that apply.)
Response options: American Indian, Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, White, Other, I prefer not to respond

33. Are you a member of a social fraternity or sorority?
Response options: Yes, No

34. Which of the following best describes where you are living while attending college?
Response options: Dormitory or other campus housing (not fraternity or sorority house), Fraternity or sorority house, Residence (house, apartment, etc.) within walking distance to the institution, Residence (house, apartment, etc.) farther than walking distance to the institution, None of the above

35. Are you a student-athlete on a team sponsored by your institution's athletics department?
Response options: Yes, No

36. Are you a current or former member of the U.S. Armed Forces, Reserves, or National Guard?
Response options: Yes, No

37a. Have you been diagnosed with any disability or impairment?
Response options: Yes, No, I prefer not to respond

37b. [If answered “yes”] Which of the following has been diagnosed? (Select all that apply.)
Response options: A sensory impairment (vision or hearing), A mobility impairment, A learning disability (e.g., ADHD, dyslexia), A mental health disorder, A disability or impairment not listed above

38. Which of the following best describes your sexual orientation? [Question administered per institution request.]
Response options: Heterosexual; Gay; Lesbian; Bisexual; Another sexual orientation, please specify; Questioning or unsure; I prefer not to respond
APPENDIX B: NSSE Data Sharing Agreement

Indiana University
Data Sharing Agreement

This Indiana University Center for Postsecondary Research Data Sharing Agreement ("Agreement") defines the parameters for data sharing from the National Survey of Student Engagement ("NSSE") between the Research Institution(s) and its Authorized Researchers named below and the Trustees of Indiana University on behalf of the Indiana University Center for Postsecondary Research ("IUCPR"). The terms below are intended to reflect and comply with the existing agreements between NSSE and the institutions that participate in the survey program. Under these participation agreements, NSSE may:

"...make data, in which individual institutions or students cannot be identified, available to researchers interested in studying the undergraduate experience... NSSE results specific to each institution and identified as such will not be made public except by mutual agreement between NSSE and the institution."

RESEARCHERS
The following researchers ("Authorized Researchers") of Felician University ("Research Institution") may make use of NSSE data pursuant to the terms of this Agreement:

Reema Negi, [redacted]

FACULTY SPONSOR (Required for students)
Dr. Rong Chen, Associate Professor, Seton Hall University, [redacted]

PROJECT TITLE or TOPIC ("Project")
STEM Effects on American and International Student Engagement

DATA DESCRIPTION
Under this Agreement, IUCPR will provide the researchers a data file delimited in the following ways ("NSSE Data File"):

Data Source(s):
NSSE 2015

Variables:
All core NSSE survey items, institution-provided variables (sex, race/ethnicity, enrollment status, class level), and institution-level variables (Carnegie type, control, enrollment size in categories). All student identifiers will be removed. Institution identifiers will be replaced with unique non-identifiable codes.

Cases:
20% random sample of first-year and senior American students and 100% of first-year and senior international students.

PARAMETERS FOR DATA SHARING:
1. IUCPR will provide a single copy of the NSSE Data File solely for non-commercial research by the Authorized Researchers.
Indiana University
Data Sharing Agreement

2. The NSSE Data File will exclude the Unit ID code from Integrated Postsecondary Educational Data System (IPEDS), any other unique school or student identifiers, and any variables that IUCPR determines reasonably may permit the identification of a participating school or student.

3. The Authorized Researchers will not attempt, privately or publicly, to associate elements of the NSSE Data File with the individual institutions or individual students participating in the NSSE, nor will they share the data with anyone else who might do so.

4. In all publications or presentations of data obtained through this agreement, the Authorized Researchers agree to include the following citation:

   “NSSE data were used with permission from The Indiana University Center for Postsecondary Research.”

5. The Authorized Researchers agree to provide to IUCPR a copy of all reports, presentations, analyses, or other materials in which the data given under this Agreement are presented, discussed, or analyzed.

6. The data should be encrypted when not in use by the above researcher and should be destroyed once the Project has been completed. If the researcher needs the data for any longer period than that which is necessary for completing the Project, the researcher is required to ask for an extension. Using the data for other purposes besides completing the Project must be approved by the Director for the Center for Postsecondary Research at Indiana University at Bloomington.

7. Other parameters: None

8. The IUCPR of Indiana University may, by written notification to the Authorized Researchers and the Research Institution(s), terminate this Agreement if it determines, in its sole discretion, that either the Authorized Researchers or the Research Institution(s) have breached the terms of this Agreement. In the event that this Agreement is terminated, the Authorized Researchers and Research Institution(s) shall return the originals and all copies of the NSSE Data File to the IUCPR, and securely destroy all NSSE Data File elements contained in any analyses or other materials created or maintained by Authorized Researchers, within ten (10) days of the receipt of the termination notice.

9. IU will not be liable to the Research Institution(s) for any direct, consequential, or other damages, related to the use of the NSSE Data File or any other information delivered by Indiana University or IUCPR in accordance with this Agreement. The Research Institution(s) shall defend, indemnify, and hold harmless The Trustees of Indiana University, their officers, employees, and agents, with respect to any and all claims, causes of action, losses, and liabilities, of any kind whatsoever, arising directly or indirectly from the Authorized Researchers’ use of the NSSE Data File.

FEES

In exchange for access to and use of the NSSE Data File, Reema Negi of Felician University agrees to pay Indiana University the sum of $1000 by check upon execution of this Agreement. IUCPR will send an invoice detailing payment instructions.
Indiana University
Data Sharing Agreement

SIGNATURES
The undersigned hereby consent to the terms of this Agreement and confirm that they have all necessary authority to enter into this Agreement.

For The Trustees of Indiana University:

Amy L. Hoover
Contract Officer
Office of Research Administration
Indiana University Office of Research Administration
Name: Amy L. Hoover
Title: Contract Officer

Alex McComb
Alexander C. McCormick, Director, National Survey of Student Engagement

Date: 8/9/2017

For the Research Institution(s):

Francine Andrea
Vice President for Enrollment Management & Student Affairs

Name: Francine Andrea
Title: Vice President for Enrollment Management & Student Affairs

Date: 8/2/2017

Acknowledgment of Authorized Researcher(s) (including Faculty Sponsor if applicable):

Reema Negi, Felician University

Date: 08/02/17

Rong Chen, Associate Professor, Seton Hall University

Date: 8/4/2017

138