

**AN INVESTIGATION OF NUCLEUS STUDENTS' INVOLVEMENT  
IN OUTSIDE OF CLASS PEER STUDY MEETINGS**

by

Tara Michele Falcone

An executive position paper submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Education in Educational Leadership

Spring 2016

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## **ABSTRACT**

Research has shown that undergraduate students benefit from participating in peer study meetings in which they voluntarily work together on academic material outside of class time. Such productive peer interactions can help students persist in college to the completion of their undergraduate degrees (academic achievement), and develop transferable skills that are essential for success in life after college (professional development). These ways of supporting students align with the main goals of the NUCLEUS program. Therefore, providing better support for NUCLEUS students to participate in productive outside of class peer study meetings is one way NUCLEUS staff can foster the mission of the NUCLEUS program.

The NUCLEUS program is an undergraduate academic support program in the College of Arts and Sciences at the University of Delaware. Historically, NUCLEUS staff have encouraged students to work on course material with classmates outside of class time and class requirements. However, a survey of NUCLEUS students' engagement in voluntary peer study meetings outside of class time has never been carried out. This Executive Position Paper describes the findings of a descriptive study that used mixed methods to investigate the extent to which NUCLEUS students were involved in outside of class peer study meetings during the fall 2012 semester.

Furthermore, to ascertain how NUCLEUS staff can better support NUCLEUS students' participation in productive, outside of class peer study meetings (the organizational improvement goal of this Executive Position Paper), the study explored the factors that helped and hindered student participation in peer study meetings as well as the factors that helped and hindered productivity in peer study meetings. Implications from these findings, in addition to NUCLEUS students' suggestions, informed the implementation of several program activities to better support NUCLEUS students' participation in productive peer study meetings. Additionally, further recommendations for the NUCLEUS program and recommendations for ways the university may better support all students' participation in outside of class peer study activities are described.

## **Chapter 1**

### **OVERVIEW**

#### **NUCLEUS Past and Present**

The NUCLEUS program was established at the University of Delaware (UD) in September 1993. In 1992, Dr. Phillip A. Gottlieb, Professor in the department of Chemistry and Biochemistry, was awarded a one million dollar science education grant from the Howard Hughes Medical Institute (HHMI). A condition of the HHMI award required UD to develop a program to encourage and provide opportunities for undergraduate students from underrepresented minority (URM) groups to prepare for graduate studies and careers in biomedical research and medical practice. HHMI defined underrepresented minority groups as blacks, Hispanics and African Americans. The NUCLEUS program, which at the time was an acronym for “Network of Undergraduate Collaborative Learning Experiences for Underrepresented Scholars,” was established at UD to fulfill this specific component of the HHMI award.

At its start and for the majority of its years, the NUCLEUS program was only open to underrepresented racial/ethnic minority undergraduate students who majored in the life sciences—Biology, Chemistry, and Biochemistry in particular—or in health science majors. This was a direct result of the NUCLEUS program’s funding source.

HHMI required the development of programs like NUCLEUS at universities that received large HHMI grants to help increase the numbers of Americans from underrepresented racial/ethnic minority backgrounds in the United States' biomedical research workforce and medical practitioner workforce. Thus, the main goals of the NUCLEUS program at UD originally were twofold: (1) to retain underrepresented racial/ethnic minority students in life and health science fields to graduation at UD, and (2) to encourage and help URM students get into graduate and professional degree programs in life science fields, medical research fields, and areas of medical practice such as medicine, dentistry and optometry. Therefore, for much of its existence the NUCLEUS program had a very narrowly defined scope. It served students who met particular criteria and it helped them strive toward specific career goals.

Today, the NUCLEUS program at UD looks much different than when it was founded. Although the program's name has not changed, "NUCLEUS" is no longer an acronym. At present, the program is fully funded by UD's College of Arts and Sciences (CAS). Given this funding source, the program is open to students in all majors across CAS (consisting of the Natural Sciences, Social Sciences, Arts and Humanities), and students from all racial/ethnic backgrounds may join the program. Although only incoming freshman and transfer students in CAS majors are recruited to join the NUCLEUS program, students in any class year with majors in the other six colleges of the university are also able to participate if they volunteer to join. The mission of NUCLEUS today is to ensure the retention of NUCLEUS students to graduation with a bachelor's degree at UD. The program is not concerned with

retaining students in particular majors or disciplines. Rather, it helps students be academically successful in the majors of their choosing. Similarly, the program does not promote that all students should pursue graduate or professional degrees. Rather, NUCLEUS supports students in successfully preparing for their chosen post-baccalaureate plans, whatever they may be. Thus, in contrast to when it was first founded, NUCLEUS today is an academic support services program that includes UD students across racial/ethnic backgrounds, academic interests and career aspirations.

This spirit of inclusiveness has fostered great growth in student participation in the NUCLEUS program. Each year, roughly 20% of incoming CAS freshmen join the program. Thus, over the course of a few years NUCLEUS student membership has grown exponentially. During spring 2010, which was the last semester NUCLEUS was funded by HHMI, the program supported 87 students. In terms of the racial/ethnic demographics of these students, 53% identified as black, 23% as Asian, 14% as Hispanic, 7% as white and 3% as other race/ethnicity. In terms of majors, 48% of the students were Biological Sciences majors, 10% were Chemistry majors, and the rest of the students were in one of 19 various other majors—predominantly health and agricultural science fields. Five years later, in spring 2015, there were 800 students supported by the NUCLEUS program. Of them, 54% were from historically underrepresented groups in higher education—28% black, 17% multi-ethnic, 8% Hispanic and 1% Native American or Pacific Islander. Additionally, 9% of students identified as Asian and 37% identified as white. Forty percent of students were first generation college students and/or from low income family backgrounds (specifically,

18% first generation, 15% low income, and 7% both first generation and low income). Moreover, NUCLEUS students pursued undergraduate degrees in at least one of 89 majors across the university. For more details about the growth of the NUCLEUS program and the changes in NUCLEUS student demographics over time, see Appendix A.

Although NUCLEUS has been inclusive of all UD students for several years now, the program still encounters individuals, including current UD faculty and staff, who hold misconceptions about the program, its mission and its members. Due to its long history of only serving underrepresented racial/ethnic minority students who are life and health science majors wishing to pursue graduate or professional school in life science or medical fields, some individuals still believe, erroneously, one or more of the following about the NUCLEUS program today: (a) the NUCLEUS program exclusively supports racial/ethnic minority students at UD; (b) the NUCLEUS program exclusively supports science majors at UD; or (c) the mission of the NUCLEUS program is to help students gain entry into life science and health related graduate/professional schools and careers. NUCLEUS staff hopes that in time fewer instances of misconceptions about the current mission, membership and activities of the NUCLEUS program will exist.

#### Present Leadership and Main Activities of NUCLEUS

Over the years as changes in program leadership have occurred, so have changes in the NUCLEUS program's activities, membership and focus. The

NUCLEUS program has undergone three major transitions through four eras of leadership (see Appendix A for a more detailed history that outlines what the NUCLEUS program looked like under each era of leadership). During the time of data collection for this project in fall 2012 and winter 2013, I was the Graduate Assistant for the NUCLEUS program. Since the 2012-2013 academic year was a period of transition in leadership for the program, I was not permanent staff at the time, but I managed the program's daily operations and was the primary contact for NUCLEUS students located in 118 Brown Lab. Now, stable leadership exists. At present as the Academic Program Coordinator of the NUCLEUS program I report to and work closely with Dr. Rosalind Johnson, Assistant Dean of Student Success in CAS. Together we provide leadership for the NUCLEUS program and manage its day-to-day operations.

Presently, one of the main activities of the NUCLEUS program is providing supplemental, one-on-one academic and professional development advisement to students. In general, NUCLEUS members are told that if they have academic or professional development questions and they are not sure who to ask, they may e-mail or drop by 118 Brown Lab to talk with NUCLEUS staff, or they may make an individual advisement appointment to meet with us. The message is sent to students that NUCLEUS staff are here to help them successfully graduate from UD and get on the path of pursuing their career goals. Thus, NUCLEUS strives to directly connect students with resources, information and opportunities on-campus as well as off-campus in order to empower them to fruitfully work toward their academic and

professional aspirations. For example, when a student comes to NUCLEUS staff with questions that would be best answered by talking with a Career Counselor, NUCLEUS staff will help the student navigate the Career Services Center's online appointment scheduler to set up a meeting with a Career Counselor who is knowledgeable in the student's field of interest.

Additionally, in order to support students on the path to graduation, NUCLEUS staff monitor students' academic progress and do special outreach to groups of students. Student groups that receive outreach from NUCLEUS staff include (but are not limited to) students who are on academic probation, students who are in danger of being on academic probation, incoming freshmen and transfer students who are new to UD, first-year students with low midterm grades, and seniors who will soon be graduating to make sure they know which requirements they have to complete. NUCLEUS staff also send congratulatory e-mails to students who have greatly increased their semester GPA, students who have gotten off academic probation, and students who have made Dean's List each semester. Overall, NUCLEUS uses a welcoming, supportive and pro-active approach to student outreach and advising to help students remain on course for graduation.

In addition to these services, current NUCLEUS members have exclusive access to a study space located on central campus, receive a weekly e-mail with important information and useful resources, and have opportunities to receive funding to conduct undergraduate research and attend professional conferences. The physical space NUCLEUS students can use is in 118 Brown Lab. It features study space with

computers, free printing privileges, a copier/scanner/fax machine, refrigerator, microwave and water cooler for student use. The Monday morning “NUCLEUS Update” e-mail members receive contains information about academic and professional development related workshops occurring on campus that week; information about opportunities, resources, and services available to students; and reminders about important approaching academic calendar dates. Between weekly e-mails, information and reminders are posted via social media (Facebook and Twitter) and Sakai website announcements. Additionally, each year funds in the NUCLEUS budget are allocated to support NUCLEUS student participation in undergraduate research opportunities. Moreover, given the availability of funds, NUCLEUS will supply travel funds for several students to participate in local and regional conferences.

In sum, NUCLEUS provides students with various services: individualized supplemental academic and professional development advisement; help with navigating academic degree requirements; academic monitoring and encouragement; connections with campus resources; information about academic and professional development opportunities; opportunities to engage in undergraduate research; and access to a welcoming and supportive professional environment centered on academics. All of the NUCLEUS program activities today are focused on supporting students to (1) do well academically and persist in college to the completion of their undergraduate degrees (academic achievement), and (2) prepare for their professional pursuits after graduation (professional development).

## **Rationale for this Investigation**

Historically, the NUCLEUS program has encouraged students to form outside of class peer study meetings with others enrolled in their courses (see Appendix A for a detailed history of NUCLEUS). In fact, the notion of students working together to learn with and from one another had been essential to the NUCLEUS program from its conception. After all, the “N-U-C-L-E” in NUCLEUS stood for “Network of Undergraduate Collaborative Learning Experiences.” However, a survey of NUCLEUS students’ engagement in voluntary, outside of class peer study activities has never been carried out. Therefore, there is a need to collect baseline data. The purpose of this investigation is to assess and examine the state of NUCLEUS students’ engagement in peer study activities outside of class time and class requirements.

NUCLEUS staff encourages students to participate in outside of class peer study activities because these peer interactions can support undergraduate students’ academic success and professional development. Academic research and professional studies (discussed in the next section) show that by engaging in academic work with fellow classmates on their own time outside of class requirements, students may help one another learn course content, persist in their academic programs, and develop transferable skills they will need to be successful in professional settings. Thus, supporting students’ formation of productive peer study meetings is a way to foster the mission of the NUCLEUS program.

This project was constructed to investigate the state of outside of class academic peer study meetings among NUCLEUS students. Data from findings were

also used to shed light on how the NUCLEUS program may better support students in forming productive outside of class peer study meetings. The importance of this project was twofold. First, it provided information about NUCLEUS students' academic activities that had never before been collected. Secondly, since the project examined student interactions that promote the major goals of NUCLEUS, the findings informed recommendations to improve program efforts.

### **Findings from Relevant Literature**

Past research provided guidance for this project. In addition to supporting the project's rationale, findings from literature informed the creation of survey instruments, interview protocols, qualitative coding schemes, and the analysis of the results of this investigation. Relevant literature directly or indirectly explored issues around college students working together—or choosing to not work together—on academics outside of class time. Since outside of class academic-centered peer interactions are informal, beyond the classroom context, are not assessed or required by instructors, are student organized and run, and are not purely academic or purely social in nature, the topic does not fit into a specific niche in traditional higher education research. As a result, relevant studies were spread across a wide range of fields. Findings supporting the project rationale, findings from frequently cited studies on students working together academically, and findings that directly address the key questions of this project are highlighted within this literature review.

## Working Academically with Peers Promotes College Student Persistence

Working with peers on academics outside of class time and class requirements may not only improve students' understanding of course material, but it can also help them persist in college to degree attainment. What makes outside of class academic peer interactions so unique is that they are not purely academic interactions. Since they occur outside of class time and class requirements they are also social in nature. Thus, by interacting with peers around academics on their own time, students are engaged with their peers in academic and social ways simultaneously. Such enriching interactions can foster student persistence in college. This notion is supported by research on college student retention.

In the post-secondary student retention literature, Vincent Tinto's model of institutional departure, first formulated in 1975 and revised twice in 1987 and 1993, has been described as holding "paradigmatic stature" in the field (Braxton & Hirshy, 2005). In short, Tinto's (1993) theory divided college life into two separate domains—the academic and the social. Tinto claimed that students' formal and informal interactions with faculty, staff and peers within these two separate domains shape students' perceptions of their sense of belonging at their institutions. Thus, in Tinto's model, students' perceptions of their integration into the academic life at their colleges, and their integration into the social life at their colleges, influence their decisions about persisting in or departing from post-secondary institutions.

Some higher education researchers have found Tinto's notion of discrete academic and social spheres of influence in postsecondary institutions to be

problematic. For example, Davidson and Wilson (2013-2014) argued that contrary to Tinto's depiction, the concepts of academic and social integration are interconnected. The authors note how it is often difficult to categorize variables as either academic integration factors or social integration factors since most variables have both academic and social components (e.g., students' informal interactions with faculty outside of class time, and interactions with peer tutors). In fact, Tinto himself found his dichotomous model illustrating student "fit" into the separate academic and social realms of college life to be problematic. In a 1997 study Tinto conducted on student persistence at a two-year commuter institution, the researcher concluded that the social and academic lives of college students are interwoven. In particular, Tinto noted how academic activities that take place within the classroom are social in character, and how social communities often emerge from academic classroom activities.

In this work, Tinto (1997) argued that shared learning experiences among classmates strongly encourage college student persistence. He reasoned that they enable students to develop small, supportive networks of peers with whom students can engage in academics both inside and beyond the classroom through formal or informal outside of class peer study meetings. Tinto claimed that when students work together on academics in and out of the classroom they form friendships or interpersonal relationships while learning at the same time. Therefore, when working academically with peers students are involved with others at the institution in both academic and social ways simultaneously. In sum, Tinto found that students in supportive, academic-centered peer networks: (1) experienced a sense of personal

involvement in their own and each other's learning; (2) expended greater effort on academics than students not involved in learning with peers; and (3) encouraged each other's learning and persistence toward degree completion. For these reasons, Tinto concluded that participation in learning activities with peers in and out of the classroom heightens college student persistence.

Similar to Tinto (1997), Deil-Amen (2011) noted how college students' feelings of belonging and connection occurred both inside and outside of the classroom when students worked together to learn. In Deil-Amen's study, which also took place at a two-year college for commuting students, the researcher examined supportive social interactions among peers that revolved around academics. Deil-Amen found that academic-centered peer interactions in and out of the classroom—such as when students ask and answer each other's questions in and out of class, or when students formally or informally help each other learn course content outside of class—were both academically helpful and socially helpful for students. The author described these interactions as being purposeful, yet often casual and limited in that they most often did not ripen into true friendship. In other words, many students described their helpful academic interactions with peers as “being friendly” although they did not necessarily describe the peers they worked with as their friends.

Deil-Amen (2011) concluded that academic-centered peer interactions contributed to students' positive feelings about the institution's social climate, helped them to overcome self-doubt about their abilities, and helped them to become more stable and grounded in their college student identity. Additionally, the researcher

noted that academic-centered peer interactions helped students learn course content and also acquire knowledge to make more effective choices and better strategize their college careers. Examples of knowledge of this sort include information about academic course planning, study skills, and other information needed to be better college students and to successfully navigate the college system. By providing students with academic and social support in these ways, Deil-Amen concluded that academic-centered peer interactions aided students' persistence in college.

In particular, Deil-Amen's (2011) research highlighted how the academic and social spheres are tightly interrelated in postsecondary students' integration experiences. Additionally, the author found that supportive, academic peer interactions were valued by students not for their depth or length of interaction, but rather for their creation of a shared sense of connection through common experiences and challenges. As a result of these observations, the researcher developed an original concept that fuses Tinto's formerly distinct processes of academic integration and social integration, called "socio-academic integrative moments." According to Deil-Amen (2011):

The concept of 'socio-academic integrative moments' can be used to describe opportunities for specific instances of interaction in which components of social and academic integration are simultaneously combined. The word 'moment' is used to indicate that such an opportunity can, but does not necessarily have to, involve formally structured, in-depth, routine, or even frequent interactions. (pp. 72-73)

Some examples of "vehicles" for socio-academic integrative moments given by Deil-Amen (2011) are as follows: in-class interactions and dynamics that involve

students working together; formal or informal, planned or spontaneous outside of class study meetings; mentor relationships with faculty or staff; consistent communication with peers in similar academic situations; and participation in academically-centered clubs and activities. Overall, Deil-Amen concluded that it is neither purely social interactions nor purely academic interactions that drive student commitment and persistence, but rather, it is socio-academic interactions that do. Thus, as vehicles for socio-academic integrative moments, formal and structured, or even casual and spontaneous study meetings in which students work with peers on academics independent from class time and class requirements support college student persistence toward degree attainment.

#### Working Academically with Peers Promotes the Development of Transferable Skills

Students working together with peers academically outside of class time and class requirements can benefit in ways that not only help them while they are attending college. Working together when the authority of an instructor, teaching assistant, or other expert is not an immediate presence gives students opportunities to develop transferable skills that are essential for success in life after college. It has been found that students who collaborate with one another to solve academic problems or master difficult academic material acquire valuable skills that prepare them to deal with the complex and often impromptu problems they will encounter throughout their lives (Kuh, Kinzie, Schuh, Witt, & associates, 2010). For example, Boud (2001) noted that through engaging in reciprocal peer learning, where students act as both teachers

and learners, students develop the valuable life skill of learning how to discern for themselves the accuracy of information.

Moreover, Boud, Cohen and Sampson (1999) found that working on academics with peers promotes respect for the varied experiences and backgrounds of others, and enhances the development of many useful skills. The authors claimed that by interacting with peers outside of class to help each other learn, students have opportunities to develop collaboration skills, including collective goal setting and planning; communication skills, including communicating with others beyond their specialization areas; critical thinking skills, including engaging in critical inquiry, exploration of ideas and reflection; and lifelong learning skills, including learning to learn. In addition to helping them do well in undergraduate programs, students can utilize the skills, values and abilities developed in autonomous peer learning to help them be successful in graduate or professional education programs if they choose to pursue further education beyond the four-year degree. For instance, there is a tradition of students engaging in voluntary peer study activities in law and medical schools. Often times in these professional programs the amount of assigned work is too much for one person to tackle. Thus, the payoffs of productively working with peers in law and medical schools are substantial.

Many of the competencies students develop when working on academics with peers not only assist students in their further educational pursuits and post-college lives, but they are also qualities that employers look for in new hires. Each fall, the National Association of Colleges and Employers (NACE) surveys its employer

members about employment-related issues in order to project the job market for spring college graduates. One question in the yearly survey asked employers to rate the importance of candidate skills/abilities. For the past three years, the top three qualities employers indicated they sought in college graduate new-hires were the ability to work in a team structure, the ability to verbally communicate with persons inside and outside the organization, and the ability to make decisions and solve problems (Koc & Koncz, 2011; Koc & Koncz, 2012; Koc & Koncz, 2013). Such teamwork, communication and problem solving skills can be developed and honed by students working together academically outside of class time. In another annual labor market study conducted by the Collegiate Employment Research Institute (CERI), employers identified the ability to build and sustain working professional relationships as the most critical skill that new college hires would be asked to demonstrate in their initial position (Hanneman & Gardner, 2010). By productively working with peers on academics outside of class on their own time, students have opportunities to develop the kinds of interpersonal skills necessary to do well in their first jobs after graduation.

In our current employment market in particular, the transferable skills students develop through working together academically are of great value. Since the world of professional work increasingly relies on teamwork and the exchange of information among peers, interacting with others to learn outside of class requirements can help students more easily transition into the world of professional work (Seely Brown & Duguid, 2000; Miller, 2012). For instance, in the book *The Social Life of Information*, Seely Brown and Duguid (2000) depict how employees in various fields work together

by acting as resources for each other in order to solve problems and innovate within organizations. Many of the practices involved in socially constructing knowledge within workplace settings among colleagues described by Seely Brown and Duguid may also be found in the context of college student classmates in autonomous educational settings where they are socially constructing knowledge together. Thus, by working with peers on academics independent from class time and class requirements students develop transferable skills and abilities, and engage in educational practices they can continue to use in their post-baccalaureate pursuits that will help them to be successful in their professional endeavors.

#### Frequently Cited Studies Involving College Students Working Together Academically

As previously mentioned, since the notion of outside of class academically-centered peer interactions does not fit neatly into a niche in higher education research, studies that look into this phenomena are scattered and difficult to find. However, two lines of research were commonly cited and well-known that reference students working academically together outside of lectures. The work of these two researchers—Richard Light and Uri Treisman—are discussed in this section.

Richard Light, a Harvard University professor, carried out a long-term, large-scale investigation at his institution to explore the choices students can make to get the most out of their college experience (Light, 1992; Light, 2001). Light's work is often cited in support of peers working together on academics outside of class time because it very strongly advocates for students to engage in those activities. In fact, Light

claimed that undergraduate students who were the happiest, who grew the most academically, and who got the most out of their time in college were ones who met with classmates outside of class time and class requirements to accomplish substantial academic work.

Light (1992, 2001) described how working with peers on academics made students feel more challenged and interested by their coursework. This resulted in them spending more time learning, and made them feel less hesitant to seek help if needed. Moreover, Light argued that working on academics with peers was beneficial because it helped students avoid isolation that may lead to their academic failure and departure from college. He noted that students who were having trouble academically were likely to drift into even deeper trouble if they kept to themselves doing academic work alone. For these reasons, Light advocated for peers to work together on academics outside of class time, and for faculty and advisors to encourage undergraduate students to engage in collaborative peer study activities.

Another line of research commonly referenced when discussing the topic of college peers working together academically is Uri Treisman's creation and evaluation of the Mathematics Workshop Program (MWP) at the University of California, Berkeley (Fullilove & Treisman, 1990; Treisman, 1985). This literature is frequently cited because the MWP has produced extraordinary results promoting high academic performance in college calculus among black and Hispanic students. Treisman developed the MWP after conducting an informal investigation of students who perform well and poorly in math courses. Since Chinese American students were

disproportionately represented among students who did well in math courses and African American students were disproportionately represented among students who did poorly, Treisman explored the factors that explained the differences in math performance for the two racial/ethnic groups.

Treisman's main finding was that students in the two groups used very different study strategies (Fullilove & Treisman, 1990; Treisman, 1985). African American students most often studied alone and separated their social lives from their study activities. They did not seek assistance from peers, nor from their Teaching Assistants. The African American students viewed themselves as self-reliant, and referred to example problems in the textbook to work through difficult homework problems. In contrast, the Chinese American students were very likely to study with classmates. They sought assistance from peers and combined their social lives and study activities from the very start of their university matriculation. Working together, Chinese American students shared their math knowledge, checked their understandings about course content, corrected each other's mistakes and misconceptions, and worked through difficult homework problems. When they could not find solutions working together, they sought assistance from their Teaching Assistants and would share any new information. These activities resulted in more time engaged in math coursework than students who studied alone. Treisman found that on average, the Chinese American students studied calculus six hours more per week than the African American students did.

Treisman (1985) used these findings from his informal investigation to design the MWP for racial/ethnic minority students (Fullilove & Treisman, 1990). The core activity in the MWP required students to work with one another to solve difficult math problems outside of course lectures. Participants in the MWP (framed as a challenging honors program) met for two hours twice a week in workshop sessions monitored by a graduate student workshop leader. Arranged in tables of about five, students helped one another complete worksheets containing difficult math problems. By participating in the program, students spent a significant amount of time on task engaged in coursework with each other, and they developed useful social and study skills. Participating in workshops also lead students to form friendships, and many students who studied together during workshop sessions often studied together outside of workshops. The MWP blurred the boundary between students' academic and social lives and created an academically-oriented social peer network that valued academic achievement. These factors not only helped MWP participants do well in calculus and in their subsequent mathematics courses, but they also helped students persist at the university to graduation.

Treisman's successful MWP required students who participated in the program to work together on academics in frequent, structured workshop sessions that included a non-peer facilitator and specific tasks to be accomplished by the end of each session. The questions of interest to the project at hand, however, concern undergraduate students working with classmates outside of class time and requirements on their own accord. Therefore, reasons why some college students choose to work with classmates

independent from course or program requirements, while others choose to study alone, were explored in the broader, less commonly known literature related to students working academically with classmates.

### Reasons Why Students Elect to Work with Peers Academically or Elect to Work Alone

Past research has uncovered several reasons for students' choices to work with classmates on academics or to work alone. One main reason students study with classmates outside of class time is because they see it a strategy to do well on assignments, prepare for exams, and improve their course grades (Christian & Talanquer, 2012; Downs, 1995; Lazar, 1993; Lazar, 1995; Tang, 1993; Van Etten, Freebern, & Pressley, 1997). Interestingly, this same reason is why some students choose to study alone. Many students who prefer to study alone tend to have higher than average academic aptitudes (Arum & Roska, 2011) and effective study skills (Gubbels, 1999). Therefore, they do well on assessments without interacting with others. Most often, these particular students work alone because they do not want others to inhibit or control their studies (Gubbels, 1999). They want to control their study sessions, including what the study environment is like, what study activities are done, and the pace at which materials are covered. Often, since their particular study strategies work well, these students do not see it to be in their best interest to change their ways of studying (Bruffee, 1999). The finding that students choose to study with others or study alone as a strategy to do well on tests and assignments is not surprising

since college students' primary motivation for studying course material using any method is to obtain good grades on assessments (Van Etten, Freebern, & Pressley, 1997).

Although improving grades may be a common factor for bringing students together to work on academics, students can perceive different functions for their peer study meetings. Yan and Kember (2004) found that some students work together outside of class time because they wish to minimize the time and effort spent on academic tasks, while other students work with peers outside of class time because they wish to better understand course content and optimize the quality of their learning. The researchers labeled the former approach as students displaying “avoider behaviors,” and the latter as students displaying “engager behaviors.” Some examples of students carrying out avoider behaviors include the following: when students come together to centralize resources and share or create condensed materials for quick absorption (Yan & Kember, 2004); and when students intentionally work with one or more knowledgeable classmates who teach them course material, or address their specific questions (Christian & Talanquer, 2012). In the alternate case, students who carry out engager behaviors actively participate in thoughtful, critical discussions with classmates where they inquire, think about and comment on each other's perspectives, coming to a communal understanding of course material. In such scenarios, students have equivalent roles in understanding ideas and “co-construct” meanings together (Christian & Talanquer, 2012). Researchers have found students' collaborative study approaches to be dynamic. Students may adopt engager behaviors when working with

classmates for some courses, and use avoider behavior for others. They may also change behaviors within and across peer study sessions (Christian & Talanquer, 2012; Yan & Kember, 2004).

Similar to wanting to do well on assessments, lack of self-confidence in learning a particular subject may cause students to seek classmates to study with outside of class, or it may cause them to study in isolation. Sandoval-Lucero, Blasius, Klingsmith, and Waite (2012) found that students who lacked confidence in their ability to learn course material sought the help of classmates who seemed to understand the course content well and who showed leadership qualities. The researchers described this as students with lower self-efficacy naturally gravitating toward classmates who displayed higher self-efficacy to work as a strategy to do well in the course. Gubbels (1999) found an opposite relationship between self-confidence and the desire to participate in peer study activities. The researcher noted that students with lower self-confidence in their abilities to learn subject matter did not study with others in order to avoid showing a lack of understanding of course material in the company of their peers. Thus, studying alone protected students' self-esteem and prevented their embarrassment by avoiding circumstances where they would work with others who could more quickly and thoroughly understand course content.

Sometimes students' choices to work alone or with peers outside of class are influenced by their perceptions of academic tasks. For example, Tang (1993) examined Hong Kong students' outside of class peer study tendencies for two different assessments—an exam and a written assignment—within a physiology

course. The researcher found that most students studied alone for the exam because they viewed doing well on it as requiring simple, straightforward memorization to answer close-ended responses. The majority of students did not work with others since they felt that studying simple, clear-cut material and memorizing facts could be easily done on their own time. In contrast, most students worked with classmates to complete the written assignment. They viewed doing well on the task as requiring complex arguments to answer open-ended questions. Moreover, the written assignment was a new assessment format for students, and it had to be completed in English. Thus, the native Chinese-speaking students viewed the written assignment as very difficult. For this reason, they worked with classmates to share ideas, strengthen their arguments and improve their English composition before turning in their individual works.

In addition to students' perceptions of academic tasks, students' perceptions of academic disciplines have been found to shape their tendencies to study alone or with peers outside of class. Similar to what Tang (1993) found in terms of students being more likely to collaborate with peers on academics when they perceive assignments and assessments to be difficult, several researchers have found that students most often work together outside of class for science, math, and quantitative problem solving courses (e.g., economics) because they perceive these courses to be more difficult and require greater effort than their other courses demand (Downs, 1995; Lazar 1993, 1995; Sandoval-Lucero, Blasius, Klingsmith, & Waite, 2012).

Furthermore, students' ideas about the natures of different disciplines have been found to affect their decisions to study alone or with others. As Lazar (1993,

1995) explained, students tend to view interpretive tasks in reading and writing based courses, like the humanities and social sciences, as providing “cushion” in that they do not lend themselves to “right” or “wrong” responses. In contrast, they tend to think of science, math and quantitative problem solving based courses as yielding specific “right” solutions that require particular “correct” methods. For example, some students perceive reading and writing based courses to require solitary work by nature. These students see working with peers to understand readings and compose written assignments as forms of cheating and plagiarism. Thus, they avoid working with classmates on written assignments because they do not want to share ideas with peers for fear of producing assignments that are too similar to others’ work (Bruffee, 1999; Lazar, 1993, 1995; Tang 1993). For these reasons, students are more likely to work with peers in “objective” science, math, and problem solving based courses than they are in “subjective” text-based humanities and social science courses.

It has also been found that classroom learning environments can influence students’ choices to study with peers outside of class or to study alone by way of the classroom curricula, in-class activities, classroom structure, and messages from instructors (Christian & Talanquer, 2012; Lazar, 1993, 1995; Nespor, 1994; Sandoval-Lucero, Blasius, Klingsmith, & Waite, 2012; Yan & Kember, 2004). In general, science, math and problem solving courses have learning environments that are very different from learning environments in reading and writing based courses. For example, collaborative in-class projects (e.g., labs) are commonly found in science courses but not in history courses. Moreover, Lazar (1993, 1995) noted that many

science, math and problem solving courses have frequent assessments given on a regularly occurring basis. Such structure helps to make students' peer study meetings become routine by coinciding with cyclical assessment schedules, such as weekly problem sets (Lazar, 1993, 1995; Nespov, 1994). Furthermore, faculty in science, math and problem solving courses more often praise collaborative study as a good way to learn, and they encourage students to work together on course material outside of class more than faculty of reading and writing based humanities and social science courses do (Lazar, 1993, 1995). Therefore, Lazar noted that students may not think of working on academics with peers as a faculty condoned way to learn in courses beyond science and math courses.

In fact, Arum and Roska (2011) asserted that faculty in different fields create distinct socializing environments that foster development of specific skills, attitudes and values. As a result, the researchers claimed that students exhibit different cultures of engagement in different kinds of courses. In support of this idea, Brint, Cantwell and Hanneman (2008) have found two distinct cultures of engagement among college students. They describe the culture of engagement in the arts, humanities and social sciences as based on individual assertion, classroom participation and interest in ideas, while the culture of engagement in the sciences and engineering is based on working toward quantitative competencies through both individual study and collaborative effort with peers. These cultures are likely to influence students' tendencies to work academically with classmates outside of the classroom or to work on academics alone for different types of courses. Thus, since working with peers on academics is part of

the culture of engagement in science and engineering courses, but not necessarily part of the culture of engagement in arts, humanities and social science courses, students are more likely to work together outside of class for their science, math and problem solving courses than they are for other kinds of courses.

An additional finding in the literature is that students who are familiar with one another are more likely to work together outside of class time. An example of this is found in Nespor's (1994) ethnographic study of undergraduate physics majors. Nespor observed how the large number of required sequenced courses students took for major requirements led them to form stable, close-knit, outside of class peer study meetings that they sustained for their shared courses over multiple semesters. Since major courses often consist of smaller class sizes where students interact with the same peers from class to class, students become familiar with each other. This familiarity makes students feel comfortable around each other, which allows them to easily approach each other about working together on academics outside of class.

Other researchers have found that peer study meetings often occur among students who are familiar with each other, whether they know each other from having taken classes together previously, or from living near each other on campus, from sitting next to each other in class, or because they consider each other as friends (Christian & Talanquer, 2012; Lazar, 1993, 1995; Sandoval-Lucero, Blasius, Klingsmith, & Waite, 2012). On the other hand, not being familiar and comfortable with peers inhibits students from working together on academics outside of class. Several researchers have found that students who did not know classmates previously

felt anxious, uncomfortable, and wary to take the first steps to get to know peers. Thus, these students were reluctant to initiate the formation of outside of class peer study activities even when they desired to work on course material with others (Downs, 1995; Willment, 1998). Moreover, as Bruffee (1999) noted, even when students are approached by peers who they do not know well inquiring about working together outside of class, a foundation of trust is not established between them. Thus, students may not believe the requests to collaborate are genuine, and they cannot know what might be in it for them if they do collaborate. For example, students may think others are looking to use or take advantage of them.

Since not being familiar with peers hinders the formation of outside of class peer study meetings, Boud (2001) noted that students who do not have the social skills or time necessary to create friendly relations with classmates, and students who do not progress through academic programs in a cohort, are likely to be excluded from peer learning experiences. Thus, students with poor social skills, students who work off-campus, students who switch majors or who enter college without a declared major, transfer students, adult learners, and other types of students who have been historically marginalized in higher education (such as commuter students, students from low income families, and first generation college students) are less likely to be involved in outside of class peer study activities. For example, one commonality across the reviewed literature is that in almost all instances, researchers found that students met to work on academics outside of class time in on-campus locations, such as library study spaces, dormitory common areas or dormitory rooms (Christian & Talanquer,

2012; Downs, 1995; Lazar, 1993, 1995; Nespor, 1994; Willment, 1998). This factor is likely to make meetings more convenient for residential students than for non-residential students. In fact, Downs (1995) noted that many more students who lived in residence halls participated in outside of class peer study activities than did students who lived either with parents or in their own place off campus.

There are several other reasons found in the literature why some students choose to not study with others outside of class. They include lack of knowing how to work with others academically outside of class requirements (Downs, 1995; Willment, 1998), and conflicting time commitments often due to large academic course loads and/or many extracurricular activities (Willment, 1998). Boud (2001) and Bruffee (1999) also note that competition within courses and academic programs may make the idea of working academically with peers unattractive to students. Students may perceive studying with others to be a waste of their time because they would be just helping students who are slower and/or less motivated than them. Especially in courses with curved grading, students may believe that working academically with others would hinder their own academic achievement. Additionally, researchers have pointed out that the culture of traditional schooling, which focuses on solitary effort and individual performance through hearing lectures, taking individual assessments (Lazar, 1993, 1995), and never questioning instructors (Boud, 2001; Bruffee 1999), influences students' views: that they may perceive solitary study to be the natural and proper way to study, and think that it is not possible to learn anything worthwhile from other students.

## Factors Affecting the Productivity of Students Working Together Academically

Sometimes peer study meetings are academically beneficial for students, and sometimes they are not (Arum & Roska, 2011; Gubbels, 1999; Lazar, 1993; Van Etten, Freebern & Pressley, 1997). Although not all of the reviewed literature included statistical analyses to examine students' academic performance in light of their participation in outside of class peer study meetings, three of them did. In two studies, working with peers outside of class time was not found to be related to academic performance in any way (Gubbels, 1999; Willment, 1998). In the other work, Arum and Roska (2011) found a negative correlation between the time students spent studying with peers outside of class and performance on the critical reasoning and writing portion of the Collegiate Learning Assessment. However, the authors explain that this finding is not causal, but reflects self-selection. Since the researchers also found that students who entered college with lower than average academic aptitudes spent more time studying with their peers outside of class, they conclude that the negative relationship is not a consequence of student participation in peer study activities, but of students' self-selection into them.

Researchers agree that whether peer study interactions are academically beneficial or not depend on many factors, including: (1) the skills and attributes of students working together, mainly the study skills of students, the content knowledge of students, the level of interest in learning subject matter among students, the approaches students take toward learning course material, and students' epistemological beliefs; (2) the activities that students do when they work together,

including the structure and level of cognitive demands of the tasks students perform; and (3) the relationships between the students working together, such as how familiar they were with each other prior to working together (Boud, 2001; Christian & Talanquer, 2012; Gubbels, 1999; Lazar, 1993). All of these factors affect the nature of peer study meetings. For example, Lazar (1993) highlighted how pre-existing social relationships shape how students interact with each other in study meetings via the ways students operate to help each other, the language they use to communicate with each other, and their comfort level with assisting and receiving assistance from one another. Because of these distinct relationships, Lazar concluded that what works in one circumstance for students working together academically may not work in another circumstance with different students.

Although outside of class peer study interactions are highly variable across different students working together and within different contexts, researchers have found several factors that support academic productivity in peer study meetings. For instance, peer study meetings are likely to be more productive when they do not include a large number of students. Meetings of two to four students often work well (Christian & Talanquer, 2012; Willment, 1998). Another finding is that most often, when students who work together outside of class time have studied material on their own prior to meeting, their collaborative study activities are productive (Van Etten, Freebern, & Pressley, 1997). Also, students are more likely to spend their time together effectively when they work on more structured academic tasks during peer study meetings (Arum & Roska, 2011; Van Etten, Freebern, & Pressley, 1997). Since

science, math and problem solving based courses commonly have very structured assignments and exams, Arum and Roska (2011) noted that outside of class peer study meetings tend to be productive for students' learning in these fields.

Peer study meetings are most academically beneficial and productive when all participants learn. This is most likely to occur when students who have competent foundational knowledge and study skills view themselves as interactive partners who share the responsibility for learning (Gubbels, 1999) and construct a mutually supportive environment within their peer study meetings (Boud, 2001). By taking active roles to learn through interactions with one other, and sharing a sense of responsibility for learning, students can work together toward shared understandings and common learning goals. Additionally, in a supportive environment, students feel free to express and test their ideas, ask for or offer help when needed, and are open to the ideas of others. Creating such an environment requires trust, which is fostered by mutual honesty and relatability (Boud, 2001). Thus, study meetings that are productive uses of participants' time occur among students who have competent content knowledge and study skills, relate to and trust one another, and see learning as rooted in the exploration of their ideas together.

When time is not spent on academics, peer study meetings are not beneficial to students. A distractive environment, such as spaces with students who are not participating in the study meeting, hinders productivity (Gubbels, 1999; Christian & Talanquer, 2012). Related to this, Van Etten, Freebern, and Pressley (1997) noted that interacting with peers might support students' studying, or it might distract them from

it. If peers encourage or put pressure on students' academic engagement, then study meetings with them are likely to be productive. However, if peers encourage students to do other things rather than study, then study meetings with them will be unproductive. Thus, as Gubbels (1999) concluded, studying with others outside of class time is likely not to be a good study strategy for students who are easily distracted by their peers.

Moreover, Gubbels (1999) found that when students who did not have effective study skills, or who lacked content knowledge, worked with other students with similar deficits, they could not make good use of their meeting time. The researcher found that these students often worked side-by-side engaged in what she called "parallel studying." In such circumstances, the students worked alone for more time than they spent interacting with each other, and they often studied from separate and incomplete sets of notes. Because of their lack of skills and understanding, these students were unable to help each other learn. Thus, outside of class peer study meetings are academically unproductive uses of students' time when students who meet are unskilled studiers and/or greatly lack understanding of course material.

### **Organizational Improvement Goal**

This investigation collected data about NUCLEUS students' involvement in outside of class peer study meetings and used the findings to inform ways that the NUCLEUS program can better support students' productive, academically-centered, outside of class meetings with peers. The organizational improvement goal of this

project was to address the following question: “How can the NUCLEUS program better support students’ formation of productive outside of class peer study meetings?” To answer this question, information was needed within three specific areas: (1) the engagement of NUCLEUS students in peer study meetings outside of class time and class requirements; (2) factors that help and hinder the formation of outside of class peer study meetings; and (3) factors that help and hinder productivity in outside of class peer study meetings. Therefore, data in these three areas were central to the investigation and shaped the project’s key questions.

### **Key Questions**

In order to inform the organizational improvement goal, this descriptive study used mixed methods to explore the following three key questions:

1. To what extent do NUCLEUS students meet with peers to work academically together outside of class?
  - a. During the fall 2012 semester, what proportion of NUCLEUS students met with peers to work together academically out of class regularly, at least once per week?
  - b. During the fall 2012 semester, what proportion of NUCLEUS students met with peers to work academically together outside of class on a less than once per week basis?

- c. During the fall 2012 semester, what proportion of NUCLEUS students did not ever meet with peers to work academically together outside of class?
2. What factors bring students together to work with one another academically outside of class? What factors hinder students from coming together to work with one another academically outside of class?
3. What factors support and hinder students in working together productively on academic tasks outside of class?

### **Key Definitions**

To clarify the scope of this project, two key terms are defined below: “peers” and “outside of class peer study meetings.” It is important that these terms are explicitly defined because they are central to the project. In the case of “outside of class peer study meetings,” a rationale for why this term was used, rather than alternate terms like “peer study groups” or “task groups,” is given.

#### **Peers**

In this project, peers are defined as classmates who are enrolled in the same course during the same semester. Peers may be in the same class year, although it is not necessary. For example, a freshman enrolled in Calculus I and a sophomore enrolled in the same Calculus I course are peers. If these students were to study Calculus I together outside of class time, their meetings would be of interest to this

project. Even if the students were not enrolled in the same course section, or if they did not have the same Calculus I instructor, their meetings outside of class time and class requirements to work on Calculus I material together would be of interest to this project.

### Outside of Class Peer Study Meetings

This project focuses on outside of class peer study meetings, which are defined to occur whenever two or more peers voluntarily interact in-person outside of class time and class requirements to work together on shared course content. These meetings exclusively consist of peers as defined above. Instructors, graduate teaching assistants, staff members and more advanced students who have already taken the course are not present or involved in outside of class peer study meetings. Peers coordinate with each other when, where and how long their outside of class peer study meetings will be. They also coordinate how the meetings will be carried out and the circumstances under which meetings will occur.

Another condition is that outside of class peer study meetings are in no way connected to course requirements. Participation in outside of class peer study meetings by students is completely voluntary. Thus, a meeting of peers outside of class to work together on a group project assigned by the instructor would not be considered an outside of class peer study meeting because their work together outside of class time is a required course activity. Furthermore, outside of class peer study meetings may or may not have structure (i.e., roles and procedures) and they may or may not be pre-

planned. For example, outside of class peer study meetings may occur serendipitously if by chance students are studying in the same common area, notice each other as classmates, and begin to work together.

Outside of class peer study meetings are defined in this very broad way in order to capture the many different kinds of voluntary “socio-academic integrative moments” peers may experience when they work together on academics outside of class time and class requirements (Deil-Amen, 2011). In fact, the terminology of “outside of class peer study meetings” is intentionally used in this project rather than “peer study groups.” This is because within group theory, a group is defined as an identifiable psychological entity that exhibits specific characteristics such as a structure, common goals, an association of individuals as group members, and an established system of interpersonal relationships and trust among members (Winston, Bonney, Miller, & Dagley, 1988). Although some outside of class peer study meetings examined in this project may match all the criteria set by group theory, not all will. Since forming and maintaining structured study groups requires considerable effort, many peer interactions found in this project are likely to be meetings of students who are not participants of formally or informally structured peer study groups. Since unstructured academic-centered peer interactions outside of class are also of interest to this study because they are instances of socio-academic integrative moments, the terminology of “study meetings” over “study groups” is used.

Thus, use of the broader notion of “outside of class peer study meetings” allows this investigation to include of all kinds of face-to-face, academic peer

interactions beyond the classroom—from meetings of structured peer study groups to casual instances of peers working together academically outside of class. Moreover, it alleviates semantic confusions that arise from group theory terminology. In cases of casual, non-structured interactions of individuals working together in some way (e.g., academically), group theory would define such collections of people as “tasks groups” (Winston, Bonney, Miller, & Dagley, 1988). A task group does not exhibit all of the criteria of a true psychological group. However, the term “group” is within its name. Thus, this project examines “outside of class peer study meetings” in order to avoid terminology confusions, and to be inclusive of all types of in-person academic peer interactions—study groups, task groups, and serendipitous interactions—that occur outside of class time and class requirements.

## **Methods**

### **Project Design**

This project utilized data from three sources: surveys distributed to all NUCLEUS students, individual interviews with a subset of NUCLEUS students, and institutional data related to participants’ demographics and academic records. Survey instruments and interview protocols are found in Appendices F through I. The author used findings from the literature review to create the survey instruments and interview protocols. Two versions of survey instruments and interview protocols were created—“Version 1” for students who had met with peers outside of class time to study

together during the fall 2012 semester, and “Version 2” for students who did not. Also, since the NUCLEUS program collects NUCLEUS members’ demographic information and academic record information for programming, academic advising and academic monitoring purposes, the author utilized data from NUCLEUS student records to inform this investigation. Only information from NUCLEUS students who agreed to participate in the study was used, and informed consent was obtained from all participants (a copy of the informed consent form is in Appendix J, and Institutional Review Board approval and renewal documents for this project are located in Appendix K). Informed consent was obtained at the start of the online survey for each participant. If students declined consent, no survey questions were displayed to them and they were not asked to participate in individual interviews.

#### Data Collection & Study Sample

Using a Qualtrics online survey platform ([www.qualtrics.com](http://www.qualtrics.com)), survey instruments were distributed via e-mail to all NUCLEUS students who were enrolled in fall 2012 UD courses. Students who were not attending traditional, in-person, standard-letter graded courses were excluded from the study (for example, senior health science majors enrolled in their final semester in off-campus clinical internship courses). The surveys asked students about their activities related to studying, or not studying, with peers outside of class time and outside of class requirements during the fall 2012 semester. Since the fall 2012 semester had just ended, students’ study experiences were likely to have been fresh in their minds when they took the survey.

Surveys were sent to students on December 10, 2012 during the fall 2012 semester final exam week. Over the following three weeks, several e-mail reminders were sent to students who had unopened or uncompleted completed surveys. Surveys were closed for responses on December 31, 2012.

“Version 1” of the survey instrument, for students who participated in outside of class peer study meetings, asked students to indicate if they studied with peers outside of class time and class requirements for one course only, for more than one course, or for all of their courses during the fall 2012 semester. If students indicated that they worked outside of class with peers for more than one course, or for all of their courses, the survey instrument then asked students, “Which course did you meet most frequently with classmates to study for?” After this question, the instrument instructed students to answer the rest of the survey questions based on their experiences studying together with classmates outside of class time for the particular course they had just indicated. This focused students’ responses on their experiences for the fall 2012 semester course where they had the most face-to-face interaction with peers outside of class time. Thus, students’ survey responses were specific to their experiences studying with peers for one particular course, rather than for multiple courses, which likely varied for each course context. This feature of the survey instrument strengthened the reliability of survey data.

Two hundred out of 285 students responded to at least the initial yes-or-no survey question that asked, “Did you meet with other students in your courses to study together outside of class time and outside of class requirements? (Note: Meetings with

classmates to work on assigned group projects would not count in this case. Also, meetings with more experienced peers for tutoring help would not count either.)” With this large response rate (70.2%), the group of study participants were representative of the NUCLEUS student population at the time of data collection. See Table 1 for a comparison of the study sample to the NUCLEUS population across several demographic characteristics. The data source for the information presented in Table 1 is an institutional data source. Table 2 contains other characteristics of the study sample that could not be obtained from the institutional data source. Thus, the data presented in Table 2 is self-reported data by the survey participants. Moreover, for purposes of data analyses participants’ academic majors were classified into three discipline groups. These groups are as follows: (1) natural sciences; (2) applied sciences; and (3) social sciences, arts, and humanities. Table 3 displays how the three discipline groups were classified and the number of participants in each group.

In addition to surveys, individual interviews were carried out with 15 students. Potential interviewees were identified using their survey responses. The last survey question asked participants if they would be willing to be interviewed about their outside of class peer study experiences (or lack of such experiences). Students who answered “yes” to this question were considered. Because more students answered “yes” than needed, the researcher strategically chose to invite particular individuals in varying majors and class years, and from varying racial/ethnic backgrounds in order to get a broad perspective of students’ experiences. Moreover, in order to probe students with varying levels of involvement in outside of class peer study meetings (no

participation in them to frequent participation in them during the fall 2012 semester), the researcher used students' survey responses to select five students who did not meet with peers outside of class time, five students who met on average less than once per week with peers outside of class time, and five students who met on average once per week or more with peers to work on course content outside of class time. Taking into consideration all of these factors, the sample of 15 students was diverse in many ways. See Tables 4-6 for detailed information about interviewees. Each participant was interviewed once. Individual interviews ranged from 35 to 70 minutes in length and lasted 50 minutes on average. Although protocols were used, interviews were conversational in nature and the author used many probes not found in the protocols to get a fuller picture of each participant's experiences.

Table 1

*Comparison of the Study Sample to the Fall 2012 NUCLEUS Population*

Characteristic	NUCLEUS Population		Study Sample	
	Number	Percent	Number	Percent
<b>Sex</b>				
Male	66	23.2	44	22.0
Female	219	76.8	156	78.0
<b>Race/Ethnicity</b>				
White	66	23.2	48	24.0
Black	91	31.9	65	32.5
Hispanic	31	10.9	18	9.0
Asian	53	18.6	36	18.0
Multi-Ethnic/Other	44	15.4	33	16.5
<b>Class Year by Expected Graduation Date</b>				
Freshman	84	29.5	55	27.5
Sophomore	77	27.0	53	26.5
Junior	63	22.1	46	23.0
Senior	61	21.4	46	23.0
<b>Primary College/Major</b>				
College of Arts & Sciences	204	71.6	140	70.0
Natural Sciences	126	44.2	86	43.0
Social Sciences	50	17.5	33	16.5
Arts & Humanities	28	9.8	21	10.5
College of Health Sciences	58	20.4	45	22.5
College of Agriculture & Nat. Res.	10	3.5	6	3.0
College of Engineering	3	1.1	3	1.5
College of Earth, Ocean, & Env.	2	0.7	1	0.5
College of Ed. & Human Dev.	3	1.1	1	0.5
University Studies/Associate in Arts	5	1.8	4	2.0
<b>Honors Program Student Status</b>				
Honors	32	11.2	26	13.0
Non-Honors	253	88.8	174	87.0
<b>First Generation College Student Status</b>				
First Generation	85	29.8	61	30.5
Continuing Generation	200	70.2	139	69.5
<b>Residency</b>				
Delaware Resident	168	58.9	123	61.5
Out-of-State Resident	117	41.1	77	38.5

*Notes.* Population N = 285; Sample N = 200.

All items are data obtained from institutional records.

Table 2

*Other Characteristics of the Study Sample*

Characteristic	Number	Percent
Commuter Student Status		
Commuter		
Live with family members off campus	39	20.3
Total Commuter	39	20.3
Non-Commuter		
Live in residence hall	126	65.6
Live in off-campus housing with roommates	27	14.1
Total Non-Commuter	153	79.7
Transfer Student Status		
Transfer Student	14	7.3
Not a Transfer Student	178	92.7
Has Prior Experience Working With Peers Outside of Class		
Yes	150	78.1
No	42	21.9

*Notes.* N = 192.

All items are self-reported data obtained from Dec. 2012 survey instruments.

Table 3

*Participants' Academic Major Classified into Discipline Groups*

Discipline Group	Number	Percent
<b>Natural Sciences</b>		
College of Arts & Sciences - Natural Sciences	86	44.0
<b>Total</b>	<b>86</b>	<b>44.0</b>
<b>Applied Sciences</b>		
College of Health Sciences	45	23.0
College of Agriculture & Natural Resources	6	3.0
College of Engineering	3	1.5
College of Earth, Ocean, & Environment	1	0.5
<b>Total</b>	<b>55</b>	<b>28.0</b>
<b>Arts, Humanities, &amp; Social Sciences</b>		
College of Arts & Sciences - Social Sciences	33	16.8
College of Arts & Sciences - Arts & Humanities	21	10.7
College of Education & Human Development	1	0.5
<b>Total</b>	<b>55</b>	<b>28.0</b>

*Notes.* N = 196.

Data obtained from institutional records.

Four participants who were University Studies/Associate in Arts majors were not included in the classification.

Table 4

*Characteristics of Interview Participants who Never Met with Peers about Academics Outside of Class during Fall 2012*

Participant	Class Year	Sex	Race/ Ethnicity	College/Major	Commuter (C) Status	First Generation (FG) Status	Honors (H) Status	Cum. Fall 2012 GPA
Madesh	Freshman	Male	Asian	College of Earth, Ocean, & Environment	Non-C	Non-FG	Non-H	2.20
Abraham	Sophomore	Male	Black	College of Arts & Sciences – Arts & Humanities	C	Non-FG	Non-H	3.33
Cynthia	Sophomore	Female	White	College of Health Sciences	Non-C	FG	Non-H	2.78
Jasmyn	Junior	Female	Multi- Ethnic	College of Health Sciences	C	FG	H	3.99
Rose	Senior	Female	Asian	College of Arts & Sciences – Natural Sciences	C	FG	Non-H	3.51

*Notes.* All names are pseudonyms.

The item “commuter status” is self-reported data collected from Dec. 2012 survey instruments. All other items are data obtained from institutional records.

Table 5

*Characteristics of Interview Participants who Met with Peers about Academics Less than Once per Week Outside of Class during Fall 2012*

Participant	Class Year	Sex	Race/ Ethnicity	College/Major	Commuter (C) Status	First Generation (FG) Status	Honors (H) Status	Cum. Fall 2012 GPA
Denise	Freshman	Female	Black	College of Health Sciences	Non-C	Non-FG	Non-H	2.71
Fatima	Sophomore	Female	Black	College of Arts & Sciences – Social Sciences	Non-C	Non-FG	Non-H	3.18
Bradley	Junior	Male	White	College of Arts & Sciences – Natural Sciences	Non-C	Non-FG	H	4.00
Pranav	Junior	Male	Asian	College of Arts & Sciences – Natural Sciences	Non-C	Non-FG	H	3.67
Stacy	Senior	Female	Black	College of Health Sciences	Non-C	Non-FG	Non-H	3.02

*Notes.* All names are pseudonyms.

The item “commuter status” is self-reported data collected from Dec. 2012 survey instruments. All other items are data obtained from institutional records.

Table 6

*Characteristics of Interview Participants who Met with Peers about Academics Once per Week or More Outside of Class during Fall 2012*

Participant	Class Year	Sex	Race/ Ethnicity	College/Major	Commuter (C) Status	First Generation (FG) Status	Honors (H) Status	Cum. Fall 2012 GPA
Ava	Freshman	Female	Asian	College of Arts & Sciences – Social Sciences	Non-C	Non-FG	H	3.71
Jessica	Freshman	Female	White	University Studies	Non-C	FG	Non-H	3.15
Lauren	Sophomore	Female	Black	College of Health Sciences	Non-C	Non-FG	Non-H	2.28
Keri	Junior	Female	White	College of Arts & Sciences – Natural Sciences	Non-C	Non-FG	H	3.93
Thomas	Senior	Male	Hispanic	College of Arts & Sciences – Natural Sciences	Non-C	Non-FG	Non-H	3.80

*Notes.* All names are pseudonyms.

The item “commuter status” is self-reported data collected from Dec. 2012 survey instruments. All other items are data obtained from institutional records.

## Data Analysis

The scope of this project was descriptive and exploratory in nature. Given this, the goals of the quantitative and qualitative data analyses were to summarize information and to find patterns in the data that address the key questions. The ultimate goal of collecting and analyzing data was to learn how the NUCLEUS program could better support students' formation of productive outside of class peer study meetings (the organizational improvement goal). Survey responses and institutional data provided quantitative information. Interviews and responses to open-ended survey questions provided qualitative information. Descriptive statistics were computed for quantitative data. Additional exploratory post-hoc analyses were performed to look for statistically significant patterns in the quantitative data. Such analyses included Pearson's chi-square tests and one-way analysis of variance (ANOVA) tests. When necessary for one-way ANOVA tests, post-hoc comparisons were apportioned using the appropriate adjustments (Hochberg or Games-Howell procedures). All statistically significant findings are reported and discussed in the following chapter.

The 15 individual interviews were audio recorded and transcribed verbatim by the author. Along with interview data, responses from open-ended survey questions were included in qualitative coding procedures. In order to reduce bias, interviews and survey responses were blinded before coding. The coding process was carried out with two goals in mind: to capture variety in the responses and to find commonalities

across participants. The author created two start lists of codes—one in response to the second key question and another in response to the third key question of this study. These start lists were informed by the quantitative results of survey data, the initial readings of the qualitative data, and the findings from the literature review. A neutral colleague examined the two start lists of codes to check the clarity of the codes and to reduce redundancy.

Once established, the author applied the coding scheme to all qualitative data. While doing so, the author refined codes and was open to variety and uniqueness in the data (Miles & Huberman, 1994). After completing the coding of all qualitative data, qualitative codes were grouped together with significant findings from quantitative data in order to form categories. These categories were developed into themes that addressed the second and third key questions of this project. Due to the nature of the first key question, only quantitative data was needed to inform it.

### Trustworthiness & Limitations

Multiple trustworthiness approaches were incorporated into this study (Lincoln & Guba, 1985). Triangulation through the use of multiple and different sources and methods was employed. Also, peer debriefing enhanced the development of the coding scheme. Efforts to provide thick descriptions for readers were carried out by the use of verbatim transcriptions and detailed quotes from participants. Quotes were edited when necessary, only to improve readability. Also, an audit trail and reflexive journaling were utilized to document steps, decisions, emerging ideas and biases.

The position of the author as deeply involved in the coordination of the NUCLEUS program may be a limitation of the study. Because of the author's role, participants may have been less likely to disclose to her their negative perceptions of the NUCLEUS program, if they had any. However, the fact that the author had been so involved in the program since August 2011 may also have been a strength of the study. In her role, the author built a supportive and trusting rapport with students, which may have been a factor in obtaining a high survey response rate and in-depth interview conversations with participants.

The use of participant memory and recall for answering survey and interview questions may be another limitation of this study. However, efforts were made to reduce the lack of students' memory of experiences by asking them to reflect on their actions in the fall 2012 semester by responding to a survey distributed in December 2012, and by being interviewed during the first six weeks of 2013. This immediacy helped to reduce gaps in participants' recall of experiences.

## **Chapter 2**

### **FINDINGS & DISCUSSION**

#### **NUCLEUS Students' Participation in Outside of Class Peer Study Meetings**

The first key question investigated the extent to which NUCLEUS students met with peers to work together on academic tasks outside of class time and class requirements. It inquired about the proportion of students who participated in peer study meetings versus the proportion of students who worked alone. Moreover, it examined the typical frequencies of outside of class peer study meetings. Results from the survey instruments addressing these aspects of the first key question are found in Tables 7 and 8. In sum, more than three-quarters (76%) of students surveyed met with one or more classmates outside of class time and class requirements to work together on academic tasks. Most often, students who met with peers to work on academic tasks did so on a less than weekly basis. Only 23% of students participated in regularly occurring peer study meetings that met at least once per week.

Table 7

*Participation in Outside of Class Peer Study Meetings during Fall 2012*

Participation in Peer Study Meetings	Number	Percent
<b>Met with Peers</b>	<b>152</b>	<b>76.0</b>
Met with Peers Less than Once per Week	104	52.0
Met with Peers Once per Week or More	45	22.5
Did Not Indicate Meeting Frequency	3	1.5
<b>Did Not Meet with Peers</b>	<b>48</b>	<b>24.0</b>

*Notes.* N = 200.

Data obtained from Dec. 2012 survey instruments.

Table 8

*Frequency of Outside of Class Peer Study Meetings during Fall 2012*

Frequency of Meetings	Number	Percent
<b>Never</b>	<b>48</b>	<b>24.4</b>
<b>Less than Once per Week</b>	<b>104</b>	<b>52.8</b>
One to two times during the semester	26	13.2
Three to five times during the semester	58	29.4
About every other week	20	10.2
<b>Once per Week or More</b>	<b>45</b>	<b>22.8</b>
Once a week	26	13.2
More than once a week	19	9.6

*Notes.* N = 197.

Data obtained from Dec. 2012 survey instruments.

## Student Use of Electronic Forms of Communication

Since it is possible that students could have worked with classmates on academics outside of class time using electronic forms of communication in lieu of meeting in person, students' use of electronic communication was explored. More specifically, students' use of phone calling, e-mailing, text messaging, instant messaging (e.g., using Facebook Chat or Gchat), and video calling (e.g., using Facetime, Skype, or Google Video Chat) to work with classmates on course material outside of class time were inquired about in the survey instruments.

When students' usage of electronic communication was compared across the two groups—students who participated in peer study meetings, and students who studied alone in the fall 2012 semester—no statistically significant difference was found. Thus, students who studied alone were not more likely than students who studied with others to use electronic communication. This finding supports the notion that students who studied alone did not use electronic communication in place of meeting with classmates. Results of the comparison are displayed in Table 9.

Furthermore, Table 10 shows the frequency of usage of different modes of communication by both groups of students. Statistically significant differences were found when comparing the frequencies of usage for specific forms of electronic communication. In particular, students who participated in peer study meetings used text messaging ( $d = 0.75$ , medium-to-large effect size), phone calling ( $d = 0.57$ , medium effect size) and video chatting ( $d = 0.50$ , medium effect size) more frequently to contact classmates about academic material than did students who studied alone.

This may be because text messaging, phone calling and video chatting often require students to have exchanged personal cell phone numbers. Thus, they may be considered more personal modes of communication than e-mailing or instant messaging via Gmail or Facebook. Overall, the findings in this section address a gap in the literature since no information about students' use of electronic communication to work with one another on academics outside of class time was mentioned in previous studies.

Table 9

*Usage of Electronic Communication to Work with Classmates on Course Material Outside of Class Time*

Participation in Peer Study Meetings	Used Electronic Communication with Peers		Did Not Use Electronic Communication with Peers	
	Number	Percent	Number	Percent
Met with Peers	91	78.4	58	75.3
Did Not Meet with Peers	25	21.6	19	24.7

*Notes.* N = 193.

Data obtained from Dec. 2012 survey instruments.

No significant association was found when a Pearson's chi-square test was performed.

Table 10

*Frequency of Forms of Electronic Communication Used to Work with Classmates on Course Material Outside of Class Time*

Item	Met with Peers Outside of Class			Did Not Meet with Peers Outside of Class			F(1, 111)	d
	n	M	SD	n	M	SD		
Text Messaging	90	2.47	0.57	23	2.04	0.56	10.30*	0.75
E-mail	90	1.97	0.64	23	1.91	0.42	0.14	--
	Met with Peers Outside of Class			Did Not Meet with Peers Outside of Class			F(1, 105)	d
	n	M	SD	n	M	SD		
Phone Calls	84	1.73	0.68	23	1.35	0.53	5.91*	0.57
	Met with Peers Outside of Class			Did Not Meet with Peers Outside of Class			F(1, 110)	d
	n	M	SD	n	M	SD		
Instant Messaging	89	1.45	0.56	23	1.39	0.72	0.17	--
	Met with Peers Outside of Class			Did Not Meet with Peers Outside of Class			F(1, 107)	d
	n	M	SD	n	M	SD		
Videochat	86	1.22	0.50	23	1.00	0.00	4.56*	0.50

*Notes.* Data obtained from Dec. 2012 survey instruments.

Rating scale: 3 = *At Least Once per Week*, 2 = *A Few Times Over the Semester*, 1 = *Never*.

\*  $p < .05$

## Characteristics of Meetings

Data obtained from surveys also examined what NUCLEUS students' outside of class peer study meetings were like. Table 11 displays information about some of the major characteristics of these meetings. In general, 64% of NUCLEUS students who participated in outside of class peer study meetings did so for more than one of their courses during the fall 2012 semester. More than three-quarters of respondents (78%) reported that their main reason for working with peers on academics outside of class time was to achieve high course grades. Moreover, students reported that outside of class peer study meetings almost always took place in on-campus locations (93%), and most often occurred among two or three students working together (57%) for about one to two hours (66%). These findings support what the literature has indicated to be common logistics of outside of class peer study meetings.

Table 11

*Characteristics of Outside of Class Peer Study Meetings*

Characteristic	Number	Percent
<b>Number of courses for which students met with peers<sup>a</sup></b>		
More than one course	96	64.4
One course only	44	29.5
All of fall semester courses	9	6.0
<b>Primary reason for meeting<sup>b</sup></b>		
To get a grade of A or B in the class	115	77.7
To pass the class	19	12.8
To improve motivation	4	2.7
Other: "To do well on exams/assignments"	4	2.7
Other: "To better understand/learn from each other"	3	2.0
To get to know other students	3	2.0
<b>Usual location of meetings<sup>b</sup></b>		
In an on-campus location	138	93.2
In an off-campus location	10	6.8
<b>Usual duration of meetings<sup>a</sup></b>		
Two hours	45	30.2
An hour	28	18.8
An hour and a half	26	17.4
Two and a half hours	16	10.7
Three hours	16	10.7
More than three hours	11	7.4
Less than an hour	7	4.7
<b>Number of other participants in meetings<sup>b</sup></b>		
Two other people	45	30.4
One other person	40	27.0
Three other people	33	22.3
Four other people	20	13.5
Five or more other people	10	6.8
<b>Work style within meetings<sup>c</sup></b>		
Worked on material aloud with one another	90	61.2
Worked on material quietly side-by-side	54	36.7
Other: "Both ways"	3	2.0

*Notes.* Some percentages do not sum to 100 due to rounding error.

Data obtained from Dec. 2012 survey instruments.

"Other" responses were write-in responses by students.

<sup>a</sup> N = 149.

<sup>b</sup> N = 148.

<sup>c</sup> N = 147.

It is interesting to note that although a majority of students reported that they worked together on course material aloud with one another in meetings (61%), more than a third (37%) reported that in meetings they worked on material quietly side-by-side, talking only to ask one another questions when they arose. In the literature, Gubbels (1999) described the latter peer meeting activity as “parallel studying,” and found that it most often occurred among students working together who lacked study skills and/or content knowledge. Some evidence was found to support Gubbels’ observations about parallel studying in this investigation. When the final course grades of students who participated in parallel studying were compared to those who worked aloud with peers, students who reported that they worked on material individually and quietly side-by-side were less likely to achieve grades of A’s or B’s in the courses they met with peers when compared to students who reported that they worked aloud on course material together throughout their peer study meetings ( $d = 0.37$ , small effect size). Table 12 displays this finding.

Table 12

*Final Grade in Course by Work Style in Peer Study Meetings*

Work Style within Meetings	A or B		C, D, F, W, or L	
	Number	Percent	Number	Percent
Worked Quietly Side-by-Side	35	32.7	19	52.8
Worked Aloud Together	72	67.3	17	47.2

*Notes.* N = 144.

Data obtained from Dec. 2012 survey instruments and institutional records. Letter grade categories include + or – grades. P grades were not included. A significant association was found when a Pearson’s chi-square test was performed,  $\chi^2(1, n = 144) = 4.62, p = .032, d = 0.37$  (small effect size).

### Perceived Helpfulness and Benefits of Meetings

Almost 95% of NUCLEUS students who participated in outside of class peer study meetings reported that their peer study interactions were “Helpful” or “Very Helpful” for them. On a scale of one to four with four indicating “Very Helpful” and one indicating “Waste of Time,” respondents’ mean rating for the helpfulness of outside of class peer study meetings was 3.34 ( $SD = 0.60, N = 148$ ). Moreover, students reported benefiting from outside of class peer study meetings in many ways. For example, “Increased knowledge and understanding of course content” was the most commonly perceived benefit claimed by 84% of respondents. Refer to Tables 13 and 14 for a complete report of students’ perceptions of the helpfulness and benefits of peer study meetings.

An interesting finding resulted from an examination of students' grades prompted by the results of students' responses to the question of how peer study meetings benefitted them. Although 55% of respondents perceived gaining better grades from their participation in peer study meetings, no significant differences existed between the grade point averages (GPAs) of students who participated in outside of class peers study meetings and students who studied alone. This result is consistent with the literature—researchers who examined relationships between students' participation in outside of class peer study activities and their academic achievement did not observe statistically significant patterns (Gubbels, 1999; Willment, 1998). Table 15 presents findings about students' GPAs.

Table 13

*Student Responses for How Helpful Studying with Peers Outside of Class Was for Them*

Item	Number	Percent
<i>“How helpful for you was studying with classmates outside of class for this course?”</i>		
Very Helpful	59	39.9
Helpful	81	54.7
Not Helpful	7	4.7
Waste of Time	1	0.7

*Notes.* N = 148.

Data obtained from Dec. 2012 survey instruments.

Table 14

*Perceived Benefits Gained from Peer Study Meetings*

Item	Number	Percent
<i>“Increased knowledge and understanding of course content”</i>		
Agree	124	83.8
Disagree	24	16.2
<i>“Better grades than I would have achieved studying on my own”</i>		
Agree	81	54.7
Disagree	67	45.3
<i>“Friendships”</i>		
Agree	75	50.7
Disagree	73	49.3
<i>“Connections with people I can ask academic questions to in the future”</i>		
Agree	57	38.5
Disagree	91	61.5
<i>“Stronger communication skills”</i>		
Agree	45	30.4
Disagree	103	69.6
<i>“Stronger interpersonal skills”</i>		
Agree	39	26.4
Disagree	109	73.6
<i>“Increased interest in course content or career path”</i>		
Agree	33	22.3
Disagree	115	77.7

Notes. N = 148.

Data obtained from Dec. 2012 survey instruments.

Table 15

*Comparisons of Mean Grade Point Averages (GPAs)*

Item	Total Sample			Did Not Meet with Peers Outside of Class			Met with Peers Outside of Class		
	n	M	SD	n	M	SD	n	M	SD
Fall 2012 Cumulative GPA	200	3.11	0.58	48	3.12	0.66	152	3.10	0.56
Fall 2012 Semester GPA	200	3.18	0.66	48	3.20	0.71	152	3.18	0.65
Final Grade in Course Students Most Frequently Met with Peers Outside of Class to Study for	--	--	--	--	--	--	144 <sup>+</sup>	3.00	0.86

*Notes.* Data obtained from Dec. 2012 survey instruments and institutional records.

<sup>+</sup>Grades of P, W, and L were not included.

No statistically significant difference in means was found between groups.

Two other interesting findings about students’ perceptions of benefits gained from peer study meetings occurred when the responses of students who met with peers often—at least weekly—were compared to the responses of students who met with peers less frequently. Students who participated in outside of class peer study meetings that occurred at least once per week were significantly more likely to report perceived gains in communication skills ( $d = 0.55$ , medium effect size) and interpersonal skills ( $d = 0.42$ , small-to-medium effect size) when compared to students who participated in outside of class peer study meetings that occurred on a less than weekly basis—see Tables 16 and 17 below. These findings support the notion that it is worthwhile for the NUCLEUS program to encourage students to form outside of class peer study meetings that occur on a weekly basis, or more frequently, so students can better develop transferable skills that will help them to be successful in college and beyond.

Table 16

*Perceived Gain in Communication Skills by Frequency of Outside of Class Peer Study Meetings*

Frequency of Peer Meetings	Gained Stronger Communication Skills			
	No		Yes	
	Number	Percent	Number	Percent
Met Less than Once per Week	80	77.7	23	51.1
Met Once per Week or More	23	22.3	22	48.9

*Notes.* N = 148.

Data obtained from Dec. 2012 survey instruments.

A significant association was found when a Pearson’s chi-square test was performed,  $\chi^2(1, n = 148) = 10.44, p = .001, d = 0.55$  (medium effect size).

Table 17

*Perceived Gain in Interpersonal Skills by Frequency of Outside of Class Peer Study Meetings*

Frequency of Peer Meetings	Gained Stronger Interpersonal Skills			
	No		Yes	
	Number	Percent	Number	Percent
Met Less than Once per Week	82	75.2	21	53.8
Met Once per Week or More	27	24.8	18	46.2

*Notes.* N = 148.

Data obtained from Dec. 2012 survey instruments.

A significant association was found when a Pearson's chi-square test was performed,  $\chi^2(1, n = 148) = 6.21, p = .013, d = 0.42$  (small-to-medium effect size).

**Factors that Helped and Hindered the Formation of Outside of Class Peer Study Meetings**

The second key question investigated the factors that bring students together to work with one another on academics outside of class time and class requirements, and the factors that hinder students from doing so. Data obtained from survey instruments and student interviews informed the second key question. Three main themes were found from the data analyses and are discussed in this section. In brief, these three themes highlight the importance of the following: (1) students' familiarity with their peers; (2) students' perceptions of peers in relation to their learning; and (3) students' membership in historically marginalized or revered groups in higher education.

## Students' Familiarity or Lack of Familiarity with Peers

The most prominent factor found to support or hinder students' coming together to work with one another on academics outside of class time and class requirements was students' familiarity with their peers. Findings related to this theme fleshed out a fuller picture of what has already been established in the literature—students who are familiar with one another are more likely to work together on academics outside of class time, while students who are not familiar with one another are less likely to do so (Bruffee, 1999; Christian & Talanquer, 2012; Lazar, 1993, 1995; Nespor, 1994; Sandoval-Lucero et al., 2012; Willment, 1998). In addition to supporting and clarifying this notion, qualitative and quantitative findings shed light on the following two related areas: factors that fostered and hindered students from becoming familiar with their peers; and the type of knowledge about peers that factored into students' decisions to work with others, or to avoid working with others on academic tasks outside of class.

Nearly all students who were interviewed about their outside of class peer study experiences were familiar with the peers they worked with, and most often students described these peers as their friends. For example, when asked about studying with others, Rose explained, "I have my group of friends that I study with, I'm very comfortable with them." Similarly, Lauren began telling about her peer study experiences recalling, "OK, it all starts back from freshman year, me and my friend Violet...we were friends before so it was easier to study together." Also at the end of Bradley's interview, he reflected out loud, "I think it's really interesting thinking

about how my really close friends are the ones that I turn to the most to study with.” In general, students saw working with friends as something they could do with ease, but they perceived working with unfamiliar peers as something that was difficult for them to do. For instance, after telling about her extensive study experiences with her best friend Jordan, Stacy thought aloud about the possibility of her working in a similar way with a peer she was not familiar with. She contemplated, “I don’t see with people I hardly know, I don’t know if I would study with them.”

The interview data revealed that students worked with others who they considered to be friends outside of class time because they felt comfortable with them. For example, in reference to the friends Keri studied with outside of class she explained, “I feel comfortable asking them stupid questions and I wouldn’t have felt comfortable if it wasn’t them—even for the review session that some teachers have I would rather be sitting with the people I know than strangers.” Similarly, Rose told about the openness she shared with her best friend and outside of class study partner Gabrielle in contrast to the hesitancy she experienced working with other classmates during in-class activities.

During a group project in class I didn’t know the other four people in my group so I didn’t feel very comfortable to speak out about my opinion, but with Gabrielle I was very comfortable—we were very comfortable in that we can just say, ‘No, you’re wrong!’ because that’s how we learn.

The great level of comfort between Rose and Gabrielle allowed them to freely express their ideas and correct each other’s misunderstandings with no hard feelings, but Rose

could not operate in a similar manner with classmates she was not familiar and comfortable with.

Quantitative data also provided evidence that students who worked together in peer study meetings were familiar with one another and most often considered each other to be friends. A survey question inquired how students who participated in outside of class study meetings became connected with the peers they worked with. 57% of survey respondents reported that they were friends with the classmates they participated in peer study meetings with prior to the fall 2012 semester. This was the top response for how peers became connected to each other. Other responses to this question are displayed in Table 18.

Table 18

*Ways Peers who Worked Together Outside of Class Became Connected to Each Other*

Item	Number	Percent
<i>“My classmate(s) and I were friends prior to this semester”<sup>a</sup></i>		
Yes	84	56.8
No	64	43.2
<i>“My classmate(s) suggested we study together”<sup>b</sup></i>		
Yes	78	52.3
No	71	47.7
<i>“I suggested we study together”<sup>b</sup></i>		
Yes	75	50.3
No	74	49.7
<i>“My classmate(s) and I have studied together for shared courses in previous semesters”<sup>b</sup></i>		
Yes	53	35.6
No	96	64.4
<i>“NUCLEUS staff suggested we study together”<sup>b</sup></i>		
Yes	19	12.8
No	130	87.2
<i>“The professor or T.A. for the course suggested we study together”<sup>b</sup></i>		
Yes	10	6.7
No	139	93.3

Notes. <sup>a</sup>N = 148.

<sup>b</sup>N = 149.

Data obtained from Dec. 2012 survey instruments.

Moreover, qualitative data revealed that students often participated in peer study meetings or worked alone based on their familiarity with other students enrolled in the course. A reason students frequently gave for not working with peers outside of

class time was that they did not have friends in their class or they did not know anyone in the class. For example, when reflecting on a course he took in the fall semester Madesh said, “It would have been good to study with someone but I didn’t really know people in that class.” Cynthia also explained, “When I don’t have friends in the class I just go about doing it by myself, but the classes that I do have friends with I’m like OK, let’s all study on this night.” Similarly, reflecting on her upcoming spring semester courses Denise noted, “A lot of my friends won’t have the same classes I do...so I’ll just be forced to work by myself and with the professors.”

Furthermore, it was found that some students developed very strong study partnerships with friends such that when study partners were not enrolled in their same courses students did not participate in any kind of peer study activities. This finding was not mentioned in the reviewed literature but it emerged in the qualitative data. For example, Thomas told how his outside of class peer study activities were most beneficial for him when he worked with his friend Bill. When asked why sometimes he studied with peers and other times he studied alone, Thomas thought aloud, “I’m not sure...I guess it’s because Bill’s my friend and I feel like since we work well with each other—and Bill wasn’t in molecular biology so I didn’t study with anyone.” Thus, Thomas related his participation in outside of class peer study activities to whether or not Bill was concurrently enrolled in courses with him. Similarly, Rose exclusively worked with her friend Gabrielle on academics outside of class time and since she and Gabrielle were not taking any of the same classes during the fall 2012 semester, Rose studied alone for all of her courses. When asked if Gabrielle was the

only person she ever studied with outside of class time Rose replied, “Yeah, I really don’t like to study with other people...I always study with Gabrielle.”

Another finding in the data that was discussed in the literature was as follows: the less familiar students were with each other, the less comfortable they were in approaching one another about working together on academics outside of class time (Downs, 1995; Willment, 1998). On this topic, Cynthia, a sophomore student explained, “I get nervous if I don’t know you to ask you if you want to study outside of class, but if I know you then I’m OK.” Jessica, a freshman student, described a similar feeling and how she decided to overcome it in her math class:

I think probably the most difficult part for a lot of people is approaching someone...a lot of people just go through the whole class without knowing anybody—I did that for my first few days of math class, I was so shy and I didn’t know anybody but I finally just sat next to somebody and we started talking.

It was found that freshmen and sophomore students were often less likely than students who were juniors or seniors to approach classmates about working on academics together outside of class time. This may be because freshmen and sophomores were newer to the university and therefore, they were more likely to not be familiar with others in their classes. For example, Keri reflected on her outside of class peer study interactions over the years. She commented, “Junior year I really started meeting up with people because I knew more people in my major.”

Quantitative data also supported this point. In the survey instrument given to students who did not participate in peer study activities during the fall 2012 semester, respondents rated how much they agreed with statements explaining possible reasons

why they did not work with classmates on academics outside of class time. A statistically significant difference was found when responses of freshman and sophomore students were compared to those of junior and senior students pertaining to a statement about not knowing classmates well enough to feel comfortable asking them if they would like to study together outside of class time. Freshmen and sophomore students who studied alone were more likely to agree with the statement than their junior and senior counterparts ( $d = 0.70$ , medium-to-large effect size). Table 19 below displays this data.

Table 19

*Student Agreement with Not Knowing Classmates Well as a Reason for Not Meeting with Others*

Item	Freshman or Sophomore			Junior or Senior			F(1, 44)	d
	n	M	SD	n	M	SD		
<i>“I didn’t know anyone in my classes this past Fall 2012 semester well enough to feel comfortable asking them if they would like to study together outside of class”</i>	25	2.72	0.84	21	2.10	0.94	5.63*	0.70

*Notes.* Data obtained from Dec. 2012 survey instruments.

Rating scale: 4 = *Strongly Agree*, 3 = *Agree*, 2 = *Disagree*, 1 = *Strongly Disagree*.

Midpoint: 2.5

\*  $p < .05$ .

Unfortunately, even if students build up courage to ask classmates with whom they are unfamiliar if they would like to work together outside of class time, peers are not likely to agree to do so. Bruffee (1999) noted this point in the literature, and Madesh's outreach to classmates he did not previously know illustrated it in the data. Madesh told how he e-mailed three of his psychology classmates to see if they would like to study together outside of class time. Madesh did not previously know these students, but he sat at a table with them in class and as a group they worked well together on in-class activities. None of the students replied to Madesh's e-mail message. When asked why he thought they ignored his e-mail, Madesh replied, "I didn't know them and I was coming on too fast...I figured that they might have been uncomfortable with it because we didn't know each other much." Madesh did not send a follow up e-mail or ask his classmates about his suggestion during class. He explained, "I didn't want to keep on pestering them about it, and pressuring them because I felt they had things to do." Thus, although they worked together well during class, the lack of familiarity between Madesh and his classmates hindered them from getting together to work on course material outside of class time.

Of the 13 students interviewed who had experience in outside of class peer study meetings at some point during their college years, 11 students (85%) described the peers they worked with either as their friends or as people who became their friends over the course of working together in peer study meetings. Ava provided insight into how friendship either brings students together to work with one another or friendship develops as a result of students working together in outside of class peer

study meetings. She remarked, “It’s either study groups then friendship, or vice versa—friendships with the added bonus of having a study group kind of thing.”

Although Ava was not previously friends with the mathematics classmate she worked with outside of class time, Ava was familiar with this person from seeing her in passing around her dormitory.

### **Factors that Foster and Hinder Students’ Familiarity with Peers**

In general, the data showed that students who were not previously friends with the peers they worked with outside of class time most often were familiar with them in some way. Interviews revealed several ways in which students became familiar with their peers. Most commonly, students noted that they knew the peers they worked with from living near each other on campus. Often times, students were floormates, or dormmates, or lived in neighboring dormitories. Of the 13 students interviewed who had experience working with peers in outside of class study meetings at some point during their college years, 10 students (77%) indicated that they worked with peers who lived either in their building or in their complex. Students living near each other would gain familiarity with one another by seeing each other around dormitories, in common lounge areas, and also along their walks to and from classes. For instance, Bradley recalled an observation he made during his freshman year that helped him get to know his classmates. “I would walk to class and notice these people walking to class and then notice them walking back to my building, and a couple weeks

afterwards I realized, ‘Hey, these people live right next to me and they’re in my same class, cool!’”

In addition to fostering familiarity among students, living on-campus near each other made peer study meetings convenient for students. Stacy and Jordan’s situation in particular illustrated how greatly outside of class peer study activities can be influenced by the convenience of living near each other on campus. During the 2010-2011 academic year, Stacy’s good friend and study partner Jordan lived in a dormitory close by hers. She described, “Our dorms were right next to each other so he would always come over and we’d study all night...it was so convenient because he was right there, we could go to dinner, study, it was really nice.” During the fall 2012 semester however, Jordan lived off-campus. Although Jordan moved within five miles from campus it greatly reduced Stacy and Jordan’s peer study activities. When asked about the frequency of their meetings Stacy replied:

Last year it would be almost every night he’d come over, but last semester it was maybe twice a week, and then maybe sometimes we’d do an all day Sunday—and we’d do a lot of over the phone questions and answers more so than in person which I didn’t really get as much out of.

Although Jordan and Stacy were not far apart in distance, the inconvenience of Stacy having to drive to pick Jordan up at his apartment, or of Jordan having to walk and take the campus bus inhibited them from meeting in person to study together.

Another student, Jessica described the ease of coordinating peer study meetings with her classmate Beth who lived on her floor.

Beth lived right down the hall so it was always so convenient to meet up...I could just knock on her door, and because I’m in Rodney [dormitory] and all

of the doors are open I would just walk by and be like, 'Hey, when do you want to do the homework?'

In fact, Jessica and Beth first began meeting outside of class time to work on Spanish material together serendipitously one day when they both happened to be in the lounge area of their dormitory studying at the same time. Jessica noted the following about the first time she interacted with Beth: "I saw her doing her homework in the lounge and I was just like, 'Hey, you have that class too?'" and we started working together every week." In her interview, Ava also talked about the importance of classmates living near one another for the occurrence of outside of class peer study meetings. Reflecting on her experience working with her classmate Maria on mathematics outside of class time Ava remarked, "Convenience is critical because if Maria lived on the other side of campus no matter how compatible we were it would've been hard to meet up."

In addition to living near one another, students became familiar with peers through having mutual friends, mutual interests and from participating in extracurricular activities together. For example, Bradley explained how he first met his study partner Ezra. "In Intervarsity, the Christian Fellowship, we went to a large group together and I met him there, he became a good friend of mine and I realized he's the same major as me, taking all these classes with me, so it sort of moved from there." Similarly, Cynthia told how she became comfortable approaching classmates by having mutual friends and interests with them.

I was friends with one person in the class through field hockey, and actually I met some others through common friends—hanging out and meeting people

that are in my class that way, now we have that connection...I also met people by seeing them at the gym, just different ways that you see people and talk to them outside of class, now I feel comfortable talking to them outside of class, we can study outside of class, that kind of thing.

Hence, students' common connections through mutual friends and/or mutual interests contribute to their senses of familiarity and comfort with one another, which makes it easier for them to work together on academics outside of class time.

Another way students became familiar with one another was through their common academic pursuits. In general, students who were the same major and/or same class year were more likely to have similar schedules. Common course taking fosters familiarity with one another, which fosters the formation of outside of class peer study meetings. Of the 13 students interviewed who had experience working with peers in outside of class study meetings at some point during their college years, nine students (69%) worked with peers who had multiple shared courses with them during the fall 2012 semester and/or in previous semesters.

Simply put, students who have previously taken courses together recognize one another. With this sense of familiarity, students feel comfortable working together outside of class time. For instance, Keri described how she started studying with peers by approaching two classmates who were familiar to her:

One of them was also in the medical scholars program so she looked familiar, so then we just started talking and then the other girl she was my year, we were kind of friends but not really, but she was like that familiar face in the class so I just went up to her.

Similarly, Pranav told how he began peer study meetings with a particular mathematics classmate. "I recognized that she was in my math classes for the last two

semesters and I asked her, ‘Do you want to go over the homework answers?’ that’s pretty much how it happened.” In this manner, students who have taken courses together in previous semesters, and students who were enrolled in multiple courses together during a single semester often met to study together outside of classes.

When outside of class peer study meetings went well for students, they often continued to meet for their shared courses in future semesters. For example, Pranav, a junior student explained:

I studied with three other girls and the reason why I chose them was because they were in a lot of my classes beforehand—two of them were in my physiology class sophomore year and the three of us started meeting, and the other person joined us when we had another class together.

Pranav worked with this group of students outside of class time for multiple science courses over three consecutive semesters. Moreover, during one semester when the group had two science courses in common they held outside of class peer study meetings for both courses. Although Pranav was not in the same major as his study partners who were the same major, many of the course requirements overlapped for both majors. This fostered their formation of peer study meetings across multiple semesters.

Similar outside of class peer study meeting patterns were discussed in the literature by Nespors (1994). In his ethnographic study of undergraduate physics majors, the researcher found that many students formed stable, tight-knit study groups that they continued to participate in for shared major requirements over several years. In the present study during an interview with Ava, she reflected on how peer study

meetings among students in the same major have great potential for endurance. “I think when you develop study groups with people in your major you create connections with people that you can sustain throughout your four years because they’re in your major, they’re going to take the same classes you take...you can make that kind of investment.”

Shared course taking fosters familiarity between students not only because students taking many of the same courses together see each other often, but also because the students have had common academic experiences and they can therefore relate well to each other. An example of this was seen in how Thomas described his connection with his study partner Bill. “Since Bill is also pre-med, also a neuroscience major, we had the same courses and know what it’s like—I think that’s why we mesh really well together.” Additionally, reflecting on her commonalities with her study partner Violet, Lauren explained, “We’re in the same major and we’re in the same classes and it’s like you naturally gravitate towards people like you.” Similarly, referring to his study partner Ezra, Bradley said, “We realized we’re pretty much the same person taking all these classes together.”

Since students in the same major are in the same boat together, so to speak, they can validate and support each other. Ava discussed this phenomena when describing the experience of forming study partnerships with same-major peers. “It’s like camaraderie you build, it’s like we all know this professor, we all have this same project...someone’s there who knows your pain and knows your suffering and then that like gets you through it.” These sentiments speak to how participation in outside

of class peer study activities support students' persistence in college to degree completion, which was a major theme in the literature (Deil-Amen, 2011; Fullilove & Treisman, 1990; Light, 1992; Light, 2001; Tinto, 1997; Treisman, 1985).

On the other hand, students who do not have the same major and who had not taken the same courses in the past are unfamiliar with each other. Thus, they likely do not relate well to each other's academic experiences. Therefore, it is more difficult for these students to approach one another about working together outside of class time. Bradley talked about such a situation in the context of how he was very unfamiliar with other students enrolled in his Spanish course. "In Spanish I'll go in the class and because most of the kids aren't biology majors or aren't science majors even—I haven't taken classes with them, so it's more difficult to say, 'Hey, my name is Bradley, why don't we study tonight?'"

In a similar manner, students who do not progress through academic majors with peers in a cohort model are not likely to be familiar with classmates and therefore, they are less likely to participate in outside of class peer study activities. Boud (2001) noted this point in the literature. In the data, Rose and Lauren were two interviewees who discussed how classmates in their major courses questioned their enrollment. Rose switched from a health science to a natural science major after her sophomore year. Reflecting on her experience with classmates in one of her first upper-level chemistry courses, Rose said, "I felt weird because these people were like, 'Where were you the first two years of chemistry?' I was like, 'Well, I wasn't here because I was not a chemistry major.'" Also, Lauren and her study partner Violet

experienced similar questioning from their nursing major classmates. Since Lauren and Violet had done poorly in their introductory-level nursing courses, they were held back from taking higher-level major courses until they increased their GPAs. Due to this, coupled with the timing of course offerings and the sequence of pre-requisites, Lauren and Violet fell a year behind in their major requirements. Thus, once enrolled in nursing courses again Lauren and Violet were taking courses with students who entered the university a year after they had done so. Lauren described:

When Violet and I went to Nursing 235 there were a few people that asked us, 'Are you guys transfers?' or 'Did you just transfer to nursing?' because they all knew each other from the year before, but me and Violet didn't take nursing classes that year before...so they were like, 'Who are these random girls that just came into OUR class?' After a while though they started seeing me and Violet in every class with them.

Such data demonstrate how due to their exclusivity, tight-knit major cohorts can hinder the involvement of particular students in outside of class peer study activities, yet simultaneously support the formation of peer study meetings among students who began their studies in major cohorts.

Furthermore, it was found that students' desire or lack of desire to become familiar with peers and build social relationships with peers also fostered or inhibited their familiarity with one another, and in turn, fostered or inhibited their formation of outside of class peer study meetings. Some students saw value in the social aspect of peer study activities and participated in peer study meetings in part to develop social relationships with classmates. For example, Lauren explained:

Since I decided to take complete control of my academic life my social life completely went down, so I don't party as much, I don't go out really, so study

sessions are a good time for me to be social and also get my work done—that's what I used our study sessions as.

Ava also saw value in making social connections and building friendships with classmates through participating in outside of class peer study meetings. She noted:

Studying in groups is a social thing where you create your own community and learn from each other...it's a nice environment, for example I've never heard stories where you're like, 'I'm best friends with my tutor'—you don't build those same kind of relationships as you do in study groups.

In contrast, other students were not interested in socializing and getting to know peers beyond their interactions with them in the classroom. One interviewee, Abraham felt that way: “In high school I was a little bit more social, I talked to a lot of people, in college I just haven't done that too much.” When asked how he interacted with his classmates, Abraham replied, “It's mainly just talking during class, after class if we're going in the same direction we'll walk together but that's pretty much it.” Abraham was a commuter student who held employment off-campus. He did not communicate with classmates outside of class time, studied alone for all of his courses, and was content with not socializing or working with others outside of his classes.

### **Students' Knowledge of Peers' Commitment to Learning**

In addition to bringing to light factors that facilitate and hinder students from becoming familiar with one another, data from the interviews revealed the kind of information that was important to students' decision-making about working with others outside of class time or working alone. Overall, it was found that students'

familiarity with peers fostered the formation of peer study meetings not only because students felt comfortable interacting with familiar peers, but also because students knew important information about familiar peers. In particular, students knew what familiar others were like as students. They knew how seriously peers took their studies, how motivated they were to learn, and what peers' study habits were like. In other words, students were knowledgeable of peers' commitment to learning.

In the literature, Gubbels (1999) used the term "commitment to learning" to describe students' willingness to do whatever it takes to learn. Moreover, the researcher found that students' commitment to learning made a difference in whether they studied effectively or ineffectively. She concluded that students with a higher commitment to learning studied more effectively than students who had a lower commitment to learning. Gubbels (1999) explored students' commitment to learning in the context of their individual study habits. The author did not explore this concept in relation to how it may support or hinder students' formation of peer study activities. However, students' knowledge of peers' commitment to learning was found in the present study to affect students' formation of peer study meetings. This finding is a contribution to the literature.

The qualitative data revealed that when students were familiar with peers who they knew had a high commitment to learning, students were more likely to meet with them to study together outside of class time. Also, when students were familiar with peers who they knew had a low commitment to learning, students were more likely not to meet with them to study together outside of class time. These patterns occurred

because working with classmates who had a high commitment to learning would increase the likelihood that peer study meetings would be productive and beneficial for students, while working with classmates who had a low commitment to learning would likely result in unproductive peer study meetings that would not be beneficial for students. For example, Thomas included or excluded peers from his and Bill's outside of class peer study meetings based on the level of commitment to learning that classmates demonstrated.

A few of us studied together throughout Organic Chemistry I and II and then we kind of condensed because we realized some of the people weren't as—like Bill is also pre-med so he also tries his hardest and tries to get the top grades as he can, and some of the other people weren't as focused, so we found out that they veered off-path and it wasn't very helpful so we condensed the group and it was just me and Bill last semester...another girl was invited to our study group for Genetics this semester because she was the level of commitment—I think that was what our requirement was, make sure you do your work...as long as I know people are committed to it and I can see it, like if you wanted to do well in the course you're more than welcome to join us as long as you contribute, so I think that was a requirement for our study group.

In addition to the amount of effort students invested in understanding, commitment to learning included students' study styles and habits. Thus, students who were knowledgeable about peers' commitment to learning knew what peers' approaches to studying were like and could make decisions to work with others or avoid working with others outside of class time based on this information. For instance, when Rose was asked why she did not work with classmates outside of class time for an upper-level course in her major, she replied, "There were only 15 people in the class and I knew most of them, I knew their study habits and I knew they weren't going to match with my study habits so I just didn't bother." Throughout her interview

Rose described how her study habits were often different from her peers because she did not procrastinate. “I’m the kind of person that if I have work due next week I would do it this week, most people don’t do that.” However, she noted that her good friend and study partner Gabrielle had study habits that were similar to hers and this allowed them to work well together. Rose described how she and Gabrielle studied together in contrast to how other classmates crammed before assessments. “Gabrielle and I, we don’t just do old exams and homework problems the day or two days before an exam, we spend an entire week or two weeks studying a concept and trying to understand a concept.” Rose and Gabrielle’s approach to studying and desire to master information demonstrated that they both had a high commitment to learning.

When students who have a high commitment to learning work together, a sense of trust bonds them because they know all are willing to do whatever it takes to be academically successful. For example, Bradley told how he felt he could trust his friends who he studied with. “I know that they’re top academic performers so it’s like I can trust what they say.” In the literature, Bruffee (1999) noted that some students may mistrust peers’ requests to work together outside of class time. The qualitative data revealed that students with a high commitment to learning were especially wary of others. They were cautious about working with unfamiliar peers because they did not know what peers’ commitment to learning was like. Thus, working with unfamiliar peers was a risky thing for high commitment to learning students to do since if it turned out that peers had a low commitment to learning, outside of class study activities with them would most likely be a waste of students’ time.

Additionally, low commitment to learning peers may try to take advantage of high commitment to learning students' study efforts.

Several interviewees who had a high commitment to learning discussed this notion. Keri, who aspired to attend medical school, described why she participated in peer study activities with particular classmates that she knew well, and why she would not work with unfamiliar classmates outside of class time.

People that aren't pre-med I don't study with because I just don't know them...usually the honors/pre-med students are the ones I study with because we all have the same dedication and interests...if you don't know a person you don't want to study with them because it's like, 'What if I don't get anything out of it?' and with my friends I know I'll get something out of it.

Another interviewee, Fatima, described how she would give unfamiliar peers a chance to work with her outside of class time. However, if peers displayed a commitment to learning that was lower than hers, Fatima would not meet with them again.

When I do a group review I pick people that I know we're on the same level—I hate working with people that if I'm reading and you're not reading I have to teach you, so sometimes I'll start working with a group of people but I'll end up working with just one or two people...whoever hasn't read or is not keeping up with the material as much as I'm keeping up I don't work with them again...I don't continue with those people because you'd walk out just as you'd walked in, the same, and that's just a waste of time.

Moreover, Ava described how she “studied” classmates for evidence that their commitment to learning was compatible to hers before asking them if they would like to meet with her to work on academics outside of class time.

I'm cautious about who I ask, I feel like I kind of study that person, get a feel for what kind of person they are, what kind of student they are, and if they'll be compatible with me—I think that's what I look for, compatibility, I don't want to pick someone that would not help me at all...when you have someone

who's compatible with where you're at then you don't have to wait for them, you don't have to play catch up, it's like being on the same track.

Similar to Ava, another interview participant Pranav told how he intentionally picked who he studied with outside of class time based on his knowledge of what peers were like as students. Moreover, in his explanation of how he "picked his people," Pranav described what he used as evidence to gauge peers' commitment to learning:

I kind of need to know people a little bit, the one girl I knew she was honors as well, so I was like alright she's probably good, and the other kid was my major and we had four classes together last semester so I was like alright I can work with him as well...I need to know how seriously they would take it, like would they actually do the work or are they just going to piggy back off of me? so, I pick my people.

In sum, familiarity with peers permits knowledge of commitment to learning and trust, which eases the formation of outside of class peer study activities. Ava expressed this idea as follows: "With people you know you trust them, you know their habits, you know if you work well with them and that takes a step out of the element of forming a study group." Students sought out peers who they knew had a high commitment to learning and evaded working with peers outside of class time who they knew had a low commitment to learning. Students did so in order to maximize productive uses of their time and in order to avoid their study efforts being exploited by peers. This was particularly true for students with a high commitment to learning because they were most vulnerable to peers taking advantage of their efforts. In fact, mistrust of others was a main reason why one interviewee with a very high commitment to learning studied alone for all of her courses throughout her college

experience. Jasmyn, a junior health science major with a 3.99 cumulative GPA, explained:

Honestly, a lot of people just try to take advantage of you because they know that you're smart, and a lot of the people that would approach me I knew that they weren't doing so well so I would help them during class but as far as me taking my time out and having a study group with them—I would want it to benefit both ways, and if I met with them it would be more of me explaining everything that the teacher just said and that's not really—yeah, me explaining it to you would help me too but there might be more than I'm explaining to you that I need to study...so I mean, I would love to help you out but I have to study myself.

Thus, Jasmyn's mistrust of others coupled with her very strong commitment to learning drove her to devote all of her time and effort on her own learning and influenced her decision to always study alone. This look into Jasmyn's thoughts about why she felt it was best for her to not work with peers on academics outside of class time touches on another strong factor found to influence students' participation in peer study meetings—students' perceptions.

#### Students' Perceptions of Peers as Being or Not Being Potential Contributors to Their Learning

Students' perceptions were central to the second main theme in the data that addressed why some students elected to work with classmates on academics outside of class time and others chose to work alone. In addition to students' familiarity with peers and their commitment to learning, it was found that students' general perceptions of peers as being or not being potential contributors to their learning influenced their participation in peer study meetings. The data revealed that when

students thought that working with peers would likely contribute to their learning they worked with classmates outside of class time. On the other hand, when students thought that working with peers would likely not contribute to their learning, or when they thought that working with peers would potentially hinder their learning efforts, they studied alone. Furthermore, it was found that students often held course context dependent perceptions. In such cases, students saw peers as potential contributors to their learning only within specific academic contexts.

The ideas mentioned above are consistent with the literature. The literature noted that students may view working with peers outside of class time as a strategy to do well, or as a hindrance to doing well in their courses (Arum & Roska, 2011; Bruffee, 1999; Christian & Talanquer, 2012; Downs, 1995; Gubbels, 1999; Lazar, 1993; Lazar, 1995; Tang, 1993; Van Etten et al., 1997). Moreover, the literature highlighted how students can hold differing perceptions about the usefulness of working with peers outside of class time for different types of courses and assignments (Downs, 1995; Lazar, 1993; Lazar 1995; Sandoval-Lucero et al., 2012; Tang, 1993). However, this investigation extends what is known in the literature by uncovering a larger theme for understanding why some students study with classmates outside of class time and others do not, centered on students' perceptions of peers in relation to their learning within particular academic contexts.

By and large, it was found that students who perceived that peers could be contributors to their learning saw several ways in which working with classmates outside of class time aided their academic success. They most often noted that

discussing ideas and concepts with peers could help them better understand course material. In fact, 84% of survey participants who met with classmates outside of class time reported that they gained “increased knowledge and understanding of course content” (see Table 14). For instance, Lauren explained how interacting with her study partner Violet allowed her to challenge her ideas, which improved her understanding:

I feel like I learn better when I’m not learning verbatim word for word what the teacher says, I have to learn to apply things and understand who, what, when, where why, and how, all those things to better understand, so it’s easier to do that when we’re challenging each other back and forth about things.

In a similar manner, Bradley told how meeting with peers to talk about course material helped him to better grasp concepts by giving him the opportunity to hear others’ perspectives and to bounce his ideas off others.

I’ll read the chapter and interpret something one way, or sometimes I’ll read through it and miss something, so then when I talk with a friend of mine and we’re going through it they might point something out, or they’ll think of like, ‘This can be asked this way,’ or I’ll bring up, ‘Hey what do you think about this?’ ...so it’s sort of a good way to test my ideas on other people and test my understanding.

Furthermore, students recognized that these academic peer interactions not only contributed to their learning, but to their peers’ understanding as well. For instance, Thomas described his peer study meetings with Bill in the following way: “We would get together and figure out our weaknesses and then help each other through those things.”

Additionally, several students perceived that working on academics with peers outside of class time could contribute to their learning by helping them be more motivated, disciplined, and accountable in their study efforts. Lauren illustrated this

when she said, “Having someone count on me to help them study makes me want to study more, and I feel like Violet feels the same way because I count on her too...it’s good that we have each other to push each other.” Moreover, Keri recalled how working with peers helped her to be more disciplined in her solitary study efforts.

In high school I used to be like really study, study study, and then in college I started joining clubs so I didn’t study as much and then once I started studying with my friends I realized how I used to study because that’s how they were studying now and so I started to make myself more like my high school self.

Two interviewees, Pranav and Ava also told how participating in peer study meetings helped them be held accountable for completing non-graded assignments. Pranav explained, “In genetics we had homework, there were no due dates but we still did it and met and went over it together...we just made our own due dates, otherwise we weren’t going to do it.” Similarly, Ava described her experience meeting with a classmate to work on math homework:

Homework was never really due but we did the homework every day, after class we’d meet up and go through the problems...it helped with keeping up with the material...I think if I didn’t do that I would’ve been foundering and sinking in math...so I think the benefits of having someone to study with is not only that you have someone to work through the material with, but you have someone to keep you accountable and disciplined while you’re working.

Thus, students who perceived peers to be potential contributors to their learning saw that by working with classmates on academics outside of class time they could not only increase their understanding of course material, but they could also increase the amount of time and effort they spent engaged in learning activities. In turn, these students were more likely to participate in peer study meetings. In contrast, other students held very different perceptions about peers in relation to their learning.

They felt that working with classmates outside of class time could not add more value to their learning than what they could achieve alone. Hence, these students did not think of peers as potential contributors to their studies beyond the classroom, and some even perceived peers as potential inhibitors to their learning. As a result, they did not participate in peer study meetings.

Some quantitative data was found to support the notion that students who did not work with classmates outside of class time often studied alone because they did not see peers as potential contributors to their learning. A survey question asked NUCLEUS students who did not participate in peer study meetings to rate their agreement with statements that were possible reasons for not working with classmates outside of class time. Although all items received low ratings, the statement “I don’t want to study with others, I study better on my own” had the highest agreement value ( $M = 2.73$ ,  $SD = 0.92$ ,  $N = 45$ ). In fact, 25 out of the 45 respondents (56%) “Strongly Agreed” or “Agreed.” The complete results of this survey question are displayed in Table 20.

Table 20

*Student Agreement with Reasons for Not Meeting with Peers Outside of Class*

Item	n	M	SD
<i>"I don't want to study with others, I study better on my own"</i>	45	2.73	0.92
<i>"I didn't have time this past Fall 2012 semester, but if I did I would have liked to study with others outside of class"</i>	46	2.61	0.83
<i>"Most of the classes I took this past Fall 2012 semester were reading and writing based, so working with others would not have helped me much"</i>	45	2.51	0.99
<i>"I saw no need for studying with classmates outside of class time this past Fall 2012 semester"</i>	46	2.50	0.94
<i>"Most of the classes I took this past Fall 2012 semester were easy for me so I did not need help from others"</i>	45	2.44	0.79
<i>"I didn't know anyone in my classes this past Fall 2012 semester well enough to feel comfortable asking them if they would like to study together outside of class"</i>	46	2.43	0.94
<i>"I never considered studying with classmates outside of class time this past Fall 2012 semester"</i>	46	2.33	0.85
<i>"I don't know how to study with classmates outside of class time- what would we do?"</i>	44	2.16	0.81
<i>"I have studied with classmates outside of class time in the past and it wasn't a good experience"</i>	45	2.07	0.75
<i>"Studying with others outside of class time is a waste of my time"</i>	45	2.02	0.78

*Notes.* Data obtained from Dec. 2012 survey instruments.

Rating scale: 4 = *Strongly Agree*, 3 = *Agree*, 2 = *Disagree*, 1 = *Strongly Disagree*.

Through interviews, qualitative data provided abundant evidence to support the notion that a main reason why students who studied alone did so was because they did not see peers as being potential contributors to their learning. Jasmyn was an exemplar of a student who held the perspective that she could not benefit more in her learning by working with peers outside of class time than she could by studying on her own. Jasmyn was a very high achieving and motivated student who possessed strong study skills and habits. When asked about her study approach Jasmyn responded, “I just study every day, if you give me a lecture that day by that afternoon I’m re-reading my notes...usually for all of my classes I do that so by the time exams roll around I’m more reviewing than studying.”

Jasmyn’s study approach worked very well for her. At the end of the fall 2012 semester Jasmyn was a junior with a 3.99 cumulative GPA. Because of this, Jasmyn did not want to change her study activities in any way. She saw changing her ways, including working with peers outside of class time, as a threat to her learning and academic achievement.

There are definitely people who are on my same level that I can study with, but I just haven’t reached out to them because I think that me reaching out now, three years into college might more so hurt me than help me because I’m so used to studying by myself, if I study with other people and I change the way that I study who knows what that will do to my test scores?...so, I just figure I’ll keep on doing what works for me.

Jasmyn did not see peers as potential contributors to her learning. For example, she felt that reviewing information, explaining concepts, and asking questions with peers

would not be more helpful to her understanding of course material than her solitary study efforts.

I think studying in a group is more for clarification so it's like you already know your stuff now you're just going over that information and if you can explain it to other people who may not understand it then you really know your information, but that to me takes up more time that I can be studying for something else, so if I have the information down pat, why would I do that?...and yeah, asking questions back and forth sort of helps but I can just do that myself, like sometimes I'll look at something and I'll ask myself questions about the topic and answer them myself, so the strategies that we would use I could really use them on my own.

In addition, Jasmyn saw instructors as experts. Thus, when she had questions about course content Jasmyn would turn to them instead of classmates. She explained, "Usually I'll save questions for the professor, not discounting anyone else's knowledge but the professor is going to know more about it than my peers."

Several findings in the literature are relevant to Jasmyn's case. Jasmyn, a student who did not work with others outside of class time, had a higher than average GPA (Arum & Roska, 2011), and felt that professors were the authorities of content knowledge (Boud, 2001; Bruffee, 1999). Also, Jasmyn had good study skills and did not want to sacrifice personal control over aspects of her studying sessions, such as the pace at which she studied (Gubbels, 1999). Moreover, Jasmyn did not want to change a system of studying that worked well for her, and she mistrusted peers' requests to work with her outside of class (Bruffee, 1999). However, what the literature does not do is link these individual findings to a larger theme. At first glance, the findings may seem unrelated. However, the theme presented herein, centered on students' perceptions of peers as being or not being potential contributors to their learning, ties

the literature findings together by providing an larger theme for understanding why some students participate in peer study meetings and others do not. Using this theme, it can be seen how Jasmyn intentionally studied alone because she did not want peers to “mess her up.” In other words, she viewed peers not as potential contributors to her learning, but as potential inhibitors to her learning and academic success.

The only other interview participant who had never worked with peers outside of class time over the course of his college career up until the time of being interviewed was Abraham. Although Abraham was different than Jasmyn in many ways, including his major, class year, and GPA, Abraham also did not work with others outside of class time because he did not see classmates as potential contributors to his learning. Abraham explained, “I think I learn better just studying on my own, I think I retain the material better, and for me personally I think I get more done if I’m just by myself.” Thus, because he did not think that working with peers on academics outside of class time would potentially help his learning and academic success more than his individual efforts, Abraham studied alone for all of his courses.

### **Course Context Dependent Perceptions**

Although some students like Jasmyn and Abraham held fairly stable views that peers do not contribute to their learning beyond the classroom, other students held perceptions about peers in relation to their learning that varied according to the academic context. In these cases, students perceived peers to be potential contributors to their learning in some courses, but not in others. Interviews revealed that students

more commonly held course context dependent perceptions than stable perceptions about this matter. Additionally, patterns in the qualitative and quantitative data showed common characteristics among courses in which students were more likely to perceive peers as contributors to their learning, and courses in which students were less likely to have such perceptions of peers in relation to their learning.

Overall, the qualitative data showed that students who held course context dependent perceptions related their differing study approaches to how difficult or easy they thought courses were. They were more likely to perceive peers to be potential contributors to their learning for courses that they felt were difficult, and they were less likely to have this perception of peers for courses that they felt were easy. In general, students saw courses that required them to solve problems, apply content knowledge, or analyze ideas within graded assessment formats to be difficult courses. On the other hand, students saw courses that required them to memorize and replicate straightforward facts within graded assessment formats, or courses that required them to write and submit essays and research papers as the sole forms of graded assessments to be easy courses.

For instance, Fatima worked alone to study for a geography course but worked outside of class time with a classmate to study for a political science course. When asked about this during her interview, Fatima clarified the difference between courses for which she studied alone and courses for which she studied with others.

Classes that are straightforward I don't study with other people but classes where you have to apply and think, that's when I usually go for study groups...geography was easier to me, for that class it was like let me memorize

and this is what will be asked on the test, whereas for political science it wasn't like that, it was can you apply this concept...you had to be able to make connections because the professor wasn't direct and the tests were ambiguous—like he wouldn't tell you a definition, he would give you different examples and you'd have to figure out what he was trying to define, it was the hardest class I've ever taken.

Additionally Fatima, like other interview participants, told how she prioritized her courses each semester based on difficulty and rigor. When she did this for her fall 2012 schedule, the difficult political science course that she described above was her first priority, and a different political science course that required her to write papers was her last priority. She claimed, “My African Politics course didn't need work, we just had to write papers—no exams, so that was on the bottom.” As Fatima mentioned in this instance, students commonly noted that when classes did not have in-class examinations or quizzes they were easy courses that did not involve studying. Thus, students most often did not work with others outside of class time on them.

Another way students assessed the difficulty of classes was based on the amount of effort needed for them to grasp course content. Students saw difficult courses as those in which they were struggling to understand the material, and easy courses as those in which they were not having problems understanding the material. Some students who held course context dependent perceptions made decisions about studying alone or participating in peer study meetings using this criterion. For example, Denise described how she perceived working with peers outside of class time as being helpful for her in chemistry, where it was extremely difficult for her to

understand course content, but not in psychology, where understanding course content came easily to her. Denise recalled:

In chemistry I was just like, 'Help me! I'm drowning! I don't understand!' ...I could walk in the class and the professor might as well have been up there speaking Mandarin or German, I literally did not understand anything he was talking about, so to anyone around me I was just like, 'Oh, you know a little bit about this? Let's study together!' ...psychology I felt as though I had to sit down and study it and digest it on my own, for the most part I get psychology, my mom is a counselor so I have some basic idea of what's going on and I'm able to apply that to what I learn in class and I just grasp it easier than my science classes.

Denise's experience in chemistry is also congruent with Sandoval-Lucero and colleagues' (2012) finding that some students who have low self-efficacy in a particular course gravitate toward classmates who display higher self-efficacy as a strategy to do well in it.

Related to Denise's contrast between her chemistry and psychology courses, the qualitative and quantitative data uncovered patterns among students' participation in peer study meetings by course discipline. It was found that because many natural and applied science courses often included graded in-class exams and quizzes, and involved content that was not straightforward nor quickly grasped by students, students commonly perceived natural and applied sciences courses to be difficult courses. Therefore, students were more likely to view peers as potential contributors to their learning in them and in turn, they were more likely to participate in peer study meetings for natural and applied science courses compared to arts, humanities or social science courses. Stacy touched upon this in her interview when she was asked how the courses for which she felt it was helpful for her to study with others outside of

class time were different from the courses for which she felt it was not helpful to do so. In her response, Stacy distinguished science courses from arts, humanities, and social sciences courses.

Classes where you have things like equations it's better to work with someone but English, psychology, stuff like that it's like you read it and you get it and take a test on it, or you write a paper, I really don't need someone to help me with that, so no, I'm not studying with someone for theater, it's the sciences.

Keri, another interviewee who worked outside of class time with peers only in science courses had a similar reply to this interview question.

I think the material's easier—I don't think I've ever struggled in a non-science class...I took a history class freshman year, all you had to do was read the textbook and you did fine, and then a theater class but that was easy, and I took a Latin class but that was really easy so I didn't need any help.

Quantitative data also provided evidence that students more often participated in peer study meetings for natural and applied science courses than for other types of courses. On the survey instrument, students who participated in peer study meetings were asked to identify the course that they most frequently met with peers to work on outside of class time during the fall 2012 semester. These courses were categorized into disciplines using the same classification groupings found in Table 3. Survey results indicated that 82% of NUCLEUS students who participated in peer study meetings most frequently met with peers outside of class time to work together on a natural science or applied science course. The complete results to this survey question are displayed below in Table 21.

Table 21

*Discipline of Course for which Students' Most Frequently Participated in Peer Study Meetings*

Item	Number	Percent
<b>Discipline of Course</b>		
Natural Sciences	87	58.4
Applied Sciences	35	23.5
Arts, Humanities & Social Sciences	27	18.1

*Notes.* N = 149.

Data obtained from Dec. 2012 survey instruments.

Thus, students most often perceived natural and applied science courses to be more difficult than other types of courses, and therefore most often worked with peers outside of class time on them because they perceived peers to be potential contributors to their learning in those contexts. This finding is in agreement with the literature. Several researchers concluded that students were more likely to work together outside of class time for science, math and quantitative problem solving courses because they perceived those courses to be more difficult and require more effort than their other courses (Downs, 1995; Lazar 1993, 1995; Sandoval-Lucero et al., 2012). However, the current investigation contributes new knowledge to the literature. Although past research explored students' perceptions of course difficulty, it did not consider students' perceptions of peers as being or not being potential contributors to their learning as a factor in effecting students' participation in outside of class peer study meetings. Therefore, the larger theme centered on students' perceptions of peers in

relation to their learning introduced herein is an extension of the literature that incorporates previous research findings.

Moreover, the qualitative data clarified that what drove students to work with others outside of class time was not the discipline of the course *per se*, but rather students' perceptions of peers as being potential contributors to their learning within course contexts. Students participated in peer study meetings for courses in all disciplines, not only the sciences. Fatima, for instance, worked with classmates outside of class time in some social science courses. Also, students sometimes studied alone in science courses. Jessica studied alone for mathematics, which is classified as a natural science course. Jessica revealed, "My math class was so easy to me, because it was algebra I knew it all...I got at least 90s on all of the exams so I didn't need to study with anyone." Furthermore, several interview participants studied alone in some science courses, but worked with classmates outside of class time in others. For example, Bradley worked alone in physiology and microbiology, but worked outside of class time with peers for organic chemistry.

For a class like physiology or microbiology where it's really just memorize the fact and you have the information so you can answer the question, in those instances I found that working with a group might evolve into just going off on tangents and talking about silly things as opposed to focusing on fact memorization, so for those classes it was much more beneficial to work by myself...in organic chemistry it was really helpful studying in a group because organic is about problem solving and knowing how to get from A to B, so it was nice to work with others and say, 'Hey, I can't get this fraction, I'm stuck,' and somebody else might have gotten it and they can help you.

Therefore, the qualitative data allows for a bigger picture understanding of why some students work with peers on academic material outside of class time in some courses,

but work alone in others. Specifically, when students perceive peers to be potential contributors to their learning in particular course contexts—which most often are courses that students perceive to be difficult—students are likely to participate in peer study meetings.

Further exploration of the quantitative survey data resulted in additional findings that also fit into the new theme. Taking a closer look into the frequencies of students' peer study meetings it was found that students who met for natural and applied science courses were significantly more likely to meet on an at least weekly basis than students who met for arts, humanities and social science courses. In fact, a medium effect size existed ( $d = 0.53$ ) when the frequency of arts, humanities and social science peer study meetings were compared to the frequency of natural science peer study meetings. Moreover, a large effect size existed ( $d = 1.00$ ) when the frequency of arts, humanities and social science peer study meetings were compared to the frequency of applied science peer study meetings. However, no statistically significant difference existed between the frequencies of natural science and applied science peer study meetings. Table 22 shows the results of the chi-square test that examined meeting frequency across the three discipline groups, and Table 23 displays the outcomes of the post-hoc comparisons.

Table 22

*Frequency of Outside of Class Peer Study Meetings by Field of Course Most Frequently Met with Peers to Study for*

Frequency of Peer Study Meetings	Field of Course					
	Natural Sciences		Applied Sciences		Arts, Humanities & Social Sciences	
	Number	Percent	Number	Percent	Number	Percent
Met Less than Once per Week	58	66.7	14	51.9	32	91.4
Met Once per Week or More	29	33.3	13	48.1	3	8.6

*Notes.* N = 149.

Data obtained from Dec. 2012 survey instruments.

A significant association was found when a Pearson's chi-square test was performed  $\chi^2 (2, n = 149) = 12.30, p = .002, d = 0.60$  (medium effect size).

Table 23

*Post Hoc Comparisons for Frequency of Outside-of-Class Peer Study Meetings by Field of Course Most Frequently Met with Peers to Study for*

	Natural Science vs. Applied Science		Natural Science vs. Arts, Humanities & Social Science		Applied Science vs. Arts, Humanities & Social Science	
	Met Less than Once per Week	Met Once per Week or More	Met Less than Once per Week	Met Once per Week or More	Met Less than Once per Week	Met Once per Week or More
n	58	29	58	29	14	13
n	14	13	32	3	32	3
$\chi^2$	1.94		7.91		12.47	
df	1		1		1	
p	.163		.005*		.000*	
d	--		0.53 (medium)		1.00 (large)	

*Notes.* Data obtained from Dec. 2012 survey instruments.

$\alpha_T = .0167$

\* $p < .0167$ , denotes significance between the three groups at the .05 level

Interview data provided insight into the quantitative findings above. Since many natural and applied science courses included graded assignments and in-class quizzes and exams, students who participated in peer study meetings for those courses were likely to meet more frequently outside of class time than students who participated in peer study meetings for other courses that had such assessments less often. This was because the timing of assignments and assessments often regulated the timing of students' peer study meetings. For example, Thomas described how he met

with his friend Bill for their biochemistry course before exams occurred and assignments were due.

We met around two times a week and we'd meet before exams, but even without exams coming up we'd meet once to go over problem sets and another day to go over stuff...problem sets were due on Thursdays so we'd work on it ourselves first and then come together on that Wednesday to see if there's anything that we can help each other with.

Moreover, some applied science courses had structures that included more frequent assignments and assessments than what was commonly found in natural science courses. This drove students who participated in peer study meetings for some applied science courses to get together very often. For instance Stacy, a senior health sciences major, described how her almost daily assessments in her major courses resulted in her almost daily peer study meetings with her friend Jordan:

On average we got tested or quizzed almost every day on something, either in lab or lecture, and multiple times there'd be two tests on a day so we were constantly studying...since we were being tested or quizzed every day there was something we always had to study for, that's why we met every day...next semester we don't need to study because it's clinicals.

Because regular assessment structures facilitated routine peer study meetings that coincided with course assessment schedules, the findings about meeting frequency in the quantitative data reflected the common assessment schedules of courses in the three disciplines. In the literature, Lazar (1993, 1995) and Nespor (1994) noted similar observations about the relationship between assessment structures in different types of courses and the occurrences of outside of class peer study meetings.

An additional finding in the quantitative data that also fits into the theme centered on students' perceptions involves a difference in peer study participation by

class year. In particular, seniors were significantly less likely to participate in peer study meetings compared to students in other class years ( $d = 0.48$ , small-to-medium effect size). Table 24 displays the results of the chi-square test using a random subsample containing equal numbers of senior and non-senior students.

Table 24

*Participation in Outside-of-Class Peer Study Meetings by Senior Status using Subsample with Equal Number of Senior and Non-Senior Students*

Participation in Peer Study Meetings	Non-Senior		Senior	
	Number	Percent	Number	Percent
Met with Peers	40	87.0	31	67.4
Did Not Meet with Peers	6	13.0	15	32.6

*Notes.* N = 92.

Data obtained from Dec. 2012 survey instruments and institutional records. A significant association was found when a Pearson's chi-square test was performed  $\chi^2(1, n = 92) = 5.00, p = .025, d = 0.48$  (small-to-medium effect size).

This finding is probably a result of seniors' course schedules. Many senior students have what they perceive to be easier schedules than what they had in previous semesters. In general, it is common for students in their senior year to participate in learning experiences outside of the classroom, such as clinical, internship, practicum, seminar and student teaching experiences that do not include traditional assessments like quizzes and exams. For example, in the previous quotation Stacy told how in the spring 2013 semester she would not need to study because she would be involved in clinical experiences. Moreover, many students complete the bulk of their major

coursework by the end of their junior year. Thus, seniors are often enrolled in free elective courses that are of their choosing, and students often choose classes that they perceive to be less difficult than other courses. As a result of their more common enrollment in outside of class experiences and free elective courses, seniors are likely to be enrolled in fewer courses for which they perceive peers could contribute to their learning, and in turn they may be less likely than freshmen, sophomores or juniors to participate in peer study meetings.

Furthermore, given the two findings noted earlier that students were more likely to participate in peer study meetings for natural and applied science courses than for arts, humanities and social science courses; and that students were more likely to meet on a frequent basis when they participated in peer study meetings for natural and applied science courses, it follows that natural and applied science majors would more likely be engaged in peer study meetings than students who are arts, humanities and social science majors. In the quantitative data, when participation in peer study meetings was explored by students' primary academic major, statistically significant differences were found between the three discipline groups. Students who were natural science or applied science majors were more likely to participate in peer study meetings than students who were arts, humanities or social science majors (respectively,  $d = 0.67$  and  $d = 0.53$ , medium effect sizes). Table 25 displays the result of the overall chi-square test, and Table 26 shows the outcomes of the post-hoc comparisons. These results support the notion that different cultures of engagement may exist for students in science-based courses than in arts, humanities or social

science-based courses, as suggested by Brint, Cantwell and Hanneman (2008), and Arum and Roska (2011).

Table 25

*Participation in Outside of Class Peer Study Meetings by Students' Major Field of Study*

Participation in Peer Study Meetings	Major Field of Study					
	Natural Sciences		Applied Sciences		Arts, Humanities & Social Sciences	
	Number	Percent	Number	Percent	Number	Percent
Met with Peers	73	84.9	44	80.0	31	56.4
Did Not Meet with Peers	13	15.1	11	20.0	24	43.6

*Notes.* N = 196.

Data obtained from Dec. 2012 survey instruments.

A significant association was found when a Pearson's chi-square test was performed  $\chi^2(2, n = 196) = 15.59, p = .000, d = 0.59$  (medium effect size).

Table 26

*Post Hoc Comparisons for Participation in Outside of Class Peer Study Meetings by Students' Major Field of Study Outcomes*

	Natural vs. Applied Science Majors		Natural Science vs. Arts, Humanities & Social Science Majors		Applied Science vs. Arts, Humanities & Social Science Majors	
	Met with Peers	Did Not Meet with Peers	Met with Peers	Did Not Meet with Peers	Met with Peers	Did Not Meet with Peers
n	73	13	73	13	44	11
n	44	11	31	24	31	24
$\chi^2$	0.57		14.10		7.08	
df	1		1		1	
p	.452		.000*		.008*	
d	--		0.67 (medium)		0.53 (medium)	

*Notes.* Data obtained from Dec. 2012 survey instruments.

$\alpha_T = .0167$

\* $p < .0167$ , denotes significance between the three groups at the .05 level

Some qualitative data provided insight into students' thoughts about the nature of engagement in learning in different academic contexts. As previously mentioned, students often perceived peers to be potential contributors to their learning in courses that involved problems solving, but not in courses that involved original writing.

Interview data revealed some common ideas students had about the nature of problem solving tasks versus the nature of writing tasks. In general, interviewees frequently saw problem solving to be inherently a collaborative task, and writing to be inherently

an individual task. They viewed the presence of multiple perspectives as essential to good problem solving, while they viewed having a singular, unique perspective as essential to good writing. In regard to problem solving courses, Thomas explained: “In a problem solving class it’s better to work with multiple people to get different perspectives so you can better understand...problem solving I think is a collaborative effort, I mean that’s how you do it in the real world.” In contrast, when discussing English courses Jessica explained, “For English you’re not going to study with someone because that’s writing your own paper, it’s your own thoughts and ideas.”

Similarly, Abraham said the following about writing-centered courses:

Classes where you have to make your own answers I don’t think are good for group study just because you don’t want to be too similar to other people, because the more unique your answers are the better...I don’t want to talk to someone and think, ‘Oh that’s a good idea,’ and then end up changing my own concept for theirs because that’s what comes to my mind when the time comes to write.

Students’ emphasis on the value of multiple perspectives in problem solving and unique perspectives in writing correspond to Brint, Cantwell and Hanneman’s (2008) claims that the culture of engagement in sciences and engineering utilizes collaborative efforts to work toward quantitative competencies, while the culture of engagement in arts, humanities and social sciences utilizes individual assertions in the exploration of ideas. Hence, these distinctive cultures of engagement may be another reason why students more commonly perceive peers as potential contributors to their learning in natural and applied science courses than in arts, humanities and social science courses.

## Students' Memberships in Marginalized or Revered Groups in Higher Education

Students' membership in marginalized or revered groups in higher education was found to be the third main factor to support or hinder students' participation in outside of class peer study meetings. The findings in this section connect insights that have been established by past research, and extends them to show a broader view of how membership in marginalized or privileged groups in higher education can affect college students' experiences. In the literature, Boud (2001) claimed that students who belonged to marginalized groups in higher education were more likely than other students to be excluded from peer learning experiences. The quantitative data supported this notion. It was found that students who were commuter students—defined as students who live with family members off-campus; first generation college students—defined as students whose parents' or guardians' highest level of education is high school, and black or Hispanic students—defined as students who identified as being either black or Hispanic on their university records were less likely to participate in peer study meetings than their counterparts (respectively,  $d = 0.50$  medium effect size,  $d = 0.33$  small effect size, and  $d = 0.44$  small-to-medium effect size). Tables 27, 28 and 29 display the results of these chi-square tests.

Table 27

*Participation in Outside of Class Peer Study Meetings by Commuter Status using Subsample with Equal Number of Commuter and Non-Commuter Students*

Participation in Peer Study Meetings	Non-Commuter		Commuter	
	Number	Percent	Number	Percent
Met with Peers	34	87.2	26	66.7
Did Not Meet with Peers	5	12.8	13	33.3

*Notes.* N = 78.

Data obtained from Dec. 2012 survey instruments.

A significant association was found when a Pearson chi-square test was performed,  $\chi^2 (1, n = 78) = 4.62, p = .032, d = 0.50$  (medium effect size).

Table 28

*Participation in Outside of Class Peer Meetings by First Generation College Student Status*

Participation in Peer Study Meetings	Continuing Generation College Students		First Generation College Students	
	Number	Percent	Number	Percent
Met with Peers	112	80.6	40	65.6
Did Not Meet with Peers	27	19.4	21	34.4

*Notes.* N = 200.

Data obtained from Dec. 2012 survey instruments and institutional records.

A significant association was found when a Pearson's chi-square test was performed  $\chi^2 (1, n = 200) = 5.23, p = .022, d = 0.33$  (small effect size).

Table 29

*Participation in Outside of Class Peer Study Meetings by Black/Hispanic Minority Status*

Participation in Peer Meetings	Non-Black/Hispanic		Black/Hispanic	
	Number	Percent	Number	Percent
Met with Peers	98	83.8	54	65.1
Did Not Meet with Peers	19	16.2	29	34.9

*Notes.* N = 200.

Data obtained from Dec. 2012 survey instruments and institutional records. A significant association was found when a Person chi-square test was performed  $\chi^2 (1, n = 200) = 9.31, p = .002, d = 0.44$  (small-to-medium effect size).

Boud (2001) explained that postsecondary students in marginalized groups were more likely than their peers to have employment, family and other commitments outside of college, which limited their time to meet with classmates outside of class. There was some evidence in the qualitative data to support Boud’s assertion about employment off campus, but none of the interviewees discussed family or other personal commitments beyond college. Two black students, Stacy and Abraham told how they held employment off campus that made their availability very limited. Stacy recalled, “Sophomore year I had a full time job, I was working at night so I didn’t study with people.” For Abraham, “I do catering and I work with my family’s business...so after school I go straight to the office, do work, go home, and if I need to study, I study and that’s pretty much it.”

Boud (2001) also claimed that the employment, family and other commitments beyond college often held by students in marginalized groups gave them fewer

opportunities to get to know their classmates. Thus, students like commuter students, first generation college students, black students and Hispanic students were less likely to gain familiarity with their classmates, which in turn made them more likely to be excluded from peer study activities. As previously discussed in this chapter, familiarity among students facilitates the formation of peer study meetings. Therefore, students' lack of familiarity with their peers may be another reason why students in marginalized groups in higher education were less likely to work on academics with classmates outside of class time.

Some quantitative data supported the notion that students in marginalized groups in higher education were less likely to gain familiarity with their classmates. On the survey instrument administered to all participants, one item listed several statements that were possible ways the NUCLEUS program could help students benefit more from outside of class study meetings with classmates. The item asked participants to rate the helpfulness of each statement. When differences in helpfulness ratings were compared across student characteristic groups, it was found that students who identified as black or Hispanic, and transfer students rated the statement, "Provide more help connecting students with others in their courses" significantly higher than their counterpart groups (respectively,  $d = 0.34$ , small effect size, and  $d = 0.71$ , medium-to-large effect size). Thus, because black, Hispanic, and transfer students felt that classmate connection help would be more helpful to them than their peers, it follows that black, Hispanic, and transfer students were likely to be less

familiar with their classmates than non-black/Hispanic students and non-transfer students. Table 30 displays the results of these two comparisons.

Table 30

*Responses to Ways NUCLEUS May Help Students Benefit More From Outside of Class Peer Study Meetings by Student Characteristics*

Item	Black/Hispanic			Non-Black/Hispanic			F(1, 189)	d
	n	M	SD	n	M	SD		
<i>“provide more help connecting students with others in their courses”</i>	75	3.35	0.71	116	3.09	0.81	5.21*	0.34
	Transfer			Non-Transfer				
	n	M	SD	n	M	SD	F(1, 188)	d
<i>“provide more help connecting students with others in their courses”</i>	13	3.69	0.48	177	3.15	0.78	6.10*	0.71

*Notes.* Data obtained from Dec. 2012 survey instruments and institutional data.  
 Rating scale: 4 = *Very Helpful*, 3 = *Helpful*, 2 = *Somewhat Helpful*, 1 = *Not At All Helpful*  
 Midpoint: 2.5  
 \*  $p < .05$

Past work by Treisman (1985) provided some additional insight into how students’ membership in marginalized groups in higher education can hinder their participation in outside of class peer study activities. The researcher found that the African American participants in his study viewed themselves as self-reliant in achieving success. Thus, when they experienced academic difficulty these students spent additional time studying alone rather than turn toward others or utilize resources

for assistance. It may be that students in other marginalized groups, including commuter students, first generation college students and Hispanic students were also more likely than other students to view themselves as self-reliant in achieving success. In the current investigation, some quantitative data suggested that commuter students may have been more likely than their peers to hold self-reliant views. Compared to other students who did not participate in peer study meetings, commuter students who studied alone reported a statistically significant higher agreement rating with the following statement: “Most of the classes I took this past Fall 2012 semester were easy for me so I did not need help from others” ( $d = 0.72$ , medium-to-large effect size). Therefore, since commuter students more strongly agreed with the notion that they did not need help from others, commuter students may have been more likely than their peers to hold a self-reliant perspective. Table 31 displays this finding.

Table 31

*Student Agreement with Reasons for Not Meeting with Peers Outside of Class by Commuter Status*

Item	Commuter			Non-Commuter			F(1, 41)	d
	n	M	SD	n	M	SD		
<i>“Most of the classes I took this past Fall 2012 semester were easy for me so I did not need help from others”</i>	13	2.85	0.80	30	2.30	0.75	4.62*	0.72

Notes. Rating scale: 4 = *Strongly Agree*, 3 = *Agree*, 2 = *Disagree*, 1 = *Strongly Disagree*  
 Midpoint: 2.5  
 \*  $p < .05$

One factor that was clearly seen in the data related to marginalized students' lack of participation in peer study meetings was the inconvenience of outside of class peer study activities for commuter students. The qualitative and quantitative data showed that most peer study meetings took place on campus in the evening. In fact, it was found that 93% of NUCLEUS students' peer study meetings took place at an on-campus location (see Table 11). Commuter students who left campus each day after their classes ended found it difficult to return to campus. This factor hindered many commuter students from working with peers outside of class time. For example, Abraham described how frustrating it was for him to get to evening meetings on campus, especially with the lack of shuttle bus service.

It's not easy to get back to campus to meet people, especially if you have to come back in the evenings when the busses don't really run often...I drive to

south campus and take the shuttle to main campus, and sometimes after like 5:00 or 6:00 the busses don't run often so it can become hard, especially after you've had a full day of school, you go home or go to work and then you have to come back here and wait 20 minutes for the shuttle—it's so aggravating—so I can just skip all that and go home and get that 20 minutes to study.

Another commuter student, Jasmyn, told how she dreaded coming to campus when she did not have class.

You know, it's gas and sometimes I would even complain because there was a couple of times like for the review sessions that professors hold before exams where I'll be home cozy on my day off and then I'll have to drive up to school and I'm just like, 'UGH!' and then when I walk in my classmates are like, 'Oh, you had to come and drive in,' so they know I don't like coming in to campus.

Moreover, since Jasmyn's peers knew she was a commuter student they rarely approached her about studying together outside of class time. Jasmyn explained, "Because everyone pretty much knows I commute, so I'm not really going to be willing to go home and then have to drive back up to study when I can just study at home, not a lot of people reach out to me about it." On the other side of this matter, Stacy a student who lived on campus, told how she did not ask classmates who she knew were commuter students to study together outside of class time. "A lot of people in my major are from Wilmington or farther away so for me to even ask them would be inconvenient for them...and it would be too much to ask them to stay later after class because they pay for parking hourly." Therefore, the inconvenience to get to campus both inhibited commuter students from participating in peer study meetings, and inhibited residential students from inviting commuter students to participate in peer study meetings.

In contrast to students who belong to marginalized groups in education, it was found that students who belong to revered groups in higher education, such as honors program students, were significantly more likely than their peers to work on academic tasks with classmates outside of class time ( $d = 0.70$ , medium-to-large effect size). This finding is an extension of the literature. Past research related to outside of class peer study activities did not discuss the topic of students in revered groups in higher education in general, or students in honors programs specifically. Table 32 displays the chi-square test results examining participation in peer study meetings using a subsample containing equal numbers of students who are members of the honors program, and students who are not members of the honors program.

Table 32

*Participation in Outside of Class Peer Study Meetings by Honors Status using Subsample with Equal Number of Honors and Non-Honors Students*

Participation in Peer Study Meetings	Non-Honors		Honors	
	Number	Percent	Number	Percent
Met with Peers	17	65.4	24	92.3
Did Not Meet with Peers	9	34.6	2	7.7

*Notes.* N = 52.

Data obtained from Dec. 2012 survey instruments and institutional data. A significant association was found when a Pearson's chi-square test was performed  $\chi^2(1, n = 52) = 5.65, p = .017, d = 0.70$  (medium-to-large effect size).

Given the previous findings of this investigation concerning the factors that support and hinder students' participation in peer study meetings, and the conditions

of membership in the honors program at UD, it is logical that honors program students were more likely than other students to participate in peer study meetings. Students' membership in the honors program fosters students' participation in peer study meetings. For instance, UD honors program students are distinguished from other UD students who are not part of the honors program. This distinction labels honors students as being smarter and more capable than students who are not members of the honors program. Due to the distinction, honors students may also be seen as having a high commitment to learning. Additionally, students in the honors program are given earlier registration times than students who are not in the honors program, allowing them more control over their course scheduling. This allows a greater likelihood for honors students to enroll in the same course sections as their friends. Plus, honors sections of courses restrict enrollment to honors students and some of these sections have smaller seating capacities than regular course sections. Also, to complete honors program requirements, honors students must take a certain number of credits in honors section courses. This fosters the formation of major-specific cohorts of honors students. Moreover, there is a dedicated dormitory building on campus to house freshmen honors program students. Due to this, freshmen honors students who live on campus closely interact and get to know each other.

The above circumstances privilege students in the honors program at UD. Membership in honors makes honors program students stand out from other students as being more capable and more serious about their academics, and thus, as having a higher commitment to learning than other students. Furthermore, conditions of

membership in the program, like the existence of an honors freshman dormitory, honors course sections, and major-specific honors program requirements fosters familiarity among students in the honors program. In these ways, membership in the honors program identifies students, validates them as competent college students, and helps students identify and connect with other honors students. These conditions support honors students in their formation of outside of class peer study meetings with one another.

Quantitative data provided evidence that students in the honors program were more likely to be familiar with classmates than students who were not in the honors program. One item on the survey instrument asked participants to rate the helpfulness of several statements expressing ways the NUCLEUS program could help students benefit more from outside of class peer study meetings. When differences in helpfulness ratings were compared across student characteristic groups, it was found that students in the honors program rated the statement “Provide more help connecting students with others in their courses” significantly lower than students who were not in the honors program ( $d = 0.51$ , medium effect size). This indicated that classmate connection help would not be as helpful to honors program participants as it would be for students who were not participants of the honors program. Hence, it follows that honors program students were more likely to be familiar with their classmates than students who were not in the honors program. Table 33 displays the comparison of helpfulness rating by student membership in the honors program.

Table 33

*Responses to Ways NUCLEUS May Help Students Benefit More From Outside of Class Peer Study Meetings by Honors Status*

Item	Honors			Non-Honors			F(1, 187)	d
	n	M	SD	n	M	SD		
<i>“provide more help connecting students with others in their courses”</i>	26	2.85	0.78	165	3.24	0.77	5.97*	0.51

*Notes.* Data obtained from Dec. 2012 survey instruments and institutional data.

Rating scale: 4 = *Very Helpful*, 3 = *Helpful*, 2 = *Somewhat Helpful*, 1 = *Not At All Helpful*

Midpoint: 2.5

\*  $p < .05$

Additionally, qualitative data supported the notion that students in the honors program were very likely to recognize and become familiar with one another. For instance, Ava told how she could identify other freshmen honors students in two ways. The first was by asking students where they lived on campus. She noted, “You can ask questions like, ‘Oh where do you live?’ ‘Russel’ [dormitory]—well then you know, Russel—honors student and like draw connections.” The second way was by observing how students acted in the classroom. In the context of a non-honors course section, Ava said, “You just recognize honors students in the sense that they’re the ones who take that little bit of initiative to ask questions.”

Moreover, Bradley and Keri talked about how they got to know other honors students very well starting in their freshman year. Bradley told how the classmates who he worked with outside of class time for introductory biology also lived in his dorm. When asked about this, Bradley replied, “It was an honors class so honors

freshmen all lived together, it was actually really convenient.” Also, when Keri mentioned that the peers she worked with outside of class time were also in the honors program, she was asked if she thought being in honors helped to bring them together. Keri responded, “Oh definitely yeah, we all got to know each other really early on and we know that we’re serious about our academics.” In this reply Keri noted not only the familiarity aspect, but also the assumption that honors students have a high commitment to learning. In this manner, the privileges afforded to honors students, who are a revered group of students in higher education, facilitate their formation of outside of class peer study meetings.

### **Factors that Helped and Hindered Productivity in Outside of Class Peer Study Meetings**

The final key question investigated the factors that support students’ productivity in outside of class peer study meetings, and the factors that hinder students’ productivity in them. One survey item provided some insight into this key question by asking students about problems in their meetings. Most NUCLEUS students (62%) who participated in outside of class peer study meetings reported that no problems developed. However, almost half (49%) of students who reported that problems developed indicated that peer study meetings became too social, and 44% indicated that classmates were academically underprepared for meetings (see Table 34 for a summary of all responses to the survey item). These top two survey item responses, along with qualitative findings, highlighted the importance of the following

two factors in the productivity of peer study meetings: (1) how distracting or conducive to learning meeting circumstances were; and (2) the presence or absence of content knowledge among students in meetings. The results of this inquiry align with past research, and provide a more detailed look into how meeting circumstances and students' content knowledge affect the productivity of outside of class peer study meetings.

Table 34

*Responses to Problems within Peer Study Meetings*

Item	Number	Percent
<i>"No problems developed"</i> <sup>a</sup>		
Agree	91	61.5
Disagree	57	38.5
<i>"Meetings became too social"</i> <sup>b</sup>		
Agree	28	49.1
Disagree	29	50.9
<i>"Some classmates were underprepared"</i> <sup>b</sup>		
Agree	25	43.9
Disagree	32	56.1
<i>"Poor attendance by some classmates"</i> <sup>b</sup>		
Agree	15	26.3
Disagree	42	73.7
<i>"Some classmates were too dominant"</i> <sup>b</sup>		
Agree	8	14.0
Disagree	49	86.0

*Notes.* Data obtained from Dec. 2012 survey instruments and institutional data.

<sup>a</sup>N = 148

<sup>b</sup>N = 57

### Meeting Circumstances were Distractive or Conducive to Learning

In outside of class peer study meetings, time not spent on academics is not productive. Therefore, although peer study meetings are a type of socio-academic peer interaction, the circumstances of peer study meetings must be more academic-focused than social-focused in order for them to be productive. Circumstances such as the environment in which meetings take place, the participants involved in peer study meetings, and the activities within peer study meetings all can either help or hinder productivity. In general, circumstances that distracted students from working on academic tasks hindered productivity, and meeting circumstances that were conducive to students working on academic tasks fostered productivity.

Several of the study findings about meeting circumstances that supported or hindered peer study meeting productivity were factors noted in past research. The findings included the following: a distractive study environment inhibited the productivity of peer study meetings (Christian & Talanquer, 2012; Gubbels, 1999); meetings of two to four students were more likely to be productive than larger groups of students (Christian & Talanquer, 2012; Willment, 1998); participation in meetings by students who got others off task hindered meeting productivity (Van Etten et. al, 1997); and peer study meeting activities that included more structured academic tasks supported meeting productivity (Arum & Roska, 2011; Van Etten et. al, 1997).

The qualitative data provided much evidence for the above findings. Regarding the influence of meeting environment on productivity, interview participants told how meeting in a library, study lounge or classroom space was most beneficial for working

with classmates outside of class time. When students met in non-academic spaces, such as dormitory rooms or family homes they reported they were less likely to have productive peer study meetings. For example, Stacy described:

Jordan and I would get distracted so we'd have to be in the library or in the study lounge where we'd use the big whiteboard...if we're in my room it's like, 'Oh let's watch TV, let's watch this episode real quick,' or I'd get distracted and be like, 'Oh wait, I need to do this, I need to clean my room,' and he would get upset, so yeah we'd try not to do that.

However, students noted that at times academic spaces could be distracting and unproductive environments for peer study meetings. This finding, also mentioned in the literature by Gubbels (1999), involved the presence of students who were not participating in peer study meetings in the study meeting space. When peripheral students shared spaces with students involved in peer study meetings, they often distracted meeting participants. Denise recalled such a situation she had experienced:

I remember one night it was like five of us and we went to go study in the study lounge and we didn't get hardly anything done, we just talked literally the whole time and I think that was because there were two girls there that weren't in chemistry so they kind of got everybody else off task because they weren't studying the same things we were.

Moreover, interviewees told how they were more likely to be productive in peer study meetings that involved only a few students working together. For instance, Stacy noted, "My group wouldn't be more than four, if that, and only once in a while because people get distracted and I really can't deal with that." According to Rose, "Everybody usually has one or two friends they study with, not more than that because it gets really distracted." Fatima also said, "I don't like going to group study sessions where there's a lot of people because you don't get through a lot and it doesn't help

you as much.” Thus, when a small number of students worked together outside of class time they were more likely to be focused on academics.

In addition to the number of students in peer study meetings, the specific student participants involved in meetings also affected the productivity of meetings. Individual study meeting participants helped or hindered meeting productivity by either helping others to be focused on academic work or by distracting others from doing academic work. For instance, Stacy described how her peer study meetings were much more productive when she met with her friend Jordan than when she met with her friend Eric. The difference between her two friends was that Jordan encouraged Stacy’s engagement in academics, and Eric distracted Stacy from working on academics. Stacy described, “I really studied the most with my friend Jordan...with my one friend Eric it gets into talking when it’s me and him, and Eric and I would just get caught up like watching TV and stuff, whereas Jordan was like, ‘OK, let’s get this done.’”

Related to the importance of peer study meeting participants encouraging one another’s academic engagement for meetings to be productive, interviewees often described the people with whom they participated in peer study meetings as their “study friends” or “academic friends.” Thus, the relationship between these students was largely centered on academics. This helped to keep their peer study meetings from becoming too social. For example, Pranav said, “The people I studied with were primarily study friends, so there was little areas to be distracted—we stayed focused, did what we had to do and then we were done.” Keri also mentioned the following

about her peer study meetings partners: “We’re friends, but our main goal is academics.” Similarly, Rose described her relationship with her study partner Gabrielle. “With Gabrielle our commonalities are classes, half the time we’re study buddies and the other half of the time we’re friends...so it’s not like we’re constantly with each other just because we’re friends, it’s mostly because of academic reasons.” In contrast to these accounts, Denise described the unproductive nature of her peer study meetings with her close friends. She said, “The girls I studied with, because we’re friends we would digress onto other topics and we wouldn’t get anything done because we’re too close and we’re too silly together.”

Another circumstance that affected the productivity of outside of class peer study meetings was the nature of the activities students did during meetings. Often times, peer study meetings were more productive when students were engaged in structured academic activities. Interviewees described how they utilized structured academic activities such as problem sets, practice exams, study guides and homework assignments to direct their actions in peer study meetings. For example, Bradley and Ezra used old exams to guide their meeting activities.

When the professor gave us an old copy of the test Ezra and I would go through the test and if we had a problem with a problem we’d say like, ‘Oh, how did you get to that answer?’ ‘What does that mean?’ or ‘How did you do this probability?’...and we’d also consider how the test might be changed and how the professor might manipulate the questions to ‘get us.’

Lauren also described how she and Violet sometimes used study guides to direct their peer study meeting activities. “When we had study guides it would be like, ‘Alright Violet, you take this section and I’ll take that section and then we’ll swap and compare

what we would've said,' so that worked well.” In these ways, structured academic activities helped to keep students in peer study meetings on task and engaged in academic work.

### The Presence or Absence of Competent Content Knowledge among Students in Meetings

Productive outside of class peer study meetings are academically beneficial for students. In order for productive meetings to occur, student meeting participants must possess competent content knowledge. Otherwise, if students lack foundational content knowledge they cannot engage with academic materials and in turn, they are unable to grasp content and help others learn. For these reasons, students who lack competent content knowledge are unable to make good use of their peer study meeting time. Gubbles (1999) noted the importance of competent content knowledge for productive peer study meetings in her research. Also in the literature, Van Etten, Freebern and Pressley (1997) discussed the positive impact of students' individual study efforts on the productivity of their peer study meetings. Connecting these two findings, when students study academic material independently before meeting they build the competent content knowledge necessary for productive peer study meetings to occur.

Several interviewees who participated in productive outside of class peer study meetings told how all participants studied individually before they met. This was especially common among students who utilized structured academic activities in their

peer study meetings. In these instances, students worked on problem sets, practice exams, or homework assignments on their own and then met to compare their work and ask each other questions. For example, Pranav said:

We would do problem sets on our own and then meet to go over the answers and the problems we had differences on we would figure out why we got different answers and what we were thinking, and if we had an answer book it helped, otherwise we would go with whatever seemed like the best idea.

Since all students Pranav worked with came to study meetings prepared, participants had good content knowledge and therefore they thoroughly discussed ideas and productively used their time together. Another interviewee, Rose described how her peer study meetings with Gabrielle were also productive, even when they did not utilize structured assignments in their meetings. Rose told how this was because she and Gabrielle had an unspoken agreement that they would always come to their meetings prepared with foundational content knowledge:

Gabrielle and I every time we'd study together we'd always make sure we had our foundation built beforehand so we'd be like, 'I'm going to read chapter six, you read chapter six and we can discuss it,' and that's what we would do and it was like a mutual agreement, we'd never go to our study session together without having the foundation done.

In these ways, students involved in peer study meetings where all participants came prepared to meetings with good content knowledge gained through individual study efforts had positive and productive outside of class peer study meeting experiences.

Another finding in the qualitative data was that sometimes students held each other accountable for coming prepared to their peer study meetings with competent content knowledge. Some interviewees told how if individuals repeatedly came to

meetings unprepared, they would stop working with them. Such participant accountability supported the productivity of outside of class peer study meetings. For instance, Thomas described how in order to maximize the productivity of his meetings, he intentionally excluded two students who attended several past peer study meetings lacking competent content knowledge.

After the second half of organic, I didn't reform the study group for genetics with them and they were still in the same class...there's a point where like if you can't keep up with the material and a certain group of us are, then it kind of brings us down, so it's almost like a selfish thing but you know, we have to make sure we get to our goals.

Additionally, Fatima told how participant accountability kept her and her political science study partner motivated in their individual studies and in turn, supported their peer study meeting productivity.

I knew I wouldn't come to the study session and not know anything because I know she would have questions as well, and I know if I couldn't help her she probably would've stopped working with me because she stopped working with the other people from before, so I think we were on the same page in that the only reason we'd continue working with each other is because we both realized, 'OK, this girl is keeping up with the material as much as I'm keeping up with it.'

Thus, one way students ensured the productivity of their peer study meetings was by requiring all meeting participants to study certain concepts and/or complete certain tasks on their own before meeting. Having such participant accountability preserved the continued productivity of outside of class peer study meetings.

In contrast, the qualitative data included one example of a very unproductive and not beneficial outside of class peer study meeting experience where all participants lacked competent content knowledge. It involved Denise, a freshman

student who was enrolled in introductory chemistry. Denise never took a chemistry course in high school, so she had almost no background knowledge related to the subject. In her interview, Denise told how she worked outside of class time with classmates who were good friends of hers, but who also were very lost in chemistry. Therefore, when Denise and her friends came together, competent content knowledge was absent in their peer study meetings. As a consequence, it was not possible for Denise and her friends to have productive peer study meetings. Denise identified this lack of basic chemistry knowledge among her and her study partners as the main problem of their peer study meetings:

It's hard to work with friends who are struggling in the class just like you are...they don't really know what they're talking about just like you don't...because none of us knew what was going on in the class we couldn't really help each other and sometimes we could've been misinforming each other...like we didn't know what in the world we were looking at in the book...so yeah you can work with a whole bunch of people in your class but if none of you know what's going on, what are you going to get done?

Denise's chemistry peer study meeting scenario exemplified the significance of competent content knowledge to peer study activities. Competent content knowledge must be present among students in outside of class peer study meetings in order for them to be academically beneficial and productive experiences for students.

## **Chapter 3**

### **IMPLEMENTATIONS & RECOMMENDATIONS**

#### **Addressing the Organizational Improvement Goal**

This investigation explored NUCLEUS students' participation in peer study meetings outside of class time and class requirements. It is significant because it collected baseline data on NUCLEUS students' peer study meeting activities, and it informed ways that the NUCLEUS program can better support students' productive outside of class peer study meetings. This second item was the organizational improvement goal of the project. Aiding students' formation of productive peer study meetings is one way NUCLEUS staff can foster the two main goals of the NUCLEUS program, which are: (1) to support students' academic success to degree completion; and (2) to support students' professional development. Therefore, providing better assistance for students to form productive outside of class peer study meetings with their classmates would improve the NUCLEUS program by bolstering its mission. In order to address the organizational improvement goal, the following two sources of information were considered: findings from themes discussed in the previous chapter that emerged from the data, and suggestions from NUCLEUS students.

## Findings from Emergent Themes in the Data and their Implications

Data showed how students' familiarity with peers was very helpful to their formation of peer study meetings. Familiarity with peers fostered comfort and trust among students, which allowed them to more easily connect and work well together. Familiarity among students can be gained in several ways: living near one another on campus, being involved in the same extracurricular activities, having mutual friends, and, perhaps most importantly, through shared course taking and enrollment in the same academic major and/or minor programs. Students who had common enrollment in multiple courses or who were in the same academic programs related well to one other's academic experiences and were likely to have knowledge of each other's study efforts, styles and habits, or in other words one another's commitment to learning. Such academic-based familiarity allowed students to choose who they worked with on academics outside of class time in order to maximize productive uses of their time and also to avoid their study efforts being exploited by peers. In this manner, familiarity often fostered students working together productively on academic material outside of class time. Furthermore, it was found that students who participated in peer study meetings with "study friends" that met on at least weekly basis reported that their peer interactions strengthened their communication and interpersonal skills.

Given this information, NUCLEUS staff could encourage NUCLEUS students to work outside of class time on a regular basis, about once per week, with other classmates they know in order to help each other learn course content, do well in courses and develop transferrable skills. NUCLEUS staff could also emphasize that it

is best for students to work with classmates who they know are serious about their academics. Furthermore, one way NUCLEUS staff could support the formation of students' outside of class peer study meetings is by introducing NUCLEUS students enrolled in the same courses and/or academic programs to one another, so they may begin to become familiar with each other.

The data also revealed that students' general perceptions about peers in relation to their learning fostered or hindered their formation of outside of class peer study meetings. When students saw peers as contributors to their learning and helpful to their academic success they participated in peer study meetings. But when students thought that working with peers would not contribute to their learning more than their individual study efforts, or when they perceived peers to inhibit their learning and academic success, they studied alone. However, it was found that most often students held course-context dependent perceptions. In these cases, students perceived peers to be contributors to their learning and academic success only for certain courses that they considered to be difficult. Because students often used similar criteria to assess the difficulty of courses, peer study meeting patterns occurred in several ways, including the types of courses for which students most frequently met with peers outside of class time, and the majors of students who most frequently participated in outside of class peer study meetings.

Since some students may not think they can benefit from working with peers on academic material outside of class time in some or all of their courses, NUCLEUS staff could promote that working with classmates in regularly occurring productive

peer study meetings is a strategy students can use in any of their courses, a strategy that will help them do well academically and develop skills that will be useful in their future careers. NUCLEUS staff may accomplish this by discussing with students how it is possible for them to learn with and from other classmates in academically-focused meetings beyond the classroom and give specific examples of things students can do in peer study meetings for different types of courses. In this manner, NUCLEUS staff would promote students' formation of productive peer study meetings in all kinds of courses, not only in natural and applied science courses that students frequently see as difficult. Although NUCLEUS staff cannot change all students' perceptions regarding this topic—some students may always think that working with peers outside of class time is not beneficial for them—staff can inform students about the potential benefits of peer study meetings, tell students about different kinds of productive activities they can do together in meetings, and encourage students to try out peer study meeting activities for themselves.

Moreover, this investigation looked into the factors that supported and hindered productivity in peer study meetings so that NUCLEUS staff could be knowledgeable on the topic and share information with students. It would not be effective if NUCLEUS staff encouraged students to participate in peer study meetings without offering guidance on how to have academically beneficial meetings. Findings about factors that supported the productivity of outside of class peer study meetings highlighted the importance of academic-centered meeting circumstances that are conducive to learning. Thus, peer study meetings are most productive when they:

occur in academic spaces that are free from distractions; consist of two to four participants who encourage one another to be engaged in academic activities; include structured academic activities that keep participants on task; and involve participants who have competent content knowledge gained through individual study efforts who hold each other accountable for coming prepared to meetings.

NUCLEUS staff must inform students about ways they can better ensure the productivity of their outside of class peer study meetings by communicating the above information to students. It is not helpful if NUCLEUS staff encourage students to engage in outside of class meetings that due to their circumstances cannot be academically beneficial uses of students' time. For instance, in the absence of meeting conditions that are conducive to learning, outside of class peer study meetings turn into purely social gatherings where no academic work is accomplished. Also, if students who lack competent content knowledge try to work together outside of class time, not only will such meetings not be productive, but they may be academically harmful to students since participants could misinform one another. Therefore, NUCLEUS staff cannot solely encourage students to meet with classmates outside of class time. In addition to encouragement, staff must provide guidance on how to coordinate academically beneficial and productive peer study meetings.

Lastly, a finding in the data showed that students' membership in one or more marginalized groups in higher education (e.g., first generation, black, Hispanic, or commuter) hindered their participation in outside of class peer study meetings, while students' membership in a revered group in higher education (honors) helped to

facilitate their participation in outside of class peer study meetings. The obligations beyond college that students in marginalized groups commonly held, such as employment and family commitments, limited their time and opportunities to meet with and get to know classmates. Additionally, students in marginalized groups more commonly viewed themselves as self-reliant in achieving their success, which made them less willing to turn toward others or utilize resources for assistance, even when they needed help. In contrast, a revered group of students at the university were afforded privileges that eased their coordination of outside of class peer study meetings with one another in several ways. These findings have implications not only for supporting students' participation in peer study meetings, but also for supporting students' success in higher education in general through staff and faculty outreach efforts to students.

As discussed in the beginning of Chapter 1 where the main activities of the NUCLEUS program at present were described, NUCLEUS staff currently send particular types of outreach e-mails to students in order to support them on their path to graduation. Additionally, during summer recruitment efforts, NUCLEUS staff send special outreach e-mails to first generation, low income and racial/ethnic minority freshmen in the College of Arts and Sciences encouraging them to join NUCLEUS. The theme that emerged from the data about students' membership in marginalized or revered groups implies that it is beneficial for NUCLEUS staff to continue to do such outreach activities. More specifically, the theme infers that since some students may be reluctant to seek information, resources and help from others, it would be best if

outreach efforts by NUCLEUS staff were to accomplish the following: encourage students to utilize resources and ask questions; provide students with useful information; and offer assistance to students. Thus, in addition to the outreach efforts that NUCLEUS staff have been doing, NUCLEUS staff could also reach out to students to encourage and support their participation in regularly occurring, productive peer study meetings. Although outreach efforts are especially beneficial to students in marginalized groups in higher education, all college students can benefit from encouragement, information and assistance. As described in Appendix A, this notion aligns with the perspective of current NUCLEUS program leadership.

#### NUCLEUS Students' Suggestions

NUCLEUS students' suggestions for ways the NUCLEUS program could better assist students' formation of beneficial peer study meetings were probed in surveys and interviews. One survey item asked participants to rate the helpfulness of several statements related to this issue. Item responses were examined by students' participation in peer study meetings to see if students who participated in peer study meetings and students who did not participate in peer study meetings had differing ideas on the topic. It was found that students in both groups reported similar ratings for statements, except students who participated in peer study meetings ranked the statement, "provide (or help students find) more study locations on campus" significantly higher than students who did not participate in peer study meetings ( $d = 0.41$ , small-to-medium effect size). Furthermore, both groups rated "work to build a

greater sense of community among NUCLEUS students in the same classes/majors” and “provide more help connecting students with others in their courses” as the top three most helpful ways the NUCLEUS program could assist students’ formation of beneficial outside of class peer study meetings. The complete results of this survey item are found in Table 35.

Table 35

*Responses to Ways NUCLEUS May Help Students Benefit More From Outside of Class Peer Study Meetings by Participation in Peer Study Meetings*

Item	n	M	SD
<b>Met with Peers</b>			
<i>“provide (or help students find) more study locations on campus”</i>	146	3.27*	0.82
<i>“work to build a greater sense of community among NUCLEUS students in the same classes/majors”</i>	148	3.24	0.89
<i>“provide more help connecting students with others in their courses”</i>	148	3.18	0.80
<i>“provide students with incentives for participating in outside-of-class study meetings with classmates”</i>	148	3.02	0.86
<i>“provide more help with the organization an facilitation of the first few outside-of-class study meetings”</i>	148	2.94	0.84
<i>“provide more detailed “how to” handout materials on the topic of studying with classmates outside of class time”</i>	147	2.69	0.97
<i>“offer a “how to” workshop more frequently on the topic of studying with classmates outside of class time”</i>	146	2.64	0.91
<i>“assemble a student panel to share their outside-of-class study group experiences and tips with other students”</i>	147	2.49	0.91
<b>Did Not Meet with Peers</b>			
<i>“work to build a greater sense of community among NUCLEUS students in the same classes/majors”</i>	43	3.30	0.67
<i>“provide more help connecting students with others in their courses”</i>	43	3.23	0.72
<i>“provide (or help students find) more study locations on campus”</i>	43	2.93*	0.88
<i>“provide students with incentives for participating in outside-of-class study meetings with classmates”</i>	43	2.88	0.73
<i>“provide more help with the organization an facilitation of the first few outside-of-class study meetings”</i>	43	2.79	0.71
<i>“provide more detailed “how to” handout materials on the topic of studying with classmates outside of class time”</i>	43	2.44	0.88
<i>“offer a “how to” workshop more frequently on the topic of studying with classmates outside of class time”</i>	43	2.33	0.92
<i>“assemble a student panel to share their outside-of-class study group experiences and tips with other students”</i>	43	2.19	0.85

Notes. Data obtained from Dec. 2012 survey instruments.

Rating scale: 4 = *Very Helpful*, 3 = *Helpful*, 2 = *Somewhat Helpful*, 1 = *Not At All Helpful*

Midpoint: 2.5

\*  $p < .05$ ,  $F(1, 187) = 5.65$ ,  $d = 0.41$  (small-to-medium effect size).

Similar to the top three responses reported in the survey, when interview participants were asked how they thought the NUCLEUS program could better support students' formation of beneficial outside of class study meetings, they talked about the need for more study space on campus as well as help connecting with others in their majors who were also NUCLEUS members. Since the program had greatly expanded in size, students were often unaware of others in their major who were involved in NUCLEUS. For instance, Jasmyn said, "I think sometimes you don't really know who's in your major in NUCLEUS...like I didn't know that Lauren was in NUCLEUS until I saw her here." For this reason, Jasmyn suggested that NUCLEUS staff create a list of NUCLEUS students' names, majors and e-mail addresses to share with students so they may contact each other with questions.

Multiple interview participants talked about the need for more study space on campus. When doing so, some students revealed problems about the NUCLEUS space. For instance, when Lauren was asked if there was anything she thought NUCLEUS could do to better support students' formation of beneficial peer study meetings she replied:

Not really, unless you build a building for more study space...this is a great space but there's always other people here...so it's like you've got to rush to get here first to get in that room or grab a spot on the couch or something, so just more space.

When talking about the need for good study space, Thomas mentioned that students often socialize loudly in the NUCLEUS space, making it too distracting of a space for him to study in:

I don't come to NUCLEUS a lot because people talk and it's hard for me because I want to talk to them but I know I need to get work done...like I'll realize, 'Oh crap! Half an hour has gone by!' and all I've read is a half of a page because I'm listening to what they're saying and throwing in a comment here and there.

In addition to recommendations about creating more study space and improving the NUCLEUS space, one interview participant, Bradley, recommended that the NUCLEUS program raise students' awareness of good study spaces that exist around campus.

Moreover, several interviewees commonly considered whether or not it would be helpful for NUCLEUS staff to connect students who do not know one another in NUCLEUS to work together. Denise said, "I think you have to be familiar with one another...working with strangers is awkward, you feel no commitment to them...and NUCLEUS can't force people to show up." Similarly, Ava remarked, "I don't want to tell you to match people up because I don't think it works like that, it's so organic." Instead, Ava suggested that the NUCLEUS program provide encouragement, awareness, and a conducive environment for students to work together on academics outside of class time.

I think maybe just encouraging people or informing them so people think that it's a good idea...you have that room over there for people to come in and study, and providing places definitely helps...so maybe just providing people places to study and like creating the environment where people can then perform in it.

Fatima also did not think that it would be a good idea for the NUCLEUS program to assign students to work together. However, she thought that it could be beneficial for the NUCLEUS program to help NUCLEUS students meet peers who are enrolled in

the same course and who are interested in working with others outside of class time.

Fatima claimed that although it is not likely that all of the newly introduced students would work well together, some students may find one or two individuals with whom they “click.” Then, they can form smaller, regularly occurring peer study meetings.

I feel like people work better if they’re able to pick the people in their group...so maybe just letting them know that they can make study groups and helping people get together and then people would come and find certain people they will continuously meet with...I think that’s the most you can do because you don’t sit in class and watch students interact.

On balance, students agreed that it would not be helpful for the NUCLEUS program to assign students to work with other NUCLEUS students who they are not familiar with. But, a few interviewees suggested that it may be helpful for NUCLEUS staff to introduce NUCLEUS students to each other who are in the same courses and who are interested in working with classmates on course material outside of class time.

### **Implementations in NUCLEUS**

Taken together, findings from emergent themes in the data and NUCLEUS students’ suggestions reveal that the NUCLEUS program can support NUCLEUS students’ formation of beneficial peer study meetings by utilizing outreach and other types of efforts to do the following: communicate with students the benefits of participating in regularly occurring productive peer study meetings; encourage students to participate in peer study meetings with classmates in a wide array of courses; provide students with information about ways they can better ensure meeting productivity; give examples of activities students can do in productive peer study

meetings; offer coordination and facilitation assistance for holding productive peer study meetings; help students meet classmates in NUCLEUS who are interested in working with others outside of class time; help students gain familiarity with other NUCLEUS students in their majors and courses; improve the NUCLEUS study space to be more conducive to learning; and inform students about good study spaces available to them around campus.

An advantage of studying the program I coordinate is that in cooperation with my colleague, I am able to implement new program activities and take actions in real time based on my data collection and analysis. Thus, starting in spring 2013, several undertakings have been implemented based on the above findings in order to support NUCLEUS students' formation of productive outside of class peer study meetings. These initiatives include: improvements to the NUCLEUS study space; the UD Study Spaces document; the NUCLEUS Student Directory and the NUCLEUS Academic Connection Request Form; the Tips for Successful and Productive Peer Study Meetings document; outreach e-mails connecting NUCLEUS students in popular courses; staff encouragement of peer study meeting participation and assistance with the coordination and facilitation of initial meetings; and identification of commuter, transfer and first generation students in NUCLEUS with targeted outreach to them by staff. These program efforts are described below.

## Improvements to the NUCLEUS Study Space

Substantial improvements were made to the NUCLEUS Study Space in order to increase its capacity and turn it into an environment that is conducive to both peer study and individual study activities. In fall 2011, the NUCLEUS space was an office suite that consisted of a reception area, three individual staff offices, and a conference room. At that time, NUCLEUS students were able to study in the reception area and in the conference room when it was not being utilized by faculty or staff for meetings. The reception area included these items: a lounge space with a couch, chair and coffee table; a table with two computers; and a small round table. The conference room consisted of a large conference table, several bookshelves with old textbooks, and a whiteboard. In sum, during fall 2011 there were two rooms for student use that contained: two computers, one whiteboard, one study table, and seating for ten students.

Starting in spring 2013, current program leadership completely reconfigured the space without physically renovating it. Over time, staff removed filing cabinets, bookshelves and bulky furniture, and rearranged the space using items obtained from university surplus. Then, in summer 2014 NUCLEUS staff purchased new computers and furniture to streamline the space. At that time, NUCLEUS staff also began sharing one office. The other two former offices and the former conference room were turned into student study rooms. Moreover, the former reception area was completely rearranged to maximize floor and study table space. In sum, now there are four rooms

for student study that contain: eight computers, two whiteboards, ten study tables and seating for forty students.

As a result, the feel of the space has completely changed. It is no longer a cramped and noisy social area. At present, it is a quiet academic space with several rooms available for students to study in together or alone. Instead of referring to the space as the “NUCLEUS Office” which was done in the past, current NUCLEUS staff more appropriately call it the “NUCLEUS Study Space.” Now, the space is much more conducive to learning and it is frequently utilized by students. For instance, over the 2014-2015 academic year when the NUCLEUS population consisted of 807 students there were 6,841 logged student visits to the NUCLEUS Study Space by 507 different visitors. The top two reasons students logged for using the space were to use the computer/printer and to study. Furthermore, many students are frequent users of the space who visit several times a week or even several times a day. Thus, frequent users begin to gain familiarity with one another from seeing each other often in the NUCLEUS study space.

#### Creation of the UD Study Spaces Document

NUCLEUS staff created a “UD Study Spaces” document that is a compilation of information about study spaces around campus that are conducive to learning. Creation of the document began in spring 2013 using an online survey to ask the NUCLEUS population for their input. The survey included the following three questions: “Where is a good location to study on campus?”; “Is it a good location for

individual study, group study or both?” and “What makes it a good study location?” Students voluntarily completed the survey and some students completed it multiple times to describe several good study locations on campus. The “UD Study Spaces” document was created from these responses, and it was updated as new responses came in. The document was uploaded to the NUCLEUS website and Sakai site and was distributed to NUCLEUS students through e-mail and NUCLEUS social media postings that included the download link.

During summer 2014 a temporary, part-time NUCLEUS staff member who graduated from UD in spring 2014 contributed her knowledge to this resource and edited it into its current format, found in Appendix B. The NUCLEUS website and Sakai site were updated with this new version of the document, and download links were sent to students via e-mail and NUCLEUS social media. The download link is also embedded into the “Tips for Successful and Productive Peer Study Meetings” document, and into the outreach e-mail used to connect NUCLEUS students enrolled in popular courses. Students may use the “UD Study Spaces” document to find locations on campus that are conducive to learning that they may not have known about otherwise. The information in this document can help students hold more productive peer study meetings, and it can also assist students’ individual study efforts.

## Creation of the NUCLEUS Student Directory and NUCLEUS Academic Connection Request Form

Students' suggestions speak to how it would be useful for the NUCLEUS program to help NUCLEUS students gain familiarity with one another so they may potentially find study partners with whom they can work productively on academics outside of class time. However, with the continual growth of the program—the NUCLEUS program at present is three and a half times larger than it was at the time of data collection—this is a challenging task. It is nearly impossible for NUCLEUS staff to build a sense of community among 1,000 NUCLEUS members, especially when members utilize NUCLEUS services with varying degrees. But, NUCLEUS staff have made efforts to help NUCLEUS students in the same academic programs become aware of each other and get to know one another.

Starting in spring 2013, NUCLEUS staff first created a “NUCLEUS Student Directory.” Staff continue to create an updated directory each fall and spring semester. The directory lists the first and last names, majors, class years, and e-mail addresses of all NUCLEUS students and is alphabetized by major. If students have double or triple majors, they are listed twice or three times in the directory. The directory is uploaded to the NUCLEUS website and Sakai site, and download links are sent to NUCLEUS students through e-mail, Facebook and Twitter. The message sent to students along with the download link is that if students are wondering who else in their major is also in NUCLEUS, they may check the directory. Moreover, students are told that if they have academic questions, they may use the directory to reach out to other NUCLEUS

students in their major or in majors they are considering switching into. It is also communicated to students that if they would be more comfortable having NUCLEUS staff introduce them to specific individuals, they may e-mail NUCLEUS staff to request such assistance. Thus, the directory informs students of others who they know but did not know were in NUCLEUS, and it helps students meet others in their majors who they did not know previously. If desired, students may use social media sites, such as Facebook, together with the NUCLEUS directory to connect names with faces. Doing so may help students gain confidence to approach others in their majors and classes in person. In these ways, the directory helps NUCLEUS students become familiar with one another.

In fall 2014 staff also created the “NUCLEUS Academic Connection Request Form” to assist NUCLEUS students in meeting other NUCLEUS peers in their major or in a major they are interested in declaring. This form allows students to indicate that they would like to be connected with a student who has more years of experience in their major or in a major they are considering. It also allows students to indicate that they would like to help someone who is newer to the university. Thus, NUCLEUS students may help each other if they so choose to. The academic connection is meant to facilitate one informal meeting where students can chat about topics related to their similar academic and/or career goals. It is up to the students to decide if they will keep in touch, and if so to what extent. The request form is accessible through a link on the NUCLEUS website that is also circulated to the NUCLEUS population via e-mail,

Sakai, and NUCLEUS social media sites. A copy of the academic connection request form is found in Appendix C.

When a student fills out a form, staff are notified of the submission and, based on the student's responses, staff consider what other student in NUCLEUS would be helpful for the student to talk with. Staff then send an e-mail to the student in mind with a description of the class year, major, and inquiry of the student who filled out the request form to see if he or she would be willing to connect with him or her. If the student agrees, staff send an e-mail to both students to connect them to each other. In this e-mail, staff describe how the connection is informal. Staff indicate that even if the students only meet up once to talk they may learn valuable academic or career related information from each other. Staff tell how it is up to them to work out when and where they would like to meet to chat about their common academic and/or career interests. However, staff suggest that the NUCLEUS space is a good meeting place. In this way, the request form assists students with meeting peers in NUCLEUS who have similar majors and/or career aspirations.

#### Creation of the Tips for Successful and Productive Peer Study Meetings Document

As early as spring 2012, NUCLEUS staff created a "tip sheet" for NUCLEUS students to encourage them to study with peers outside of class time and to inform them of activities they could do within their outside of class peer study meetings to make them productive. However, the document was greatly improved and updated in fall 2015 based on the data collection and analysis carried out for this study. A copy of

the most recent version of the “Tips for Successful and Productive Peer Study Meetings” document is found in Appendix D. This document highlights the potential benefits of students’ participation in outside of class peer study meetings, includes tips for creating successful meetings, and gives examples of productive activities students can do within meetings. Furthermore, it encourages students to contact NUCLEUS staff for additional help with forming and facilitating productive peer study meetings in any of their courses. The document was uploaded to the NUCLEUS website and Sakai site, and the download link was distributed to NUCLEUS students via e-mail, Facebook and Twitter. Additionally, text from the document was embedded in the outreach e-mails that are sent to connect NUCLEUS students enrolled in the same courses for several different popular UD courses.

#### Outreach E-mails Connecting NUCLEUS Students in Popular Courses

Beginning in fall 2013, NUCLEUS staff began sending e-mails each fall and spring semester to reach out to NUCLEUS students enrolled in the same courses to introduce them to each other and encourage them to connect with one another to form productive and regularly occurring outside of class peer study meetings. NUCLEUS staff use institutional data to find out which courses NUCLEUS students are enrolled in each fall and spring semester. From this information, staff create connection e-mails sent to NUCLEUS students enrolled in common courses. A sample connection e-mail is found in Appendix E. Connection e-mails are sent for popular courses (meaning several NUCLEUS students are enrolled in them) in a wide array of disciplines

including natural sciences, applied sciences, social sciences and humanities. The e-mails are sent around the eleventh or twelfth day into the semester, when the free drop/add period is over and students' semester schedules are set. The e-mails encourage students to work with classmates outside of class time to help each other learn, do well in courses, and build useful skills that will be important in their future careers. At the bottom of a connection e-mail, a list of the names, class years and e-mail addresses of NUCLEUS students who are enrolled in the particular course are included. Because courses often have several sections and sometimes sections are taught by different instructors, the e-mails indicate the course section number NUCLEUS students are enrolled in.

As of fall 2015, text from the "Tips for Successful and Productive Peer Study Meeting" document has been incorporated into the body of the connection e-mail. This way, in addition to providing information about other NUCLEUS students enrolled in a particular course, the connection e-mail contains useful information about the potential benefits of participating in productive outside of class peer study meetings, provides tips for creating successful meetings, and gives examples of productive activities students can do within meetings. Thus, the connection e-mails serve as outreach to NUCLEUS students enrolled in the same courses to encourage them to work with one another outside of class time and to inform them about ways they can successfully do so.

Moreover, in the connection e-mail NUCLEUS staff offer their assistance with helping students form and facilitate productive peer study meetings in any of their

courses. Students are told to contact NUCLEUS staff to request such help. Also, after connection e-mails have been sent out, a message to the entire NUCLEUS population is sent via e-mail, Sakai and social media notifying them that staff have sent e-mails to connect NUCLEUS students to one another in several common courses and if they would like a connection e-mail sent for a particular course that staff did not send, they may let staff know and staff will create and send a connection e-mail for the requested course.

Serendipitously, in fall 2014, NUCLEUS staff received an e-mail inquiry from a professor in the communications department regarding how to help NUCLEUS students in his introductory communications course “gel together as a study group.” Staff informed him about the outreach effort to connect NUCLEUS students in common courses via e-mail. Thus, when the NUCLEUS connection e-mail was sent out for the professor’s course, he was copied on the e-mail that was sent to NUCLEUS students in his course. Once received, the professor replied to the e-mail encouraging the students to meet with him to get tips on how to best study together for his course. Students did meet with the professor and received study help and encouragement. This occurred again in the fall 2015 semester. In fact, in October 2015 a colleague who teaches a one-credit course to support transfer students who are new to the university forwarded to NUCLEUS staff an assignment from one of her students who described her positive experience meeting with the communications professor and other NUCLEUS students in the introductory communication course. The following is an excerpt of what the student wrote:

I attended a professor hosted exam review session for Nucleus students on September 30, 2015 at 5:30pm in Pearson Hall. My Communications professor, Dr. Mortenson, reached out to the Nucleus students and invited us all to a review session for our first exam. The review consisted of about twelve people and since the Communications lecture consists of 350 people, I found this to be very helpful...Another positive aspect of this experience was that I met other students in my huge lecture class that I can study with in the future. I learned that I excel when I study in a group. This is something I never knew about myself as I had always studied on my own and done well. I learned that the UD Communications program is where I want to be and if I had any doubt about that before, this experience reassured me. I also learned that UD students are very similar in the sense that we want to do well academically. This wasn't the case at my first college. I learned that UD has excellent professors who care about their students, even in a lecture of 350 people!

Thus, with the help and willingness of a faculty member who is supportive of students' success at UD, the NUCLEUS connection e-mail played a role in facilitating a very meaningful and validating experience for this transfer student.

#### Staff Encouragement of Peer Study Meeting Participation and Assistance with the Coordination and Facilitation of Initial Meetings

Another way NUCLEUS staff encourage and inform students is through discussions with students in both individual and group settings. Staff often meet one-on-one with NUCLEUS students when students seek supplemental advisement and academic guidance. In these one-on-one discussions, among other suggestions for ways students can be more successful in college, staff often encourage students to try studying with classmates outside of class time, and they provide information on things students can do when meeting with classmates to ensure that they are academically productive experiences. During such conversations, the staff member directs the student to resources like the "Tips for Successful and Productive Peer Study

Meetings” document and also informs the student of others in NUCLEUS in his or her courses if he or she would like such information. Sometimes, if the staff member knows of another student in the course under discussion, she may look around the NUCLEUS study space to see if the other student is there and if so, introduce the two students to one another and include the second student in their conversation.

Additionally, beginning in spring 2014 NUCLEUS staff began teaching one-credit student success courses for NUCLEUS students. These courses focus on helping students make wise choices to be successful in college and in life after college. A component of the courses discuss activities that successful college students intentionally do, and “employ interdependence” is one of these activities. NUCLEUS staff engage students in conversation about the usefulness of forming mutually supportive relationships with peers where students can help each other learn and be successful in college. Staff also mention how the skill of working and communicating well with others is often sought after by employers and necessary for success in many aspects of life. Thus, within this discussion, staff encourage students to create regularly occurring peer study meetings with classmates outside of class time and talk about how to ensure that study meetings are productive.

Occasionally students ask NUCLEUS staff to help coordinate and facilitate initial outside of class peer study meetings. When this occurs, a NUCLEUS staff member reaches out to other NUCLEUS students enrolled in the course to see who else is interested in participating in a peer study meeting. Then, staff looks up interested students’ schedules and suggests times for the first meeting to be held based

on common times students are not in class. When a day and time are set, the staff member attends this initial meeting held in the NUCLEUS study space and talks with students about what the class is like. From this information, staff gives ideas of what the students can do together when they meet to help each other do well in the particular course. If the first meeting date, time and location worked well, staff will suggest that the students continue to meet at the same time and place weekly. What has often occurred is that students meet several times after this initial meeting, but then in time stop meeting. It seems that since the students were not previously familiar with each other, there is a lack of commitment to the meetings. Nevertheless, NUCLEUS staff will continue to offer and provide students with peer study meeting assistance upon request.

#### Identification of Commuter, Transfer and First Generation Students in NUCLEUS and Targeted Outreach by Staff

NUCLEUS staff employ outreach efforts to support students to be successful at UD. As seen in this study, outreach efforts are particularly helpful for supporting students in traditionally marginalized groups in higher education. Although NUCLEUS staff had been using institutional data to identify NUCLEUS students who were first generation students since summer 2011, NUCLEUS staff had not been consistently identifying transfer and commuter students who were members of NUCLEUS. Thus, in summer 2014 staff began using institutional data to identify NUCLEUS students who had transferred from another institution. However, since no

institutional data source identifies UD commuter students, in summer 2014 staff began using self-report data obtained from NUCLEUS applications to identify NUCLEUS students who commute to UD. With this information, NUCLEUS staff are now providing more targeted outreach to first generation, transfer and commuter students in NUCLEUS. For instance, staff inform these students about registered student organizations on campus that support first generation, transfer and commuter students at UD. Moreover, NUCLEUS staff have made connections with these organizations so they are informed of the latest happenings and events within the organizations and via e-mail and Sakai staff pass this information along to respective groups of students in NUCLEUS. This extra support is aimed to help first generation, transfer and commuter students in NUCLEUS utilize resources, form supportive connections with other students similar to them, and successfully graduate from UD.

### **Further Recommendations for NUCLEUS**

This study collected valuable baseline data that examined the state of NUCLEUS students' engagement in outside of class peer study activities, and informed program efforts to support students' formation of productive peer study meetings. However, no additional data about students' participation in peer study activities have been collected since new program efforts have been put in place. Therefore, one recommendation for NUCLEUS staff is to collect new data to answer the following questions: (1) What is the state of current NUCLEUS students' involvement in outside of class peer study activities? and (2) How useful in supporting

the formation of NUCLEUS students' productive peer study meetings are the changes that were put into place starting in spring 2013? Data similar to what was gathered to address the first key question of this study could be collected and compared to baseline data in order to see if there have been any notable changes in the proportion of NUCLEUS students who participate in outside of class peer study meetings. Additionally, student feedback could be collected regarding the usefulness of the initiatives that took place as a result of this study.

### **Recommendations for the University**

In short, student engagement in academic activities with peers outside of class time and class requirements promotes three vital student outcomes: (1) learning; (2) retention to graduation; and (3) development of useful, transferrable skills. In his most recent book on student retention, Vincent Tinto (2012) emphasized that in order to most effectively support student success in higher education, institutions need to take advantage of the fact that undergraduate students enjoy being involved with their peers and figure out ways to actively engage students in meaningful learning activities with each other within and beyond the classroom. For these reasons, if student success is the main priority of the university, then UD must take actions to better support students' involvement in learning activities with peers inside the classroom, and better support students' participation in productive peer study meetings outside of the classroom.

In this section, I present two suggestions for ways the university can encourage student participation in outside of class peer study activities. Furthermore, to get feedback about these suggestions, I met with Dr. Cheryl Richardson, Associate Director of the Center for Teaching and Learning (CTAL) and shared my ideas with her. Through her work in CTAL, Dr. Richardson engages in university efforts to improve teaching practices and to promote equity in classrooms. Thus, she is very knowledgeable about issues related to creating effective learning environments for undergraduate students.

My first suggestion involves the promotion of inclusive classroom learning environments where all students learn through interactions with classmates. Since actively engaging all students in cooperative learning activities within the classroom is supportive of students continuing their work together outside of the classroom, the university could encourage faculty and instructors to create *validating learning environments* in which *peer instruction techniques* are utilized. Moreover, in these supportive classroom environments faculty and instructors could encourage students to participate in productive peer study meetings outside of class time.

In classrooms that foster validation and employ peer instruction, all students feel capable of learning and their learning occurs through interactions with one other. The university can encourage such student-centered learning environments by utilizing structures that are already in place to help faculty and instructors improve their teaching, like the Center for Teaching and Assessment of Learning (CTAL). Workshops can be offered through CTAL initiatives such as the First Friday

Roundtable seminar series and/or during the Summer Faculty Institute in order to reach a wide range of faculty and instructors from across campus. The workshops would present elements from the following two areas: (1) how to create validating learning environments where all students are viewed as competent learners (Rendon, 1994; Rendon Linares & Munoz, 2011), and (2) how to facilitate learning among students during class time using peer instruction strategies (Crouch & Mazur, 2001; Hanford, 2011). An additional component of these workshops could highlight the significance of faculty and instructors' encouragement of students working together in productive ways on course material outside of class time.

As initially defined by Rendon (1994) and further elaborated by Rendon Linares & Munoz (2011), validating learning environments include conditions that foster the following: students' beliefs in their inherent capacity to learn, students' excitement about learning, and students' sense of belonging as legitimate members of the learning community. For these reasons, although validating learning environments support all students' learning, they are especially helpful for students from marginalized groups in higher education who often have invalidating experiences as college students on and off campus. Additionally, by utilizing strategies from peer instruction, a technique initially developed by Eric Mazur in the early 1990s, faculty and instructors can foster a culture of learning with and from fellow students inside the classroom (Crouch & Mazur, 2001; Hanford, 2011). In particular, in-class peer instruction activities have potential to "spill over" outside of the classroom in the form of productive peer study meetings. This is because when peer instruction techniques

are utilized, in-class learning occurs through students' discussions with one another about their particular understandings of concepts. Thus, students engage in in-depth conversations that likely help them foster a sense of familiarity with one another, which supports their continued learning together outside of class time and class requirements. Furthermore, as seen within this study, students will more seriously consider participating in peer study meetings if it is promoted by course instructors. Therefore, faculty and instructors could directly encourage students to work together beyond the classroom to help each other better understand course material.

Dr. Richardson thought that this first recommendation is sound. "It's definitely a good idea and it's possible, it just needs to be strategically done." For instance, Dr. Richardson mentioned that although some faculty would embrace the notion of creating validating learning environments, others would not easily do so. Dr. Richardson noted that the workshops could be pitched in different ways to different audiences, since the content would relate to a wide variety of topics such as inclusive learning, student engagement, high impact practices, and student retention. She remarked, "There are different buzzwords that can be used to bring in different kinds of people."

In terms of implementation, Dr. Richardson suggested that it would be best to coordinate workshops with others on campus who are already interested and engaged in issues related to classroom equity and improving student learning. In particular, Dr. Richardson mentioned that there is a faculty group working on making curriculum be intentionally inclusive who would likely be interested in this work. She also suggested

that due to their content, workshops could be formatted in three parts. First, ideas and theories behind practices would be presented, then specific activities that could be done in the classroom would be introduced, and at the end workshop facilitators would lead faculty and instructors through an exercise where they are engaged in a peer learning activity with one another.

My second suggestion for how the university can support students' productive outside of class peer study meetings is by providing more on campus study spaces that are conducive to learning within academic buildings. In 2010 construction was done to create eight group study rooms for student use tucked within the periodical room of the Morris Library. These rooms are a great resource for students, however, ensuring that study spaces exist in every academic building would have a wider impact across campus. I recommend that a cost-effective way to create additional spaces would better utilize existing spaces in academic buildings. For instance, space may be rearranged so that within every academic building there is at least one devoted location where students can study individually or with others. Study tables and chairs that are conducive to both individual and peer study activities would enhance these spaces. At present, in several academic buildings around campus there are either no spaces for students to sit outside of classrooms, or the spaces outside of classrooms are lounge spaces that include cushiony chairs and no study tables. Thus, in academic buildings where no seating exists, void areas can be made into study spaces, and also in academic buildings where lounge areas currently exist, different furniture can turn these areas into dedicated study spaces.

I believe it is important that study spaces exist within academic buildings for several reasons. As found in this study, holding outside of class peer study meetings in academic spaces support productive meetings. Also, a dedicated study space in each academic building would encourage the formation of regularly occurring peer study meetings among students. Due to their convenience, study spaces within each academic building would encourage student meetings either right before or right after classes to work on academic material together. Also, because of class scheduling, students would likely see familiar faces in academic study areas at least weekly. This could help students get to know one another. Furthermore, dedicated study spaces in every department building would contribute to a sense of community among undergraduate students across class years in each major. In their time between classes, students in each major would likely utilize their building's study space to hold regularly occurring peer study meetings or to study individually. For the above reasons, the existence of study spaces in academic buildings would create a sense of camaraderie among students who utilize the spaces.

Additionally, study spaces in academic buildings across campus would be especially useful for commuter students. Since they do not have access to residence halls and the study areas located in residence halls, commuter students often do not know where to go between classes. The existence of study spaces in each academic building would give commuter students many options for places to study alone or with peers when not attending classes. Moreover, the kind of academic-centered familiarity and camaraderie that study spaces in academic buildings create would be especially

beneficial for this particular student population. It would help them gain familiarity with other students who they often see regularly in the study spaces they utilize. This would not only support commuter students' participation in outside of class peer study meetings, but it would also support their retention to graduation from UD by strengthening their sense of belonging at UD. In fact, dedicated study spaces in academic buildings would support the retention of all UD students, since the existence of these spaces would send a message that the university encourages students to devote time to studying individually and with others when they are not attending classes.

Dr. Richardson also thought this second recommendation was a good idea that made sense, would be useful for students, and would be utilized by students. She noted how every day students sit in the hallways of the building where her office is located, often on the floor due to the lack of available seating. As an example of a good study space within an academic building on campus, Dr. Richardson pointed to the Interdisciplinary Science and Engineering Laboratory (ISE Lab). She described how the study spaces within the ISE Lab are highly utilized by students and the arrangement of these spaces encourages students to study with each other. In fact, Dr. Richardson claimed that the ISE Lab study spaces are “a proof of the concept” that study spaces within academic buildings can support student participation in outside of class peer study meetings:

The ISE Lab has a lot of study spaces and they're always in use, that would be a proof of this concept, with the way they're set up you will often find groups

of students working together...they do encourage students working together, and a similar thing could be mimicked in other buildings.

Furthermore, Dr. Richardson agreed with the notion that study spaces in academic buildings would be particularly helpful for commuter students. “I have heard the complaint that commuter students don’t feel welcomed, and that there’s nowhere for them to go, there are student lounges but they’re not ideal.” She agreed that study spaces in academic buildings across campus would help commuter students feel more of a sense of belonging at UD.

In addition to supporting student participation in peer learning activities, the above recommendations will help to make the university a more inclusive learning environment. By encouraging faculty and instructors to create validating classrooms in which peer instruction occurs, and by ensuring that devoted study spaces exist within academic buildings I believe that the university can begin to make positive shifts in campus culture. If UD is serious about retaining each student who enrolls at the university to graduation, the campus culture must be one that makes all UD students feel that they are competent college students who belong at the university; it must encourage students’ engagement in academic activities with peers inside and outside of the classroom; and it must foster the sense that the university’s top priorities are the academic success and professional development of its students.

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## **Appendix A**

### **HISTORY OF THE NUCLEUS PROGRAM**

The NUCLEUS program today has evolved significantly from its founding in the early 1990s. The following is an account of the history of the program at the University of Delaware compiled by reviewing annual reports, historical documents and archived program records. When further clarification was needed, Dr. Harold B. White, a professor in the Department of Chemistry and Biochemistry, was contacted. This historical account shows how the evolution of the NUCLEUS program was greatly influenced by two main factors: (1) the program's funding source; and (2) the priorities of the program's leadership. The NUCLEUS program had two distinct funding sources and underwent three major transitions through four eras of leadership. Over the years as those changes occurred, the NUCLEUS program's activities, membership and focus evolved.

#### **1992: The Founding of the HHMI Funded NUCLEUS Program at UD**

The NUCLEUS program began with a one million dollar grant from the Howard Hughes Medical Institute (HHMI) in order to develop an Undergraduate Biological Sciences Education program at the University of Delaware (UD). The grant was awarded in 1992 to Dr. Phillip A. Gottlieb, a professor in the Department of

Chemistry and Biochemistry. The Network of Undergraduate Collaborative Learning Experiences for Underrepresented Scholars, or the NUCLEUS program for short, was created to fulfill a specific outreach component of the HHMI award. This outreach component required the development of an on-campus program to encourage and provide opportunities for undergraduate students from underrepresented racial/ethnic minority (URM) groups—then defined as blacks, Hispanics, Native Americans and Pacific Islanders—to prepare for graduate studies and careers in biomedical research and practice.

#### **1993-1997: The Beginning Years of HHMI's NUCLEUS Under the Direction of Victoria Orner**

The NUCLEUS program was first implemented in September 1993 under the direction of Ms. Victoria Orner, NUCLEUS Program Coordinator. She remained Program Coordinator through 1997. During those four years, the NUCLEUS program's mission statement, goals, philosophy, activities and demography of students served did not significantly change. The program provided academic, student development and professional development support for URM students in the Department of Chemistry and Biochemistry, as well as URM students majoring in the School of Life and Health Sciences. The primary purpose of the NUCLEUS program during these years was to recruit, retain and graduate academically talented URM students in the biological, chemical and health sciences and assist them in entering graduate school programs, medical school programs and science related professions.

During these beginning years, the NUCLEUS program strived to recruit URM high school and college transfer students interested in the biological, chemical and health sciences to come to UD. Once URM students enrolled at UD and became members of the program, NUCLEUS supported students' persistence in their chosen biological, chemical, or health science major to four-year degree completion and beyond. In addition to helping students achieve a bachelor's degree at UD in their respective science or health-related major, NUCLEUS supported alumni by helping to ease their transitions from college into biomedical research post-baccalaureate programs and employment in health-related professions. Taken together, these objectives depict the overarching goal of the HHMI funded NUCLEUS program—to increase the representation of blacks, Hispanics, Native Americans and Pacific Islanders in the fields of biomedical research and medical practice.

In the 1994-1995 academic year, NUCLEUS was comprised of 102 students majoring in chemistry (14%), biochemistry (10%), biological sciences (56%), physical therapy interest (10%), medical technology interest (7%), and nutrition/dietetics (3%). In terms of gender, there were 70 females (69%) and 32 males (31%) in the cohort. Subsequent cohorts were similar in demographic makeup, with approximately 125 students in each cohort. In addition to the majors found in the 1994-1995 cohort, the 1996-1997 cohort included students majoring in environmental science, biology education and chemistry education. According to the 1994-1996 HHMI annual reports, there were aspirations for NUCLEUS to expand to serve students in all natural

science majors in the College of Arts and Sciences (CAS), including secondary science majors, physics and mathematics majors.

From 1993 to 1997, the fundamental components of the NUCLEUS program included intrusive advising, mentoring, and comprehensive academic enrichment services in an environment that encouraged academic achievement. Participation in the program was intended to make NUCLEUS students realize that academic success is a learned skill developed from specific values and behavior patterns. This philosophy enabled NUCLEUS students to take responsibility for their failures and successes, to regularly measure their undergraduate performance in terms of defined goals, and to have personal ownership of their academic performance and future endeavors. Furthermore, the program claimed that wisdom, personal maturity, and academic excellence were enhanced by the insights of numerous advisors. Therefore, NUCLEUS program staff collaborated with faculty and staff in CAS and administrators of other academic support programs on campus to create a unified campaign for student success within the campus community.

The main activities of the NUCLEUS program during the 1993-1997 years included community outreach activities where NUCLEUS students tutored and mentored URM students attending local middle and high schools; individual advisement sessions with the NUCLEUS Program Coordinator that helped students work toward their academic and professional goals; a student-run NUCLEUS peer mentoring program where freshmen and sophomore students were paired with successful upperclassmen to receive peer support and guidance; student-run

NUCLEUS “Satellite Clubs” that were formed around students’ shared career interests such as the pre-allied health professions club and the pre-medical/pre-dental career club; NUCLEUS sponsored and co-sponsored seminars and workshops called “Reflect Sessions” that featured guest speakers from across campus or from local organizations or medical practices; NUCLEUS student participation in research projects on-campus or at other institutions; and NUCLEUS student recognition events that honored students’ academic achievements and professional accomplishments.

All students who joined NUCLEUS were required to sign a program contract at the start of each academic year to be official members of the program. The contract was a pact that required students to maintain at least a 2.5 cumulative grade point average (GPA), meet several times each semester with the Program Coordinator (the number of times per semester depended on class year), participate in a minimum number of NUCLEUS workshops and “Reflect Sessions,” attend NUCLEUS fall and spring receptions, set their sights on achieving a minimum 3.0 cumulative GPA at graduation, become an active member of at least one student affiliate national organization related to their major or professional interest, and fulfill other obligations that put them on track for academic and professional success.

In return for meeting the obligations outlined in the student contract, NUCLEUS students could receive the following benefits: free tutoring; financial aid; help obtaining research scholarships and travel awards to present at national and local conferences; help identifying research, internship and employment opportunities; a 50% discount on Kaplan MCAT and GRE test preparation courses; access to peer,

faculty, and professional mentors; advisement from the NUCLEUS Program Coordinator; and use of a NUCLEUS office space in 310 Drake Hall. Students who did not meet contract obligations for the minimum GPA requirement and/or not meeting the minimum requirement for attendance at NUCLEUS programs participated in NUCLEUS on a probationary status, with permission of the Program Coordinator, for up to a year from the date of their student contract.

The NUCLEUS office space in 310 Drake was a useful program benefit for students. This space was equipped with computers with e-mail access, a study room, telephone use, a fax, printer and copier machine, literature on graduate and medical school programs, supplemental science textbooks and course materials, chemistry model kits, and access to copies of old exams that were collected from students through “old exam drives.” Students were required to sign into a notebook whenever they came into the office to use resources, and they also completed a telephone log whenever they used the phone. With each year, student use of the NUCLEUS office increased.

The vast majority of funding for the NUCLEUS program from 1993 to 1997 came from the HHMI grant. However, during the summer of 1996 and through the 1996-1997 academic year CAS supplied a salary line item for the NUCLEUS Program Coordinator position. Furthermore, additional funds from the CAS Dean’s Office, the Department of Chemistry and Biochemistry, the Office of Multicultural Affairs, and a grant obtained by the College of Engineering supplied additional funding for the NUCLEUS budget during the 1995-1996 academic year.

### **1997-1998: A Hiatus in HHMI Funding and a Time of Transition in Leadership**

Spring 1997 marked the end of the first HHMI grant award period. In 1998 a second HHMI grant in the amount of 1.6 million dollars was awarded to Dr. Harold B. White, faculty in the Department of Chemistry and Biochemistry as Project Director and Dr. David Usher, faculty in the Department of Biological Sciences as Assistant Project Director. Given this, during the 1997-1998 academic year there was a hiatus in HHMI funding. During that year, Ms. Orner, funded by CAS, continued to be the NUCLEUS Program Coordinator until she left the university in February 1998. During the fall 1997 semester, NUCLEUS ran like it did in previous years except with fewer NUCLEUS “Reflect Session” and workshop offerings. In the spring 1998 semester, Dr. Michael Stokes filled a new Assistant Dean for Minority Affairs position in CAS. With the NUCLEUS Program Coordinator position vacant, Dean Stokes along with junior NUCLEUS student Marijka Gray and Dr. Hal White facilitated spring 1998 NUCLEUS program activities. During this time, the NUCLEUS peer mentors played a key role in advising and helping other NUCLEUS students and encouraging student involvement in the program. There were 105 students in NUCLEUS at the time. Students continued to participate in research, attend conferences, and participate in mentoring, volunteering and internship opportunities. In addition, a “Freshman Seminar Series” was founded during this academic year where freshmen students attended a weekly seminar on a topic related to being successful in college and kept a reflective journal.

### **1998-2005: The Growth of HHMI's NUCLEUS Under the Direction of Cherie Dotson**

Dr. Cherie Dotson became the NUCLEUS Program Coordinator in May 1998 and directed the program until her departure from the university at the end of the spring 2005 semester. Dr. Dotson ran NUCLEUS in the same spirit that Ms. Orner did. The primary activities of the program included: academic advisement and monitoring; tutorial support; academic and professional development workshops; student-run peer mentoring programs; professional mentoring programs; student-run career interest groups; opportunities for outreach by tutoring and mentoring middle and high school students; participation in undergraduate research and conferences; participation in discounted Kaplan test preparation courses, and NUCLEUS student recognition events. However, there was much growth in the program under Dr. Dotson's direction.

During these years, NUCLEUS expanded to include Asian students. In addition, it expanded to involve students from a more diverse array of majors including physics, medical technology, nursing, exercise physiology, computer science, animal science, environmental science and other natural and health science-based majors. By fall 2005, NUCLEUS was comprised of 181 students from majors across the College of Arts and Sciences (CAS), the College of Health Science (CHS), and the College of Agriculture and Natural Resources (CANR). The demographic profile of the 2004-2005 cohort was as follows: 66% black, 17% Asian, 8% white, 7% Hispanic, and 2% other race/ethnicity. The majority female membership remained a

trend with 73% female and 27% male participants. In terms of majors, the breakdown was as follows: 40% Biological Sciences, 10% Medical Technology, 6% Chemistry, 6% Nursing, 5% Biochemistry, and the remaining 33% of students majored in one of 28 other majors.

In addition to growth in the number and diversity of student participants, there was programmatic and funding growth. Tutoring support was provided by a grant from the National Science Foundation's Louis Stokes' Alliance for Minority Participation award in addition to HHMI funds. This enabled NUCLEUS students to have access to more tutoring resources at no cost to them. Moreover, in 2002 with the support of CAS, the NUCLEUS office moved to a renovated space in 118 Brown Laboratory. The office included a larger study lounge space and several NUCLEUS students were hired to staff the new space. Additionally, in spring 2003 the NUCLEUS Research Apprenticeship Program was initiated with the objective of giving freshman and sophomore students the opportunity to become exposed to research with a UD faculty member. Students were awarded a stipend in exchange for working 10 hours per week in a research lab over one semester. During the 2003-2004 academic year, the NUCLEUS Financial Assistance Program was also initiated. In this program, financial aid was awarded to active NUCLEUS participants to assist with the costs of tuition, housing, books, and study abroad support.

### **2005-2006: A Second Hiatus in HHMI Funding and Time of Transition in Leadership**

After Dr. Dotson's tenure, the NUCLEUS program went through another time of hiatus and then experienced quick turnover in leadership. Despite Dr. Dotson's advanced notice of her departure from the university at the end of the spring 2005 semester, the NUCLEUS Program Coordinator position remained vacant for seven months through the summer and fall 2005 semesters. The length of time required to organize and complete a successful nation-wide search to fill the position took longer than expected. During the hiatus, the HHMI program staff, NUCLEUS administrative assistant and senior undergraduate members of the NUCLEUS program worked to sustain the program. As a result of the national search, Dr. Zakiya Wilson was hired as the NUCLEUS Program Coordinator in December 2005. Dr. Wilson directed the program for 11 months. Then, in November 2006, Dr. Wilson left the university and Ms. Jacqueline Aldridge became the new NUCLEUS Program Coordinator later that month.

### **2006-2010: The Final Years of HHMI's NUCLEUS Under the Direction of Jacqueline Aldridge**

2006 marked the last HHMI grant cycle. In total, there were four HHMI grants that were the primary source of funding for the NUCLEUS program from 1992 through 2010. The grant cycles were as follows: 1992-1997, 1998-2002, 2002-2006 and 2006-2010. In comparison to its activities under Dr. Dotson, the NUCLEUS program changed in several ways during the last HHMI funding cycle under the

direction of Ms. Aldridge. Ms. Aldridge oversaw the NUCLEUS program for six years, until she left the university in November 2012. Before leaving, she earned a doctorate and became an Assistant Dean in the College of Arts and Sciences in the summer of 2011.

During the final years of HHMI funding, financial aid continued to be awarded to students with financial need to assist with book, tuition and professional development fee costs. Additionally, research apprenticeship awards continued to be awarded to students who participated in research with a UD faculty member over the course of a semester. Kaplan test preparation course discounts for NUCLEUS students also remained. Opportunities for students to present their research at local and national conferences were sustained. In fact, each year from fall 2004 onward several NUCLEUS students participated in the Annual Biomedical Research Conference for Minority Students (ABRCMS). During 2006 and 2007, NUCLEUS students took first place at ABRCMS for their poster and oral presentations of their research.

Ms. Aldridge was passionate about health disparity issues and introduced these topics into the NUCLEUS program during her tenure. In order to show NUCLEUS students how their pursuit of science and health care careers were highly relevant to themselves and their communities, Ms. Aldridge encouraged NUCLEUS students to participate in “Health Disparity Outreach Activities.” These activities focused primarily on health outcome differences among racial or ethnic groups. Beginning in the fall 2007 semester, students were asked to select a health disparity topic and participate in a variety of discussions and community service activities related to the

chosen topic. Some of these discussions were held during “Video Lunch” seminars where students talked about health disparities presented in videos from cross-disciplinary perspectives over lunch. Health disparity topics included prostate cancer, breast cancer, obesity and HIV/AIDS. Other health disparity outreach activities included participating in HIV/AIDS awareness and testing events. In September 2007, NUCLEUS students participated in the Delaware AIDS Walk for the first time and continued to participate in this event each year until September 2010. Additionally, students helped coordinate free HIV testing and education events in local communities during these years.

Ms. Aldridge also facilitated in-house NUCLEUS seminars to help students improve their study skills, time management skills, and professional development. The titles of seminars included “How to Thrive in the Sciences,” “Time Management Workshop,” “How to Study in Groups Effectively,” “Identifying Academic Strengths, Weaknesses, Opportunities and Threats (SWOT) as a Science Student,” “Recommendation Letter Etiquette,” and “Personal Statement Workshop.” Rather than bringing in outside speakers to run seminars as had been done by past NUCLEUS Program Coordinators, seminars were led by Ms. Aldridge herself or by undergraduate student leaders. During these years, undergraduate student leaders were hired to help carry out program activities and provide assistance to other NUCLEUS student members. Undergraduate student office workers were also hired to help with filing, office maintenance, and staffing.

Within NUCLEUS seminars, program activities, and individual advisement sessions, Ms. Aldridge promoted the notion that learning from and with peers enhanced their academic success and professional development. The main activities of the NUCLEUS program at this time were student-centered and often student-run and focused on connecting students with each other so they could support one another. In addition to bringing students together through “Video Lunches” and workshops, students were connected through in-house peer mentoring and peer tutoring programs. Also, within the NUCLEUS Sakai site, students in the same major were put in online “groups” and were encouraged to create their own peer support group. Ms. Aldridge urged NUCLEUS students to support each other and study with one another along with other peers in their courses outside of class time. Her initiatives were not new—the notion of students working together to learn with and from one another had been essential to the NUCLEUS program from its conception. After all, the “N-U-C-L-E” in NUCLEUS stands for “Network of Undergraduate Collaborative Learning Experiences.”

A notable change that occurred during the 2007-2008 academic year under the direction of Ms. Aldridge was the raising of the GPA requirement for NUCLEUS members. It was raised from 2.5 to 2.75. This change was based on the increased level of competition among undergraduate applicants who planned to pursue graduate degrees in the sciences. Due to the implementation of this GPA requirement, there was a decrease in NUCLEUS membership. During the 2006-2007 academic year, 197 students were NUCLEUS members. However, in the 2007-2008 academic year

NUCLEUS membership dropped to 106 students in part due to the raised GPA requirement. Moreover, between these years some students changed their majors and/or career goals, and subsequently were no longer allowed to participate in NUCLEUS. Ms. Aldridge also held students to the participation requirement and to other requirements in the NUCLEUS student contract. These activities also contributed to the decrease in NUCLEUS membership.

NUCLEUS membership during the 2008-2009 academic year was similar to the previous year with 103 students in the program. However, another decrease in NUCLEUS membership was seen the following year. During the 2009-2010 academic year, NUCLEUS had only 87 students. In terms of demographics for the 2009-2010 academic year, 64% of students were female and 46% were male and race/ethnicity percentages of students were as follows: 53% black, 23% Asian, 14% Hispanic, 7% white and 3% other race/ethnicity. In terms of majors, 48% of the students were Biological Sciences majors, 10% were Chemistry majors, and the rest of the students were in one of 19 various other majors—predominantly health and agricultural science fields.

### **2011-2013: The Beginning Years of CAS's NUCLEUS and Third Time of Transition in Leadership**

In spring 2011, the NUCLEUS program became “hard funded” by the College of Arts and Sciences and expansion of the program to serve all students in the college began. Dr. Rosalind Johnson, a Limited Term Researcher in the College of Arts and

Sciences, started working with NUCLEUS at this time to help with the recruitment of new students and the expansion of the program. It was decided by CAS Dean George Watson and Dr. Johnson to over time make NUCLEUS available to students in all CAS majors. In the first phase of the expansion, Dr. Johnson recruited students with majors in the Department of Psychology (the second largest department in CAS). In spring 2011, ethnic minority students majoring in Psychology and Neuroscience were invited to join NUCLEUS. Several of these students joined the program and by the end of the spring 2011 semester there were 85 students in NUCLEUS. Due to the loss of student participation during the fall 2010 semester, the program at the end of spring 2011 had about the same number of participants as it did at the end of spring 2010. The breakdown of racial/ethnic demographics of NUCLEUS participants at the end of spring 2011 was also similar to the demographics during spring 2010.

The summer of 2011 marked the first major recruitment effort for the expansion of the NUCLEUS program. Letter invitations and paper applications were mailed to the homes of incoming freshmen in all CAS majors who were low income and/or first generation college students independent of their race/ethnicity, and to CAS majors who were non-white students. Additionally, incoming URM students in CHS and CANR received letters inviting them to join NUCLEUS. Invitations to join NUCLEUS were also sent via e-mail to URM sophomores with majors in CAS and CHS who had cumulative GPAs of 2.75 or greater. Furthermore, students transferring to UD from other postsecondary institutions, and students transitioning to main

campus from the Associate in Arts program who were CAS or CHS majors were invited via e-mail to join NUCLEUS.

The summer 2011 recruitment effort was successful in gaining student members. By fall 2011, 137 students joined NUCLEUS, and in spring 2012, 25 more students joined the program. In total, over the 2011-2012 academic year, NUCLEUS consisted of 220 students. 76% of the students were enrolled in CAS majors. The remaining 24% of the students were majors in one of the other six colleges, with the majority of these students enrolled in CHS majors. Within the students enrolled in CAS, 67% were natural science majors, 22% were social science majors, 10% were humanities majors and 1% were arts majors. In terms of race/ethnicity, the demographic breakdown of the NUCLEUS student population was as follows: 34% blacks, 22% whites, 16% Asians, 16% Hispanics, 12% other races/ethnicities. A similar recruitment effort was carried out over summer 2012, and applications were opened again for the start of the spring 2013 semester. In fall 2012, 98 students joined NUCLEUS, and by the spring of 2013, NUCLEUS served 293 students.

Prior to the summer 2011 recruitment effort, the NUCLEUS program did not gather data on first generation college student and/or low income status. For the recruitment effort, first generation and low income classification data were obtained from the Office of Admissions. Because of this, first generation and low income classification data were only available for incoming freshmen. Out of the 79 incoming freshmen who joined NUCLEUS in the 2011-2012 academic year, 24% were first generation college students, 12% were students from low income backgrounds (not

first generation), 5% were first generation college students who were also from low income backgrounds and the remaining 59% of freshmen students were neither first generation college students nor from low income family backgrounds.

During the 2011-2012 academic year, the NUCLEUS program ran in a similar manner as it previously had under the direction of Dr. Jacqueline Aldridge. Because of this, many non-science and non-health science students often felt confused about their participation in the program. With the expansion in student participation, Dr. Rosalind Johnson provided additional academic advisement to students in 118 Brown Lab and also coordinated recruitment and data collection for the program. Additionally, Tara Falcone began working with the NUCLEUS program at the start of fall 2011 as the program's Graduate Assistant. One staffing change that occurred during spring 2012 was that undergraduate student leaders were no longer a part of the program's structure. Because students were very busy with their academics and extracurricular activities, and also because there was no accountability in place for student leaders, they did not help with program planning and implementation efforts. However, undergraduate student office workers continued to provide clerical support for the program.

During the 2011-2012 academic year, many technological tools were implemented to communicate information to NUCLEUS students. One large project that was carried out over winter 2012 was a new website for the NUCLEUS program. Dr. Johnson and Ms. Falcone created and designed the website to contain links to many on- and off-campus academic and professional development resources and

opportunities for students. Moreover, in fall 2011, Ms. Falcone created the weekly “NUCLEUS Update” e-mail, which was sent to all NUCLEUS members every Monday morning over the fall and spring semesters. The e-mail contained useful information, resources and upcoming academic and professional development workshops on campus over the week. It allowed NUCLEUS staff to have consistent weekly communication with all student members and it also alleviated the problem of NUCLEUS students receiving many sporadic e-mails from program staff as had occurred in the past. Students appreciated the weekly e-mails and found them to be useful.

In addition to creating the weekly e-mail, Ms. Falcone started a Facebook page for the program and she also created a NUCLEUS Twitter account. Social media postings along with announcements on the NUCLEUS Sakai site were used to send important information to students between weekly e-mails. Additionally, Ms. Falcone created a Google Calendar for the program that was posted to the NUCLEUS website and continually updated with important deadlines as well as academic and professional development events occurring around campus. The calendar allowed students to sync events to their own personal Google Calendars. The program continues to use weekly Monday morning “NUCLEUS Update” e-mails, a Google Calendar, Sakai website postings, and Facebook and Twitter postings to get information to NUCLEUS students today.

Significant staffing changes occurred during the 2012-2013 academic year. After six years overseeing the NUCLEUS program, Dr. Aldridge left the university in

November 2012. Also, beginning in summer 2012, Dr. Johnson became involved in other CAS projects, working part-time on NUCLEUS data collection and program evaluation efforts outside of 118 Brown Lab. Ms. Falcone remained as Graduate Assistant for the NUCLEUS program and for the 2012-2013 academic year she was the primary NUCLEUS contact for students located in the NUCLEUS office until permanent staffing for the program was established in summer 2013. Throughout this year, Ms. Falcone provided supplemental academic advising to students, sent outreach e-mails to targeted student populations (such as freshmen with low midterm grades), and she continued to gather and distribute academic and professional development information to students via technological tools. Ms. Falcone also began rearranging the interior of 118 Brown Lab to transform it from mostly staff office space to mostly student study space.

### **2013-Present: The Growth of CAS's NUCLEUS Under the Direction of Rosalind Johnson & Tara Falcone**

Permanent staffing for the NUCLEUS program was established for the 2013-2014 academic year. In May 2013, Dr. Rosalind Johnson became Assistant Dean for Student Success in CAS, responsible for overseeing the NUCLEUS program, and in June 2013, Tara Falcone became the NUCLEUS Program Coordinator, a position also within the CAS Dean's Office. With NUCLEUS completely funded by and integrated into CAS, NUCLEUS recruitment efforts during summer 2013 were aimed at incoming CAS students only. However, the inclusivity of the program to assist any

student who elects to join NUCLEUS is the hallmark of the CAS funded NUCLEUS program today.

Beginning in spring 2013, “NUCLEUS” no longer is an acronym. This was decided by Dr. Johnson and Ms. Falcone because NUCLEUS is a program that supports, but does not exclusively focus on, racial/ethnic diversity. Current NUCLEUS staff believe that all college students can benefit from support and resources, regardless of their particular backgrounds or their majors. Therefore, NUCLEUS is an inclusive program. It assists UD students who volunteer to join NUCLEUS by providing them with supplemental guidance. The program supports students on their path to graduation. It also encourages students to take advantage of resources and opportunities while in college to help them gain the particular experiences, skills, and knowledge they need to pursue their desired career paths. Additionally, since NUCLEUS no longer requires students to maintain membership in the program through specific requirements or contracts, students may turn to NUCLEUS staff at any time with academic, degree completion, and professional development questions. Also, students may utilize NUCLEUS services and resources as much or as little as they wish. With no strings or stigmas attached, the NUCLEUS program supports a diverse population of UD students to earn a bachelor’s degree and pursue the post-degree plans of their choosing. These messages and approaches have greatly benefitted students and influenced the exponential growth of the NUCLEUS program. In spring 2014, NUCLEUS consisted of over 480 students and in spring 2015, there were over 800 students supported by NUCLEUS. Although student

participation greatly expanded, the budget and permanent staffing for NUCLEUS did not.

The recruitment efforts during summer 2013 were so successful that the same procedures were carried out over summer 2014, and NUCLEUS staff plan to continue future summer recruitment efforts in a similar fashion. In summer 2013, invitations to join NUCLEUS were sent via e-mail to incoming CAS students—transfer and freshman students—who were in at least one of the following demographic groups: first generation college students, students from low income backgrounds, or non-white students.

Targeted outreach was done for incoming low income and/or first generation college students in CAS regardless of race since students coming from those backgrounds often need of a supportive network to encourage them and help them navigate college to degree completion. Incoming CAS students who were racial/ethnic minorities but were not from first generation or low income backgrounds were also a targeted group for outreach since UD is a predominantly white institution and NUCLEUS helps students from all backgrounds to succeed. Although an extra e-mail was sent to these particular students, summer recruitment efforts encouraged all incoming CAS majors to join NUCLEUS through a pitch given at the “Meet Your College” session during New Student Orientation.

At each “Meet Your College” session for incoming students in CAS, Ms. Falcone spent a few minutes telling students about the NUCLEUS program. During her talk, Ms. Falcone would ask if students had received an e-mail from her about the

NUCLEUS program inviting them to join. She would acknowledge students' shaking their heads "yes" in the room. She would then go on to explain that if students did not yet receive an e-mail from her, they are not to worry because she was present at the "Meet Your College" session to invite everyone in the room to join NUCLEUS. In this manner, all incoming CAS students received a NUCLEUS brochure and were welcomed to join the program, with some groups of students receiving an additional e-mail outreach encouraging them to participate.

Structurally, NUCLEUS is now part of the CAS Dean's Office of Undergraduate Academic Services (UAS). This structure was established so that NUCLEUS staff may collaborate with UAS staff to provide academic services to its larger population of students. Today, few in-house workshops and programs for NUCLEUS students are developed. Rather, NUCLEUS utilizes college-wide and university-wide resources and programming. Also, with the larger student population, financial aid awards ceased. In the past, financial aid awards were given to students at the discretion of the Program Coordinator in an unsystematic manner. This often resulted in a few select students receiving multiple awards. To eliminate bias, rather than giving out financial aid awards, money was reallocated to be used to hire work-study student workers in NUCLEUS. This allowed more students to receive funds in a systematic manner, and supported students' academics by providing a way for them to get paid to study when not carrying out office work duties.

Moreover, during the 2012-2013 academic year student contracts, minimum participation requirements and minimum GPA requirements were not enforced, and at

the start of fall 2013 with permanent staffing in place, these criteria were officially abandoned. Furthermore, beginning in fall 2013 application deadlines were abolished allowing students to join NUCLEUS at any time. Often, NUCLEUS students tell their friends about the program and invite them to come into 118 Brown Lab or send NUCLEUS staff an e-mail to join. Any UD undergraduate who completes an online NUCLEUS application is accepted into the NUCLEUS program—even if she or he is not a CAS major. Students recruiting friends into NUCLEUS in this manner occurs throughout the year and contributes to the growth of the program. These major program changes occurred with the change in NUCLEUS leadership. Dr. Johnson and Ms. Falcone saw the expansion of NUCLEUS to be an opening up of the program. In the past, NUCLEUS was restricted and restrictive—students had to fit certain criteria and uphold certain requirements to be members. Under new leadership, NUCLEUS serves all students who elect to participate and it does not hold students to meeting specific requirements in order to receive helpful services.

At present, NUCLEUS is a continually growing and truly diverse body of students in terms of both demographics and in the areas of study NUCLEUS students are pursuing. In the October 2014 NUCLEUS population of over 750 students, 54% of students were from historically underrepresented groups in higher education—28% black, 17% multi-ethnic, 8% Hispanic and 1% Native American or Pacific Islander. Additionally, 9% of students identified as Asian and 37% identified as white. Also, 40% of students were first generation college students and/or from low income family backgrounds (specifically, 18% first generation, 15% low income, and 7% both first

generation and low income). Moreover, NUCLEUS students pursued their postsecondary studies in at least one of 89 majors across the university. Since recruitment efforts from summer 2013 onward have focused on recruiting incoming CAS students only, the majority of students were majors in CAS (79%), followed by majors in CHS (11%), University Studies majors (5%), and majors in one of the other five colleges in the university (5%). Within the CAS majors, 60% of students were in natural science majors, 28% were in the social sciences, and 12% were arts or humanities majors. By expanding to become inclusive, NUCLEUS supports many more students in general, and in particular, many more students from traditionally underrepresented and underserved groups in higher education. Furthermore, many of the students who join NUCLEUS are high academically achieving students and honors students who frequently utilize program services. The goal of the NUCLEUS program currently is to help NUCLEUS students achieve academically, develop professionally and graduate from UD. This goal drives the program's activities. Refer to Chapter 1 for an overview of the main activities of the NUCLEUS program today.

### **The Future of NUCLEUS**

Each year, the NUCLEUS program grows to serve about 200 more students per year on average, although the budget and number of full-time NUCLEUS staff remain the same. As a result, the resources of the program are continually stretched. In fact, the 2015-2016 NUCLEUS population consists of approximately 1,000 students. Because NUCLEUS is housed in CAS's Dean's Office as part of the Undergraduate

Academic Services unit, it makes sense for the program to concentrate its efforts on supporting students who are CAS majors. Furthermore, degree requirements and resources for CAS majors are the expertise of NUCLEUS staff. Therefore, NUCLEUS does not offer strong academic support services for students with majors outside of the college. For these reasons, starting in September 2015 NUCLEUS staff implemented that only students with one or more declared majors in CAS are eligible to join NUCLEUS. Students who inquire about joining NUCLEUS who do not meet this criterion are directed to the undergraduate academic services units of their colleges. Regarding NUCLEUS members who have majors outside of CAS that joined the program prior to fall 2015, NUCLEUS will continue to support them to their successful graduation from UD, unless they voluntarily elect to no longer be affiliated with the NUCLEUS program. In this manner, NUCLEUS as a CAS funded and staffed program is going in the direction of primarily serving CAS majors at UD. Thus, the question has been raised concerning if NUCLEUS should continue to require students to “join” the program in order to have access to program services, or if program services should be made available to all CAS undergraduate students. A decision on this matter is yet to be made.

**Appendix B**

**UD STUDY SPACES DOCUMENT CREATED FOR NUCLEUS STUDENTS**

## UD Study Spaces

Libraries					
Name (Location)	Individual	Group	Printing	Late-night (past 7 pm) <sup>1</sup>	Notes
<a href="#">Morris Library</a> (South Green)	✓	✓	✓	✓	Group study rooms are <a href="#">located throughout the library and can be reserved!</a> Open 24/7 during finals week.
Morris Library Commons (to the right after walking through the main entrance)	✓	✓		✓	Open 24/7. Multiple snack and vending machines. Café open during the day.
Morris Library (Outside)	✓	✓		✓	Outdoor patio area with umbrellas adjacent to the Commons.
<a href="#">Physics Library</a> (2 <sup>nd</sup> floor of Sharp Lab)	✓	✓	✓	✓	Super comfy chairs.
<a href="#">Chemistry Library</a> (2 <sup>nd</sup> floor of Brown Lab)	✓	✓	✓	✓	4 group study rooms available.

<sup>1</sup>Hours often vary for Friday, Saturday, and Sunday nights.

Academic Buildings					
Name (Location)	Individual	Group	Printing	Late-night (past 7 pm)	Notes
Amy DuPont Hall (Lower level)	✓	✓		✓	
Brown Lab	✓	✓		✓	Classrooms open.
Brown Lab - <a href="#">NUCLEUS office</a> , Room 118	✓	✓	✓		Free printing for NUCLEUS students! M-F 8:30 am-4:30 pm.
Colburn Lab	✓	✓		✓	Undergraduate lounges: rooms 105 & 046.
Gore Hall	✓	✓		✓	Classrooms open.
Jastak-Burgess - <a href="#">Room 006</a>	✓	✓	✓		M-F 8:45 am-4:30 pm. Free printing.
ISE Lab (Academy Street)	✓	✓		✓	Large study areas available throughout all floors. Classrooms open. Einstein Bagels on 1 <sup>st</sup> floor.
Lerner Hall Atrium (1 <sup>st</sup> floor)	✓	✓			
McDowell Hall (Lower Level)	✓	✓			Tables and individual seats.
McDowell Hall (3 <sup>rd</sup> Floor)	✓				Small tables and individual seats. Turn right when you arrive at the 3 <sup>rd</sup> floor, take a right down the hallway, and the study area is on the left.
McKinly Atrium (Lower level)	✓	✓		✓	Several tables and vending machines.
Memorial Hall	✓	✓		✓	Classrooms open.
Old College Hall (Lower level)	✓				1 large table and benches.
Purnell Hall	✓			✓	Classrooms open.
Purnell Hall (Outside)	✓	✓		✓	Outdoor round tables with yellow umbrellas adjacent to the lower level.
Sharp Hall (1 <sup>st</sup> floor)	✓	✓		✓	Classrooms open.
<a href="#">Smith Hall Computing Site</a> (lower level of Smith Hall)	✓		✓	✓	Starbucks on main level.
Willard Hall - Education Resource Center	✓	✓			1 <sup>st</sup> floor opposite North College Ave entrance.
Wolf Hall	✓				Small study area to the left when you walk in.

University Student Centers & Gym					
Name (Location)	Individual	Group	Printing <sup>1,2</sup>	Late-night (past 7 pm)	Notes
Carpenter Sports Building (the Little Bob)	✓			✓	Small study area to the left when you walk in.
Dougherty Lounge (Trabant)	✓		✓	✓	Great for quiet study.
Trabant (Upper level)	✓	✓	✓	✓	3 different areas on both ends of the floor and in the middle.
Trabant Lounge (Main level)	✓	✓	✓	✓	Excellent for group work. Food court nearby.
Perkins Scrounge (Main level)	✓	✓	✓	✓	Excellent for group work. Food court and Dunkin Donuts nearby.
Perkins East Lounge	✓	✓	✓	✓	Few power outlets available.
Perkins Lounge (Main level)	✓	✓	✓	✓	Large study area with floor-to-ceiling windows. Faces Academy street and Thomson Hall.

<sup>1</sup>Printing stations in Trabant are located across from the Multi-Purpose Rooms and in the main level study lounge. Printer is located across from the Multi-Purpose Rooms.

<sup>2</sup>Printer in Perkins is located outside the Scrounge doors, near the Event Service's Information Desk.

**Appendix C**

**PEER CONNECTIONS BY ACADEMIC MAJOR REQUEST FORM  
CREATED FOR NUCLEUS STUDENTS**



**NUCLEUS Peer Connections by Academic Major Request Form**

Use this form to:

- Request to be connected with someone who has more years of experience than you at UD who is in your major, or in a major you are considering switching into

OR

- Indicate that you would like to help someone who is newer to UD

Fill in the following:

Name:	<input type="text"/>
UD ID #:	<input type="text"/>
Academic major(s), minor(s) (including ones you are considering switching into):	<input type="text"/>
Career aspirations:	<input type="text"/>

Select one of the following:

- I would like to be connected with someone who has more years of experience at UD
- I would like to help someone who is newer to UD

What topics would you be interested in discussing with your peer connection?

**Appendix D**

**TIPS FOR SUCCESSFUL AND PRODUCTIVE PEER STUDY MEETINGS  
DOCUMENT CREATED FOR NUCLEUS STUDENTS**

## Tips for Successful and Productive Peer Study Meetings

One way to **be academically successful in college** and to **build skills that you will need in your future career** is to work with classmates on course material outside of class time and class requirements.

### Working together with classmates in productive peer study meetings you can:

- Better understand concepts, keep up with the fast pace of learning material, motivate and encourage each other to do well in courses, and
- Develop skills that will be essential for your success in employment and graduate school settings such as teamwork, communication, problem solving and critical thinking skills

Below are some tips for creating successful peer study meetings and examples of activities you can do to ensure your meetings are productive. **If you want additional help forming and facilitating productive peer study meetings for any of your courses please [contact NUCLEUS staff](#).** We are happy to help with this!

### Tips for creating successful peer study meetings:

- **Group members matter:** All group members must be serious about their academics, dependable, comfortable working with one another, attend all classes and devote time and energy to studying on their own before and after peer study meetings
- **Keep groups small:** Two to four people work best together
- **Keep meeting dates/times consistent:** Find a day/time that works well for all group members and meet regularly, every week for a set amount of time
- **Make meetings focused on academics:** Socialize and vent outside of study meeting times
- **Make meetings structured:** Decide what activities you will do when you meet, and what work group members need to do on their own before meeting
- **Hold meetings in locations with few distractions:** See this [list of good study spaces around campus](#), which includes [group study rooms in the Morris Library](#)
- **Make sure group members come prepared:** In order to stay in the group, require members to do their pre-meeting work and contribute to group activities
- **Aim for group understanding:** Utilize meetings to discuss concepts and continually challenge each other's explanations in order come to a better understanding as a group. Attend professor's/TA's office hours together when the group is stuck or in disagreement

### Examples of productive activities to do in peer study meetings:

- Have members come to meetings with specific questions, then take turns answering each other's questions and explaining concepts and terms
- Work through difficult questions that members could not solve on their own, then create procedures in words explaining how to get to solutions and identify the concepts being tested in the questions
- Have members come to meetings with summarized notes, then share and compare work to create a most complete set of notes or detailed outline
- Have members identify different types of commonly asked questions and create examples of each before meeting, then share your questions and test each other
- Create structure in your meetings using time, for example devote the first 25 minutes for asking and answering questions, the next 25 minutes for a planned activity, and the last 10 minutes for a wrap up summarizing what was learned and what needs to be done before the next meeting

**Appendix E**

**TEMPLATE OF THE OUTREACH E-MAIL CREATED TO CONNECT  
NUCLEUS STUDENTS IN POPULAR COURSES**

Subject: Connecting NUCLEUS Students in COURSE XXX

Dear NUCLEUS students in COURSE XXX,

We are sending this e-mail to connect you to each other. One way to **be academically successful in college** and to **build skills that you will need in your future career** is to work with classmates on course material outside of class time and class requirements.

**Working together with classmates in productive peer study meetings you can:**

- Better understand concepts, keep up with the fast pace of learning material, motivate and encourage each other to well in courses, and
- Develop skills that will be essential for your success in employment and graduate school settings such as teamwork, communication, problem solving and critical thinking skills

Below are some tips for creating successful peer study meetings and examples of activities you can do to ensure your meetings are productive. Additionally, at the bottom of this e-mail there is a **list of NUCLEUS students currently enrolled in the course with class sections and e-mail addresses**. **Feel free to use this information to contact with each other to form peer study meetings**. If you want additional help forming and facilitating productive peer study meetings for any of your courses please [contact NUCLEUS staff](#). We are happy to help with this!

**Tips for creating successful peer study meetings:**

- **Group members matter:** All group members must be serious about their academics, dependable, comfortable working with one another, attend all classes and devote time and energy to studying on their own before and after peer study meetings
- **Keep groups small:** Two to four people work best together
- **Keep meeting dates/times consistent:** Find a day/time that works well for all group members and meet regularly, every week for a set amount of time
- **Make meetings focused on academics:** Socialize and vent outside of study meeting times
- **Make meetings structured:** Decide what activities you will do when you meet, and what work group members need to do on their own before meeting
- **Hold meetings in locations with few distractions:** See this [list of good study spaces around campus](#), which includes [group study rooms in the Morris Library](#)
- **Make sure group members come prepared:** In order to stay in the group, require members to do their pre-meeting work and contribute to group activities
- **Aim for group understanding:** Utilize meetings to discuss concepts and continually challenge each other's explanations in order come to a better understanding as a group. Attend professor's/TA's office hours together when the group is stuck or in disagreement

**Examples of productive activities to do in peer study meetings:**

- Have members come to meetings with specific questions, then take turns answering each other's questions and explaining concepts and terms
- Work through difficult questions that members could not solve on their own, then create procedures in words explaining how to get to solutions and identify the concepts being tested in the questions
- Have members come to meetings with summarized notes, then share and compare work to create a most complete set of notes or detailed outline
- Have members identify different types of commonly asked questions and create examples of each before meeting, then share your questions and test each other
- Create structure in your meetings using time, for example devote the first 25 minutes for asking and answering questions, the next 25 minutes for a planned activity, and the last 10 minutes for a wrap up summarizing what was learned and what needs to be done before the next meeting

**NUCLEUS Students in COURSE XXX**

First Name	Last Name	E-mail Address	Course	Number	Section
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## Appendix F

### SURVEY INSTRUMENT VERSION 1

Please answer the following questions about your study activities during the Fall 2012 semester

(Q1) Did you meet with other students in your courses to study together outside of class time and outside of class requirements?

(Note: Meetings with classmates to work on assigned group projects would not count in this case. Also, meetings with more experienced peers for tutoring help would not count either.)

- Yes
- No

Answer If "Yes" Is Selected

(Q2) In how many of your courses?

- One course only
- More than one of my courses
- All of my courses

(Q3) Which course(s)?

Answer If "More than one of my courses" or "All of my courses" Is Selected

Please answer the following questions about the course you met most frequently with classmates to study for during Fall 2012

(possible Q4) Which course did you meet most frequently with classmates to study for?

(Keep in mind your experiences studying with classmates for this course as you answer the rest of the questions in this survey)

(Q5) What is your PRIMARY REASON for participating in study meetings with classmates for this course outside of class time?

- To get a grade of A or B in the class
- To pass the class
- To get to know other students
- To improve my motivation
- Other \_\_\_\_\_

(Q6) What additional factors led you to study with classmates outside of class time for this course during the Fall 2012 semester?

(Q7) How often did you meet with classmates outside of class time to study for this course during the Fall 2012 semester?

- Once or twice during the semester
- Three to five times during the semester
- About once every other week
- Once a week
- More than once a week

(Q8) When did you and your classmates first start meeting outside of class to study together for this course?

- September
- October
- November
- December

(Q9) Did your study meetings consist of a "core" group of classmates only, or were there additional classmates who joined study meetings on occasion?

- We just had a core group
- We had a core group plus occasional others

Answer If "We had a core group plus occasional others" Is Selected

(possible Q10) Were you a "core" group member who attended all meetings, or were you an occasional group member who attended meetings on occasion?

- I was a core group member
- I was an occasional group member

(Q11) How many other classmates participated in outside-of-class study meetings with you for this course?

- One other person
- Two other people
- Three other people
- Four other people
- Five other people
- More than five other people

(Q12) Are these classmates NUCLEUS members too?

- All are NUCLEUS members
- Some are NUCLEUS members, but not all
- I am the only NUCLEUS member out of the group

(Q13) Including yourself, was the group composed of all females, all males, or mixed in terms of gender?

- All female
- All male
- Both female and male participants

(Q14) Where did you usually meet to study together?

- In a library on-campus
- In a dorm building
- In the NUCLEUS office
- In another on-campus building
- In an off-campus residence
- Other \_\_\_\_\_

(Q15) How long did your study meetings usually last?

- Less than an hour
- An hour
- An hour and a half
- Two hours
- Two and a half hours
- Three hours
- More than three hours

(Q16) Between in-person study meetings, did you work on course material with others in the group over phone calls, e-mail, text messaging or other electronic ways?

- Yes
- No

Answer If "Yes" Is Selected

(possible Q17) How often did you work together in the following ways?

We called each other by phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We e-mailed each other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We texted each other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We videocalled each other (using Skype, Facetime, Google Video Chat, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We instant messaged each other (using Facebook Chat, Gchat, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Q18) How did you become connected to the classmate(s) you studied together with for this course? (Check all that apply)

- I suggested we study together
- My classmate(s) suggested we study together
- NUCLEUS staff suggested we study together
- The professor or T.A. for the course suggested we study together
- My classmate(s) and I have studied together for shared courses in previous semesters

(Q19) Prior to the Fall 2012 semester, were you friends with the classmate(s) you studied with for this course?

- Yes
- No

(Q20) Which of the following best describes your out-of-class study meetings with classmates for this course?

- We only met before exams so our meetings focused on exam review
- We only met before assignments were due so our meetings focused on completing assignments
- We only met when someone had questions and requested a meeting so our meetings focused on classmates' questions
- We met on a regular basis at least once a week so our meetings focused on the material covered in class each week
- Other \_\_\_\_\_

(Q21) How did you work together in study meetings?

- We worked on material quietly side-by-side on our own and asked one another questions when we had them
- We worked on material aloud with one another throughout our meetings
- Other \_\_\_\_\_

(Q22) What problems developed in your out-of-class study group meetings with classmates? (Check all that apply)

- No problems developed
- Some classmates were underprepared
- Poor attendance by some classmates
- Some classmates were too dominant
- Meetings became too social
- Other \_\_\_\_\_

(Q23) What benefits do you feel you gained from studying with classmates outside of class time for this particular course? (Check all that apply)

- Better grades than I would have achieved studying on my own
- Increased knowledge and understanding of course content
- Increased interest in course content or career path
- Connections with people I can ask academic questions to in the future
- Stronger communication skills
- Stronger interpersonal skills
- Friendships
- Other \_\_\_\_\_

(Q24) How helpful for you was studying with classmates outside of class for this course?

- Very helpful
- Helpful
- Not helpful
- Waste of time

Answer If "Very Helpful" or "Helpful" Is Selected

(possible Q25) How was it helpful for you?

Answer If "Not Helpful" or "Waste of time" Is Selected

(possible Q25) How was it not helpful for you?

(Q26) What else do you feel is important to mention about your experience meeting with classmates to study together outside of class for this course?

(Q27) In order to help students benefit more from outside-of-class study meetings with classmates, how helpful do you feel it would be for the NUCLEUS program to...

<p>...offer a "how to" workshop more frequently on the topic of studying with classmates outside of class time</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>...assemble a student panel to share their outside-of-class study group experiences and tips with other students</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>...provide more detailed "how to" handout materials on the topic of studying with classmates outside of class time</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>...provide (or help students find) more study locations on campus</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Q28) In order to help students benefit more from outside-of-class study meetings with classmates, how helpful do you feel it would be for the NUCLEUS program to...

...provide more help connecting students with others in their courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...provide more help with the organization and facilitation of the first few outside-of-class study meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...provide students with incentives for participating in outside-of-class study meetings with classmates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...work to build a greater sense of community among NUCLEUS students in the same classes/majors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Q29) What other thoughts do you have about how NUCLEUS could help students benefit more from outside-of-class study meetings with classmates?

(Q30) In which area is your PRIMARY MAJOR:

- Health Sciences (College of Health Sciences majors)
- Agricultural Sciences (College of Agriculture & Natural Resources majors)
- Environmental Sciences (College of Earth, Ocean and Environment majors)
- Secondary Teacher Education
- Arts (Art, Music, Theater, Dance)
- Humanities (Art Conservation, Art History, English, Foreign Language & Lit, History, Philosophy)
- Social Sciences (Anthropology, Sociology, CJ, Public Policy, Poli Sci, IR, Comm, BAMS, WOMS, Fashion Studies)
- Biological Sciences (Biology, Biochemistry)
- Psychology (Psychology, Linguistics & Cognitive Science)
- Physical Sciences (Physics, Astronomy, Chemistry, Mathematics)
- Human Services
- University Studies or Associate in Arts

(Q31) Select your classification:

- Freshman
- Sophomore
- Junior
- Senior

(Q32) Did one or more of your parents/guardians obtain a bachelor's degree?

- Yes
- No

(Q33) Select your gender:

- Male
- Female

(Q34) Select your race/ethnicity:

- White
- Black
- Hispanic
- Asian
- Multi-Ethnic

(Q35) Select your Fall 2012 semester residency:

- Live in a residence hall on campus
- Live with family members off campus and commute to school
- Live with roommates in an apartment or house off campus

(Q36) Are you a transfer student (attended a different college before UD)?

- Yes
- No

(Q37) Have you studied together with classmates outside of class time in a previous college semester and/or in high school?

- Yes
- No

(Q38) Would you be willing to participate in an individual interview about your experiences and thoughts about meeting (or not meeting) with classmates outside of class to study together?

- Yes
- No

## Appendix G

### SURVEY INSTRUMENT VERSION 2

Please answer the following questions about your study activities during the Fall 2012 semester

(Q1) Did you meet with other students in your courses to study together outside of class time and outside of class requirements?

(Note: Meetings with classmates to work on assigned group projects would not count in this case. Also, meetings with more experienced peers for tutoring help would not count either.)

- Yes
- No

Answer If "No" Is Selected

(Q2) Please rate how strongly you agree with the following statements:

I never considered studying with classmates outside of class time this past Fall 2012 semester	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I saw no need for studying with classmates outside of class time this past Fall 2012 semester	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I didn't know anyone in my classes this past Fall 2012 semester well enough to feel comfortable asking them if they would like to study together outside of class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I didn't have time this past Fall 2012 semester, but if I did I would have liked to study with others outside of class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have studied with classmates outside of class time in the past and it wasn't a good experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Q3) Please rate how strongly you agree with the following statements:

Most of the classes I took this past Fall 2012 semester were easy for me so I did not need help from others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most of the classes I took this past Fall 2012 semester were reading and writing based, so working with others would not have helped me much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't know how to study with classmates outside of class time- what would we do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't want to study with others, I study better on my own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Studying with others outside of class time is a waste of my time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Q4) What additional factors led you to not study with classmates outside of class time this Fall 2012 semester?

(Q5) Did you work on course material with any of your classmates over phone calls, e-mail, text messaging or other electronic ways?

- Yes
- No

Answer If “ Yes” Is Selected

(possible Q6) For which course or courses?

(possible Q7) How often did you work together with a classmate for the above course in the following ways?

(If you listed more than one course above, base your answers on the course you most often communicated about with a classmate)

We called each other by phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We e-mailed each other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We texted each other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We instant messaged each other (using Facebook Chat, Gchat, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We videocalled each other (using Skype, Facetime, Google Video Chat, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(possible Q8) What led you to work with classmates on course material using the above electronic methods (rather than meeting with them in person)?

(Q9) In order to help students benefit more from outside-of-class study meetings with classmates, how helpful do you feel it would be for the NUCLEUS program to...

<p>...offer a "how to" workshop more frequently on the topic of studying with classmates outside of class time</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>...assemble a student panel to share their outside-of-class study group experiences and tips with other students</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>...provide more detailed "how to" handout materials on the topic of studying with classmates outside of class time</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>...provide (or help students find) more study locations on campus</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Q10) In order to help students benefit more from outside-of-class study meetings with classmates, how helpful do you feel it would be for the NUCLEUS program to...

...provide more help connecting students with others in their courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...provide more help with the organization and facilitation of the first few outside-of-class study meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...provide students with incentives for participating in outside-of-class study meetings with classmates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...work to build a greater sense of community among NUCLEUS students in the same classes/majors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Q11) What other thoughts do you have about how NUCLEUS could help students benefit more from outside-of-class study meetings with classmates?

(Q12) In which area is your PRIMARY MAJOR:

- Health Sciences (College of Health Sciences majors)
- Agricultural Sciences (College of Agriculture & Natural Resources majors)
- Environmental Sciences (College of Earth, Ocean and Environment majors)
- Secondary Teacher Education
- Arts (Art, Music, Theater, Dance)
- Humanities (Art Conservation, Art History, English, Foreign Language & Lit, History, Philosophy)
- Social Sciences (Anthropology, Sociology, CJ, Public Policy, Poli Sci, IR, Comm, BAMS, WOMS, Fashion Studies)
- Biological Sciences (Biology, Biochemistry)
- Psychology (Psychology, Linguistics & Cognitive Science)
- Physical Sciences (Physics, Astronomy, Chemistry, Mathematics)
- Human Services
- University Studies or Associate in Arts

(Q13) Select your classification:

- Freshman
- Sophomore
- Junior
- Senior

(Q14) Did one or more of your parents/guardians obtain a bachelor's degree?

- Yes
- No

(Q15) Select your gender:

- Male
- Female

(Q16) Select your race/ethnicity:

- White
- Black
- Hispanic
- Asian
- Multi-Ethnic

(Q17) Select your Fall 2012 semester residency:

- Live in a residence hall on campus
- Live with family members off campus and commute to school
- Live with roommates in an apartment or house off campus

(Q18) Are you a transfer student (attended a different college before UD)?

- Yes
- No

(Q19) Have you studied together with classmates outside of class time in a previous college semester and/or in high school?

- Yes
- No

(Q20) Would you be willing to participate in an individual interview about your experiences and thoughts about meeting (or not meeting) with classmates outside of class to study together?

- Yes
- No

## Appendix H

### INTERVIEW PROTOCOL VERSION 1

Introduction: Thank you for meeting with me to talk with me today! The purpose of our discussion is for me to learn about your experiences and thoughts about meeting with (or not meeting with) classmates to study together outside of class time. What I learn from you will help me complete my doctorate degree! It will also help me understand how to better support students in their outside-of-class peer study activities. This information may inform scholarship as well as future NUCLEUS programming. I am sincerely thankful for your participation and willingness to share your experiences and thoughts with me. Our discussion will take approximately 30 minutes, and I will audio record it so I can review it later—I am not a very fast note taker!

I will ask you several questions. If anything is unclear, feel free to ask me to clarify. If there is a particular question you don't want to answer, you don't have to. You may skip any question you do not want to answer. Everything you tell me is confidential. Your name or any other information that could identify you will not be used in any written documents I create. I'm interested in your opinions based on your own personal experiences—whatever you have to say is fine with me. There are no right or wrong answers. I am here to learn from you. Do you have any questions for me before we begin? Are you OK with our discussion being audio recorded? \*START AUDIO RECORDING\*

(1) According to your survey responses you studied with (number) other students for (course). [**Adjust this information as appropriate based on the student's survey responses**] Tell me more about that.

**-Probe about other classmates involved. Possible probes include:** Who were the classmates you studied with? How did you get connected with them to study together outside of class? Describe your relationship with these classmates prior to this fall semester. Were you friends previously? Did you study together previously? How do you think you knowing each other (or not knowing each other) prior to this semester effected your studying with each other? Did you have things in common with them? What differences existed between you all?

**-Probe about what study meetings were like. Possible probes include:**

Describe for me what a typical study meeting for (course) would be like. Where did you meet? What did you do in them? How did your study meetings go? How did you and your classmates work together during the study meetings? What did you focus on in your meetings? Why did you focus on those things?

**-Probe about when meetings occurred. Possible probes include:** How often did you meet to study together outside of class for (course)? Did the frequency of your meetings change at all over the semester? If so, how so, and why? How did you and your classmates decide how often you would meet to study together outside of class? Are there any factors that affected how often you met to study together outside of class for (course)?

**-Probe about what happened between in-person meetings. Possible probes include:** What did you do between in-person study meeting with your classmates? Did you work on your own? Did you work with classmates over the phone, e-mail, text messaging or using other electronic ways? If so, please describe. What did you do? How often?

(2) What was the main goal of your outside of class study meetings?

-What were you and your classmates trying to achieve? Did you discuss this with your classmates? Did you mainly focus on your own achievement or on the achievement of others in your group as well? What was your reason for doing so?

(3) How did you feel about the frequency of your study meetings? For example, do you wish you would have met more or less often to study together? What is your reasoning for this?

**-(If participant was in a group that met less than once per week)** Did you and your classmates ever consider meeting more often, like on a weekly basis? Why or why not? Do you think you and your classmates would benefit more from meeting on a weekly basis? Why or why not?

**-(If participant was in a group the met at least once per week)** Did you and your classmates ever consider meeting less often than on a weekly basis? Why or why not? What benefits do you see from meeting at least once per week with classmates to study together? Are there any drawbacks from meeting at least once per week with classmates?

- (4) Were there factors that made meeting outside of class to study together difficult?  
-**If so**, what were they? How did these factors affect your study meetings? How did you and your classmates get around them? What could NUCLEUS staff do if anything to help students with this?  
-**If not**, what made meeting outside of class time easy for you and your classmates? What could NUCLEUS staff do if anything to support students' study meetings?
- (5) What do you think led you to study with classmates outside of class time for (class) in particular?  
-Was there anything about the particular course that you think led you to study with others for it outside of class? If so, what?
- (6) If you could go back to the beginning of the semester when you were first forming your out-of-class study meetings, what would you do the same? Why? What would you do differently? Why?
- (7) What were the benefits of studying with classmates outside of class? Were there any drawbacks to studying with classmates outside-of-class? If so, what were they? What could NUCLEUS staff do to help prevent such things?
- (8) What were your Fall 2012 courses that you **did not** meet with classmates outside of class to study for? Did you ever consider studying with others in any of these courses outside of class time? Why or why not?  
-What do you think led you to **not study** with classmates outside of class time for these courses?  
-Was there anything about these particular courses that you think led you to not study with others for them outside of class? If so, what?
- (9) Did you receive encouragement from anyone to study together outside of class for any of your Fall 2012 classes? If so, for which classes and by whom?
- (10) Have you studied with classmates outside of class in previous semesters or in high school?  
-**If yes**, please describe for me what these experiences were like. Did any of these past experiences influence how you approached studying with classmates outside of class this past Fall semester? If yes, in what ways?  
-**If no**, what do you think led you to not study with classmates outside of class time in the past?
- (11) What do you think the NUCLEUS program could do to better support students' formation of regularly occurring outside-of-class study meetings?

(12) Is there anything that hasn't come up in our discussion about this topic that you think is important to share?

Thank you again for your time and for sharing your experiences and thoughts with me!

## Appendix I

### INTERVIEW PROTOCOL VERSION 2

Introduction: Thank you for meeting with me to talk with me today! The purpose of our discussion is for me to learn about your experiences and thoughts about meeting with (or not meeting with) classmates to study together outside of class time. What I learn from you will help me complete my doctorate degree! It will also help me understand how to better support students in their outside-of-class peer study activities. This information may inform scholarship as well as future NUCLEUS programming. I am sincerely thankful for your participation and willingness to share your experiences and thoughts with me. Our discussion will take approximately 20 minutes, and I will audio record it so I can review it later—I am not a very fast note taker!

I will ask you several questions. If anything is unclear, feel free to ask me to clarify. If there is a particular question you don't want to answer, you don't have to. You may skip any question you do not want to answer. Everything you tell me is confidential. Your name or any other information that could identify you will not be used in any written documents I create. I'm interested in your opinions based on your own personal experiences—whatever you have to say is fine with me. There are no right or wrong answers. I am here to learn from you. Do you have any questions for me before we begin? Are you OK with our discussion being audio recorded? \*START AUDIO RECORDING\*

(1) According to your survey responses you didn't meet with any of your classmates outside of class time to study together for any of your Fall courses. Is this correct?

(2) Did you attempt to reach out to anyone in your classes about meeting outside of class time to study together?

-**(If yes)** What happened? For which class? What did you do? How did the other person/people respond?

-How would you have liked studying with your classmates to have worked out? Please describe what you would have liked to have done in study meetings outside of class, what you would have liked to focus on, how often you would have liked to meet, etc.

-Why do you think studying with classmates did not work out last semester? What do you think is the most difficult thing about coordinating outside of class study meetings with classmates? What could NUCLEUS staff do, if anything, to help students with this?

**-(If no ask next question)**

(3) Did any of your classmates attempt to reach out to you about meeting outside of class time to study together?

**-(If yes)** What happened? For which class? What did your classmate say or do? How did you respond? What was your reasoning for responding in that way?

**-(If time or scheduling was a problem)** If (time or scheduling) was not a problem, would you have worked with those classmates outside of class to study together? Why or why not? If so, how would you have liked studying with your classmates to have worked out? Please describe what you would have liked to have done in study meetings outside of class, what you would have liked to focus on, how often you would have liked to meet, etc.

**-(If no ask next question)**

(4) Did you communicate with any of your classmates in any of your classes by phone, e-mail, text messaging or other electronic ways about course material?

**-(If yes)** Please tell me about that. In which classes? Who did you communicate with? How? Who reached out to who? What did you communicate about? How often did this occur over the semester? Did you know this person prior to the fall semester? If so, how did you know each other? Did you ever consider meeting in person to work together? Why or why not?

**-(If no)** Why not? Did you ever consider doing so?

(5) What were your (other) classes this past fall semester? Did you ever consider studying with others in any of these courses outside of class time?

**-(If yes)** For which classes? Why for (particular class)? Was there anything about (particular class) that led you to consider studying with others outside of class time for it?

-What factors prevented you from reaching out to others in (particular class) to study together with them outside of class?

-What if others would have reached out to you asking you if you would like to study together with them outside of class, would you have done so? If so, how would you have liked studying with your classmates to have worked out?

Please describe what you would have liked to have done in study meetings outside of class, what you would have liked to focus on, how often you would have liked to meet, etc.

**-(If no)** Why not? For what reasons did you not consider studying with others outside of class for (particular class)? Was there anything about (particular

classes) that led you to **not** consider studying with others outside of class time for it?

**-(If time or scheduling was a problem)** If (time or scheduling) was not a problem, would you have worked with classmates outside of class to study together? Why or why not? If so, how would you have liked studying with your classmates to have worked out? Please describe what you would have liked to have done in study meetings outside of class, what you would have liked to focus on, how often you would have liked to meet, etc.

(6) Did you receive encouragement from anyone to study or work together with classmates outside of class time for your fall courses? If so, for which classes and by whom?

(7) Have you met with classmates outside of class to study together in previous semesters or in high school?

**-If yes**, please describe for me what these experiences were like.

-Did you ever participate in regular study group meetings with classmates where you met at least once per week every week to study together for a course outside of class time? If yes, please describe for me what this experience was like.

-Did any of your past experiences influence your thoughts about studying (or not studying) with classmates outside of class this past Fall semester? If yes, in what ways?

**-If no**, what do you think led you to not study with classmates outside of class time in the past?

(8) In general, what do you think about meeting with other classmates outside of class time to study together or work on coursework together?

-Do you think doing so could be beneficial for you? Why or why not?

-What do you think are the pros and cons of meeting with classmates outside of class to study together?

(9) What do you think the NUCLEUS program could do to better support students' formation of regularly occurring outside-of-class study meetings?

(10) Is there anything that hasn't come up in our discussion about this topic that you think is important to share?

Thank you again for your time and for sharing your experiences and thoughts with me!

**Appendix J**  
**INFORMED CONSENT FORM**

**An Investigation of NUCLEUS Students' Involvement in Outside-of-Class Peer Study Meetings**

**Consent Form**

**Purpose/Description of the Research:**

This study is being conducted by Tara Falcone, graduate student in the School of Education at the University of Delaware and Graduate Assistant of the NUCLEUS program. The purpose of this study is to examine NUCLEUS students' involvement in meeting with classmates to study together outside of class time. Data collected in this research will be used to satisfy work required for completion of a Doctorate of Education degree at the University of Delaware. This research will be used to inform future NUCLEUS programming. Data collected in this research may also be used to contribute to scholarship in higher education.

**Description of Procedures:**

You have been invited to participate in this study because you are a NUCLEUS member. There are 293 students eligible to participate in this study. The study will occur during the end of the fall 2012 semester through the winter 2013 semester. You will receive one online survey. This survey will take about 8-12 minutes to complete. It includes questions about your experiences studying with classmates outside of class time over the fall 2012 semester. By participating in this study you agree to allow the researcher to access and collect data from your academic records including your course taking history, letter grades and GPAs. Additionally, you may receive a request from the researcher to participate in an individual 20-30 minute interview about your experiences studying with classmates scheduled at your convenience. About 15-20 students will be selected to participate in an interview. Participants will be selected based on their survey answers to obtain a wide range of student study experiences for interviews. All interviews will be audiotaped and transcribed for analysis.

**Voluntary Participation:**

Your participation in the survey and interview are completely voluntary. You may skip questions, withdraw your participation at any time, or decide not to participate with no penalty or loss of privileges. Your status as a UD student and as a NUCLEUS member will not be affected by your participation or non-participation in this study.

**Confidentiality:**

Your responses will be confidential. Information will be kept private; your name will not be disclosed. Any identifying information will be replaced with numbers so specific responses will not be attributed to any individual. Only the researcher will be able to access the number coding key. All data will be stored electronically in a password protected file on a password protected computer within a double locked room. The coding key containing identifying information will be an electronic encrypted file stored in a separate password protected folder on the password protected computer. Data will be stored indefinitely. Other than the researcher, Professor Robert Hampel will have access to data. Research results will be reported in aggregate at the group level. Information that personally identifies you, such as your name, will not be used in written reports. Quotes and examples shared by participants may be used in reports, publications and presentations, however pseudonyms will be used. Research results will be shared with other NUCLEUS staff. Results of this research will be used for programming and scholarly purposes only.

**Risks and Benefits:**

There are no known risks or discomforts associated with participating in this research. Although you may not benefit personally, your participation in this research will help the researcher understand how to better support students in their outside-of-class peer study activities. This information may be used to improve future NUCLEUS programming, which you may benefit from.

**Financial Considerations:**

There are no financial costs or benefits associated with participating in this research.

**Contacts:**

If you have any questions about the research study, please contact Tara Falcone at [tfalcone@udel.edu](mailto:tfalcone@udel.edu), 302-561-4694, or Professor Robert Hampel at [hampel@udel.edu](mailto:hampel@udel.edu), 302-831-1651. If you have any questions about your rights as a research participant or any concerns or complaints about the conduct of the project contact: Chair, Human Subjects Review Board, 210 Hulliher Hall, University of Delaware, Newark, DE 19716-1551, 302-831-2137.

**ELECTRONIC CONSENT:**

By clicking on “I agree” to enter the survey you acknowledge that you have read the above information, you are over 18 years of age, and you agree to participate in this research study voluntarily. If you do not wish to participate in this research study, click on “I decline”.

**Before proceeding, print and keep a copy of this consent form for your records.**

Thank you for your willingness to participate!

- I agree
- I decline

If “I decline” Is Selected, Then Skip To End of Survey

**Appendix K**  
**INSTITUTIONAL REVIEW BOARD APPROVAL AND RENEWAL**  
**DOCUMENTS**



RESEARCH OFFICE

210 Hullihen Hall  
University of Delaware  
Newark, Delaware 19716-1551  
Ph: 302/831-2136  
Fax: 302/831-2828

DATE: December 9, 2012

TO: Tara Falcone  
FROM: University of Delaware IRB

STUDY TITLE: [405131-1] An Investigation of NUCLEUS Students' Involvement in Outside-of-Class Peer Study Meetings

SUBMISSION TYPE: New Project

ACTION: APPROVED  
APPROVAL DATE: December 9, 2012  
EXPIRATION DATE: December 8, 2013  
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 7

Thank you for your submission of New Project materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Jody-Lynn Berg at (302) 831-1119 or [jlberg@udel.edu](mailto:jlberg@udel.edu). Please include your study title and reference number in all correspondence with this office.



RESEARCH OFFICE

210 Hullihen Hall  
University of Delaware  
Newark, Delaware 19716-1551  
Ph: 302/831-2136  
Fax: 302/831-2828

DATE: November 12, 2013

TO: Tara Falcone  
FROM: University of Delaware IRB

STUDY TITLE: [405131-2] An Investigation of NUCLEUS Students' Involvement in Outside-of-Class Peer Study Meetings

SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED for Data Analysis  
APPROVAL DATE: November 12, 2013  
EXPIRATION DATE: December 8, 2014  
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 7

Thank you for your submission of Continuing Review/Progress Report materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.



RESEARCH OFFICE

210 Hullihen Hall  
University of Delaware  
Newark, Delaware 19716-1551  
Ph: 302/831-2136  
Fax: 302/831-2828

DATE: November 11, 2014

TO: Tara Falcone  
FROM: University of Delaware IRB

STUDY TITLE: [405131-3] An Investigation of NUCLEUS Students' Involvement in Outside-of-Class Peer Study Meetings

SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED  
APPROVAL DATE: November 11, 2014  
EXPIRATION DATE: December 8, 2015  
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # (7)

Thank you for your submission of Continuing Review/Progress Report materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or [nicolefm@udel.edu](mailto:nicolefm@udel.edu). Please include your study title and reference number in all correspondence with this office.



RESEARCH OFFICE

210 Hullihen Hall  
University of Delaware  
Newark, Delaware 19716-1551  
Ph: 302/831-2136  
Fax: 302/831-2828

DATE: November 9, 2015

TO: Tara Falcone  
FROM: University of Delaware IRB

STUDY TITLE: [405131-4] An Investigation of NUCLEUS Students' Involvement in Outside-of-Class Peer Study Meetings

SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: Approved for Data Analysis Only

APPROVAL DATE: November 9, 2015  
EXPIRATION DATE: December 8, 2016  
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # (7)

Thank you for your submission of Continuing Review/Progress Report materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or [nicolefm@udel.edu](mailto:nicolefm@udel.edu). Please include your study title and reference number in all correspondence with this office.