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A Study of First- and Continuing-Generation College Students' Use of Internet Communication Technologies in Social Capital and Its Contribution to Their Persistence in College

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A Study of First- and Continuing-Generation College Students' Use of
Internet Communication Technologies in Social Capital and Its Contribution
to Their Persistence in College

by

Gail D. Hodge

A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in
Information Systems

Graduate School of Computer and Information Sciences
Nova Southeastern University

2009

We hereby certify that this dissertation, submitted by Gail D. Hodge, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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2009

An Abstract of a Dissertation Submitted to Nova Southeastern University
in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

A Study of First- and Continuing-Generation College Students' Use of Internet Communication Technologies in Social Capital and Its Contribution to Their Persistence in College

By
Gail D. Hodge

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Prior studies have shown that students who are the first in their families to attend college fail to persist in college more so than their continuing-generation (CG) counterparts do. Prior research on this phenomenon has helped to identify various factors that contribute to the lower college persistence of first-generation (FG) students. For example, social capital has been identified as a factor that improves student persistence in college. Prior studies have shown that FG students tend to enter college with lower social capital than their CG student counterparts do. Additionally, while in school, FG students tend not to engage in behaviors that can help them in the creation of social capital. There has been growing research on how Internet communication technologies (ICTs) may be used as a resource in the creation of social capital. Specifically, there have been several studies that have examined how the Internet has provided opportunities for the creation of both bonding (relationships with persons inside one's cultural network, like family and close friends) and bridging (persons outside one's cultural network) forms of social capital.

This study used a non-experimental design approach to compare the differences in technology-enabled bonding (TEBD) and technology-enabled bridging (TEBR) behaviors of FG and CG students. This study also used a predictive design approach aimed at predicting the persistence in college of first-year students based on the contributions of TEBD and TEBR behaviors, as well as socioeconomic status (SES) and high school grade point average (GPA). Finally, this study sought to develop and validate an instrument that could reliably measure the TEBD and TEBR behaviors of college students for use in future studies.

A sample of 316 full-time first- to second-year students at a small, private, college in the Midwestern United States were surveyed on the dimensions of their TEBD (emotional support, access to resources, and sociability behavior) and TEBR

(involvement in campus activities, contact with others unlike themselves, sociability behaviors, and academic activities) behaviors, as well as three dimensions of SES (parental education, parental income, and parental occupations) and high school GPA. Findings of this study showed there was no significant difference in the TEBD and TEBR behaviors of FG and CG students, which in itself is significant. Additionally, this study found high school GPA and one dimension of SES (parental income) to be positive predictors of student persistence in college. This study also found one dimension of TEBD (access to resources), one dimension of TEBR (contact with others unlike themselves), and one dimension of SES (parental occupation), to be negative predictors of student persistence in college.

This study made the following three important contributions: 1) the development of an instrument for measuring TEBD and TEBR behaviors of college students; 2) an investigation of the differences in TEBD and TEBR behaviors of FG and CG students; and, 3) an investigation of key constructs that contribute to student persistence from their first-to-second year of college.

Recommendations for future research were made which included extending this research to 1) include other types of technology communication devices, such as cell phones; 2) examine the contributions of TEBD and TEBR to persistence in college between semesters; 3) improve the methodology for collecting survey data, and 4) investigate if there are significant differences between FG and CG students on the amount of time spent online engaged in social and academic activities, as well as examine if time spent online is a predictor of student persistence in college.

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Introduction

Statement of the Problem

The research problem this study addressed was the low college persistence rates among first-generation (FG) college students (Lohfink & Paulsen, 2005; McCarron & Inkelas, 2006; Pascarella, Pierson, Wolniak, & Terenzini, 2004). Lohfink and Paulsen defined FG college students as the first in their family to have attended college. Conversely, Lohfink and Paulsen defined continuing generation (CG) college students as having at least one parent who had at least a partial college education.

Persistence is generally defined as "the behavior of continuing action despite the presence of obstacles" (Rovai, 2003, p. 1). In higher education, persistence in college results in the successful completion of courses by students within a program of study while continuing towards the goal of degree attainment (Leppel, 2005). Degree attainment is important to students, because having a college degree contributes significantly to the graduates earning potential (London, 1992; McCarron & Inkelas, 2006; Tinto, 1993). College graduates with a bachelor's degree or higher have an earning potential that on average is 35% higher than students who fail to persist in college and never graduate (Crosby & Moncarz, 2006). A study of college persistence rates found that 58% of FG college students persisted in college at either their initial institution or another 4-year institution, compared to 77% of CG college students (Warburton, Bugarin, &

Nunez, 2001). Tinto found that the first year of college is critical since 53% of all non-persisting college students leave the institution before their second year.

Prior studies have attributed lower college persistence rates of FG students to a variety of factors including gender, ethnicity, parental involvement, and high school preparatory courses (Elkins, Braxton, & James, 2000; Lohfink & Paulsen, 2005; McCarron & Inkelas, 2006; Pascarella et al., 2004). Bui (2002) found that FG students were more likely to be an ethnic minority, come from a low-income family, speak a language other than English at home, and had scored lower on the SAT than other students. Additionally, Warburton et al. (2001) reported that when compared to CG students, FG students under-perform academically in the first year of college, as evidenced by lower cumulative GPAs.

Prior studies have also shown that students who academically perform well in high school are more likely to perform well in college (Astin, 2005; DesJardins, McCall, Ahlburg, & Moye, 2002). Harackiewicz, Barron, Taur, and Elliot (2002) found that in general, high school GPA was a significant predictor of college persistence. Students with low high school GPAs are less likely to persist in college than students whose high school GPAs are higher.

Socioeconomic factors, such as low socioeconomic status (SES), have also been associated with lower college persistence rates (Horn & Carroll, 1998; Pascarella et al., 2004). SES is a "finely graded hierarchy of social positions which can be used to describe a person's social position or standing" (Marks, McMillan, Jones, & Ainley, 2000, p.10). For school students, Horn and Carroll, as well as Marks et al., have measured SES on the

dimensions of parental education, parental income, parental occupation, and material possessions in the home.

Another indicator of lower college persistence rates is that of low social capital. Social capital is broadly defined as "the resources that people can obtain from a network of relationships" (Yuan, Gay, & Hembrooke, 2006, p. 26). Lin (1999) defined social capital more narrowly as "resources embedded in a social structure which are accessed and/or mobilized in purposive actions" (p. 35). Low social capital has been found to be correlated to low SES (Myer, Stein, Grimsrud, Seedat, & Williams, 2008). Additionally, other studies, such as Coleman (1988), Duggan (2005), and Pascarella et al. (2004), have shown that students low in social capital fail to persist in school more so than students with high social capital. Kao and Taggart Rutherford (2007) found a correlation between social capital and academic performance as measured by GPA. Research has shown that students can build social capital by academically (immersion into coursework) and socially (involvement in co-curricular activities) integrating into college life (Gatz & Hirt, 2000). However, more research is needed to understand how students acquire the resources needed in social capital development that will improve their persistence in college (Saunders & Serna, 2004).

Studies have shown that social capital is developed through collaboration, which can foster commitment, trustworthiness, and reciprocity (Patulny & Svendsen, 2007; Woolcock & Narayan, 2000; Yuan et al., 2006). Putnam (2000) differentiated between two forms of social capital—bonding and bridging. Bonding refers to relationships that "are by choice or necessity, inward looking and tend to reinforce exclusive identities and homogeneous groups" (Putnam, p. 22). Examples of bonding relationships include

persons in dense networks, such as family members, close friends, and neighbors (Briggs, 1997; Putnam; Woolcock & Narayan). By contrast, bridging relationships are more heterogeneous, "are outward looking, and encompass people across diverse social cleavages" (Putnam, p. 22). Bridging relationships are formed through linkages to external acquaintances, such as distant friends, associates, and colleagues (Briggs; Putnam; Woolcock, 2001).

It is important to distinguish between bonding and bridging forms of social capital, because they often produce different outcomes (Briggs, 1997; Putnam, 2000; Woolcock, 2001). For example, bonding relationships can benefit individuals within their own communities and help people "get by," while bridging social capital helps people "get ahead" (Briggs, p. 112). Prior research by Coleman (1988) has shown that increasing social capital can help students persist in school. According to Coleman, high school students who were more involved in social events, such as church and co-curricular school activities, had a greater chance of persisting in school.

In contrast to the positive consequences of social capital, there can be negative consequences as well (Patulny & Svendsen, 2007; Putnam, 2000). For example, bonding social capital can keep people trapped within their close personal circle of friends and family (Neri & Ville, 2008; Putnam). FG students with only bonding social capital may find it difficult to separate from their home ties in order to persist successfully in college (Duggan, 2005).

The classical work of Tinto (1993) identified three stages of persistence that students progress through in order to improve their likelihood of continuing in college. Tinto's first stage of persistence relates to separation from the communities of their past

(i.e., from bonding relationships such as family, high school friends, and hometown neighbors). Tinto's second stage of persistence relates to transition from the old norms and patterns of behavior of high school to the new norms and patterns of behavior of college life. Finally, Tinto's third stage of persistence relates to incorporation, or the degree to which students academically and socially integrate into the various communities of college life (i.e., into bridging relationships such as those with faculty, administrators, staff, and other college students). Students who fail to move through these three stages risk not persisting in school (Tinto).

Since the time when Tinto (1993) first identified the stages of persistence in college, Internet communication technologies (ICTs) have become a pervasive part of society and of academic life (Gatz & Hirt, 2000; Gordon, Juang, & Syed, 2007; Strayhorn, 2006; Hassini, 2006). Examples of ICTs include email, instant messaging (IM), chat rooms, blogs, and social network Web sites (Gooding & Morris, 2008). ICTs may have the potential to enable students to maintain contact more easily with the communities of their past while enabling students to integrate into college life (Strayhorn). Even with the growth of ICT usage on college campuses, there is still little known as to whether ICTs help or hinder a college students' ability to separate from home and integrate into college life (Gatz & Hirt).

There is growing research that social capital can be developed through socializing activities on the Internet (Resnick, 2002). Resnick defined the term sociotechnical capital as the "productive combinations of social relations and information and communication technology" (p. 3). Additionally, Williams (2006) created and validated an instrument for measuring online and offline bonding and bridging forms of sociotechnical capital. Given

the definition of bonding social capital, and in the context of this study, technology-enabled bonding (TEBD) is defined as the use of ICTs for maintaining and strengthening bonding relationships with family, high school friends, and hometown neighbors. Technology-enabled bridging (TEBR) is therefore defined as the use of ICTs for developing bridging relationships with faculty, administration, staff, and college peers.

Even though a study by Duggan (2005) found that email has a significant positive influence on persistence in college, little is known about how students engage in TEBD and TEBR behaviors for developing social capital. Moreover, very little is known about how such TEBD and TEBR behaviors are related to students' persistence in college. Prior studies, such as Gatz and Hirt (2000) as well as Strayhorn (2006), have noted an increased use of ICTs among college students. These scholars have called for more research to examine the potential benefits on student persistence in college from the use of these technologies. Lohfink and Paulsen (2005) stated that there "has been minimal research on the first-to-second year persistence of first-generation college students at four-year institutions, and very few studies have provided opportunities to explore possible differences in how various factors affect the persistence of first-generation and continuing-generation students" (p. 2). Thus, it appears that additional investigation to address the problem of FG and CG students' persistence in college is warranted.

Research Goals

The main goal of this research study was to develop a model to test differences in the TEBD and TEBR behaviors of FG and CG college students. Secondly, the main goal of this research was to develop an instrument that can assess the contributions of TEBD

and TEBR behaviors, as well as other demographic variables (such as SES and GPA) to student persistence from the first-to-second year college experience. This study addressed three specific goals. The first goal (G1) was to determine if there are statistically significant differences in FG and CG students TEBD behaviors. The second goal (G2) was to determine if there were statistically significant differences in FG and CG students TEBR behaviors. The third goal (G3) was to assess whether TEBD and TEBR behaviors, as well as SES and GPA contributed to student persistence from their first-to-second year of college.

Research Questions

The main research question that this study addressed was: What are the differences between FG and CG students on their TEBD and TEBR behaviors as well as the contributions of such behaviors to the persistence of such students from the first- to second-year experience at a 4-year private college in the Midwestern United States (U.S.). This study addressed three specific research questions:

RQ1   Is there a significant difference between first-year FG and CG students on their TEBD behavior?

RQ2   Is there a significant difference between first-year FG and CG students on their TEBR behavior?

RQ3   What are the contributions of TEBD, TEBR, SES, and GPA to first-year students' persistence at a 4-year private college in the Midwestern U.S.?

Figure 1 provides a conceptual map for this study. RQ1 and RQ2 originate from parental education status and point to TEBD and TEBR, respectively, to illustrate the

examination of the difference between FG and CG students on these specific behaviors.

RQ3 is divided into four parts to illustrate how each of the four independent variables

were examined for their contribution to college persistence from the first-to-second year.
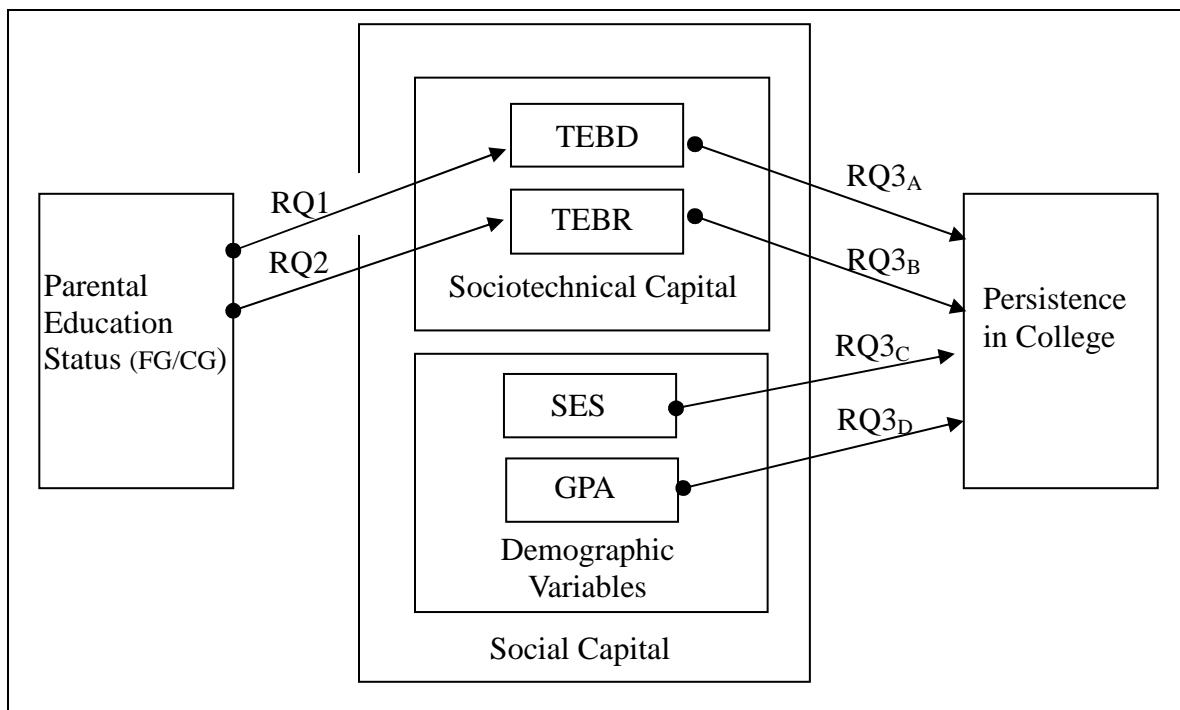
Figure 1. Conceptual Map for the Study

The need for this study was demonstrated by the work of Duggan (2005), who

found that having an email account was a significant predictor of persistence in college.

Duggan reported that FG and CG students with email accounts persisted in college at

equal rates of 94%. Duggan also reported that for students without an email account, 25%

of FG students, and 15% of CG students failed to persist in college. Moreover, Duggan

found that only 26% of FG students had an email account compared to 65% of CG

students. However, Duggan's study was limited, as it failed to address how students used

their email accounts to develop and maintain their social capital. Duggan did not

distinguish between TEBD and TEBR behaviors. Instead, he examined the relationship between FG and CG students' persistence in college to owning an email account.

The need for the study was also demonstrated by the work of Gatz and Hirt (2000) who used an exploratory approach to survey how first-year college students used email for social and academic integration into college life. According to Gatz and Hirt, students used email to communicate with their peers and less so to communicate with faculty. Other studies, such as Smith, Whiteley, and Smith (1999) as well as Boles (1999) found that when the instructor initiated email contact with students, student performance in the classroom and instructor-student interactions improved.

Additionally, the need for this research was demonstrated by the work of Markus (1994) who concluded that email could be used deliberately to avoid unwanted social interactions. For example, some students may use email to deliver negative messages, like arguing over a grade with their professor, or fighting with a friend. Since academic and social integration are important in the development of social capital in students, it was important to have investigated if first-year FG and CG students used ICTs for negative social interactions.

The need for this research was also demonstrated by the work of Williams (2006) who developed an instrument for measuring the contributions of ICTs in building bonding and bridging social capital. This dissertation built on previous research by Duggan (2005), Gatz and Hirt (2000), as well as Markus (1994) by investigating the contributions of TEBD and TEBR behaviors on college persistence rates of FG and CG students. This dissertation also built upon previous research by Williams by investigating

how TEBD and TEBR behaviors contributed to social capital formation of college

students.

Relevance and Significance

The significance of this study was based on identifying and defining two new

terms in social capital literature —TEBD and TEBR behaviors. TEBD and TEBR

behaviors are rooted in the work of Resnick's (2002) theory of sociotechnical capital.

Resnick defined the term sociotechnical capital as a subset of social capital derived from

the use of communication technology. Just as bonding and bridging are two forms of

social capital, TEBD and TEBR behaviors are two dimensions of sociotechnical capital.

The second significance of this study was based on developing an instrument for

measuring TEBD and TEBR behaviors. There has been little attention given to research

on measuring the contributions of TEBD and TEBR behaviors among college students

(Duggan, 2005; Gatz & Hirt, 2000). Additionally, the few prior studies on these behaviors

employed inconsistent methods for measuring the relationship between ICT use and

social capital formation (Duggan; Gatz & Hirt; Mayer & Puller, 2008; Strayhorn, 2006).

For example, Duggan posited that subscribing to an email account was an indicator of

possessing social capital. Whereas, Gatz and Hirt measured social capital, in part, by the

number of emails students sent to persons in their bonding and bridging networks.

Williams (2006) developed and validated an instrument for measuring social

capital derived from the use of online technology. Williams recommended using his

instrument in conjunction with measures of social networks (bonding or bridging

networks) to help establish causal relationships. This study adapted Williams' instrument

to include survey items that measured social capital formation in college students through their engagement in TEBD and TEBR behaviors.

The relevance of this study was based on advancing the knowledge of scholars who study college persistence by assessing the contributions of TEBD and TEBR behaviors on the college persistence of FG and CG students. Scholars, such as Lohfink and Paulsen (2005) as well as Strayhorn (2006) have called for more research on the socioeconomic factors that contribute to FG and CG students' persistence in college. Additionally, while there are a number of socioeconomic factors that influence student persistence in college, it will become increasingly important for higher education administrators to control institutional factors that support student success (Tello, 2007). By accomplishing the extensions of prior research, this study has provided insight for higher education administrators to improve policies and programs designed to increase student persistence in college.

Barriers and Issues

An issue faced in this study was that there has been no clear consensus on how best to measure social capital (Lin, 1999). This, in part, may be due to confusion in literature as to whether social capital is considered a cause or an effect (Williams, 2006). Social capital is both a residual of previous interactions and an enabler of future interactions (Resnick, 2002). Social capital has been measured as an asset for the collective good of the group (Bourdieu, 1986) and as an asset for the benefit of the individual (Coleman, 1988).

In some studies, social capital functioned as the independent variable, as in the work by Coleman (1988) who found that children who attended religious affiliated schools had higher persistence rates than children who attended public schools. Social capital has also functioned as the dependent variable, as seen in Putnam's (2000) work where he found that increased television watching was correlated to a decline in civic engagement, such as volunteerism. Other studies have either used qualitative approaches on social systems (Markus, 1994) or quantitative approaches that employed qualitative indicators (Glaeser, Laibson, Scheinkman, & Soutter, 2000). Additionally, studies of educational outcomes have measured social capital through survey questions on attitudes and expectations of others (Strayhorn, 2006), or indirectly by measuring the number of certain activities thought to produce social capital, such as Gatz and Hirt (2000) who recorded the number of emails sent by students.

In addition to the lack of consensus on how best to measure social capital, there has been little attention in research to measuring the constructs of TEBD and TEBR behaviors of FG and CG students (Resnick, 2002; Williams, 2006). Williams developed an instrument for measuring the bonding and bridging social capital produced from online and offline activities. Even though Williams' instrument was used to examine a broad range of activities, it did not take into account any particular social network, such as friends and family of college students. Williams recommended that any future study using this metric should also measure the social network (e.g., bonding or bridging networks). Therefore, a second problem faced in this study was the creation and validation of an instrument for measuring the TEBD and TEBR behaviors of FG and CG

students, within the context of interacting with family, hometown friends, college peers, faculty, and other college personnel.

According to Resnick (2002), any new instrument will have to be validated "either by showing a correlation with existing metrics or by showing a correlation with the ability of a group to achieve desirable individual or collective outcomes" (p. 666). Resnick cautioned to use existing instruments when available. He also conceded that a new instrument might need to be developed to determine how effective the use of technology can be in developing social capital. In order to create a survey instrument targeted to the social networks of college students, this study drew its survey items from the works of Williams (2006) and other studies such as Elkins et al. (2000), Markus, (1994) as well as Pace (1990).

To further enhance content and construct validity, Straub (1989) recommended using a panel of experts to evaluate survey items. For this study, an expert panel of higher education professors was assembled to evaluate survey items until consensus was reached that the items indeed measured each construct (Straub). Additionally, a pilot study was implemented to address questions that could not be answered by the expert panel, such as the participant's perception of complexity, ambiguity of questions, and protocols for administering the survey. The pilot study also provided insight as to the response rate this study realized, as well as provided strategies for increasing the response rate for the study.

Another issue faced in this study was how to attain a reliable measure of SES. Cabrera et al. (1990) noted that when SES is measured in institutional studies there may not be much variation in the backgrounds of the sampling group and, thus, the

homogeneous nature of the population can mask any effect of SES. Astin (1975)

recommended sampling data from several institutions when SES is an important variable

to be studied.

In addition to reliability, Marks et al. (2000) reported that there are a variety of

different approaches to measuring SES and each has threats to validity. According to

Marks et al., some studies choose to measure SES using a single variable, such as

household income. Other studies measure SES on multiple dimensions measured

separately, or as a composite measure (index) on several combined dimensions. The issue

lies in that when measuring one or more variables, it is not clear which is more useful for

measuring a participant's true SES. Marks et al. noted that a single measure "does not

capture all aspects of socioeconomic background" (p. 13). Other studies have measured

SES based on multiple variables measured separately, such as household assets (wealth),

one or both parents' educational attainment level, total household income, one or both

parents' occupation, social status, health, and area of residence (Entwisle & Antone,

1994; Marks et al.). Yet, according to Marks et al. (2000), even though using multiple

variables to measure SES is more desirable than a single measure, there are still

difficulties with this approach.

One issue with the multiple variable approach, is whether SES is defined by the

characteristics of the father, mother, or some combination of the two (Marks et al., 2000).

Entwisle and Astone (1994) noted there is tension in the field when it comes to

identifying the member of the household whose identifying characteristics has the most

influence on the economic well-being of the other members in the household. Entwisle

and Astone wrote, "Identifying the adult most responsible involves making some

simplifying assumptions about highly contentious issues" (p. 1525). For example, prior studies have collected data on the father's occupational status and mother's education level as dimensions of SES (Marks, 2008). Yet, today many women have entered the workforce whose occupation either supports the household or exceeds the father's occupation status (Kalmijn, 1994). Yet, maternal workforce effects are difficult to measure. Kalmijn explained that women in the workforce often meant that childcare was left to those most likely to be less educated than the mother. In order to assess the effects of maternal employment, Kalmijn compared educational outcomes of children of non-employed mothers to children of employed mothers with different levels of income. Kalmijn found that in dual-career families the mother's educational attainment and occupational status had a substantial effect on their children's education that is about as strong as the father's. Marks, however, found that the mother's occupational status did not have a strong effect on their children's educational attainment. When measuring SES, Hauser (1994) recommended collecting data (educational attainment and occupational status) on the head of the household, regardless of gender.

Marks et al. (2000) also found difficulty in developing composite measurements of SES. According to Marks et al., there can be difficulty in collecting reliable data for each of the components, determining how to weigh each, and interpreting the resultant scales. In some cases, a household may have high income and low parental educational attainment. In other cases, the opposite may be true. According to Marks et al., it becomes difficult to determine which variable in a group is to be given higher weight. This study measured SES on multiple dimensions measured separately, as it appears from literature to invite the least threat to validity and reliability.

A potential barrier this study faced was attaining a significant response rate to the Web-based survey from students who did not re-enroll in school from the first-to-second year. An aggregated list of email and home addresses was obtained from the institution on all first-year students who do not return their second year. These students were contacted and invited to participate in the study. One concern with this approach was that many of these non-returning students did not have an email address on file. Reminder emails were sent to those with personal email addresses on file, as well as letters were sent to their homes. Additionally, there was no way of knowing if non-returning students would respond to emails and letters. That is, in some cases, some of these students were suspended from the institution for academic reasons and wished not to be involved in the study. To entice non-returning students to complete the survey, this study followed Fowler's (2002) recommendation by offering a modest monetary incentive to improve the response rate.

Limitations and Delimitations of the Study

A limitation of this study was that data was only collected on students who completed one full year of academic study. Data on students who failed to persist between the fall and spring semesters of their first year of college was not gathered. It is possible there are differences in the between-semester non-persisters' TEBD and TEBR behaviors and the non-persisters who completed a full year of school. Therefore, the findings of this study cannot be generalized to the between semester non-persisting students.

The second limitation of this study was the timeframe in which the survey was given in relationship to when the participants were last enrolled in classes. Creswell (2005) noted that the time that passes between the beginning and end of an experiment may threaten the internal validity of a study. This study surveyed participants on, or shortly after, the 10th day of enrollment in their second year in college. This placed the participants approximately three months out after having attended their last semester of classes. This lapse in time may have inhibited the participants' recall of their TEBD and TEBR behaviors. Participants may not have been as accurate in answering the TEBD and TEBR survey items had they taken the survey earlier (closer to when they last attended classes).

The reasons why this study waited until the 10th day of enrollment in the new academic year was twofold. First, the highest percentage of non-persistence in school occurs between the first-to-second years of college (Tinto, 1993). Students not returning between academic years represents non-persisters who failed to persist for both voluntary (e.g., transfer to another school, health problems, lack of funds) and involuntary reasons (e.g., suspended from school) (Hackman & Dysinger, 1970; Pascarella & Terenzini, 1980). Second, the 10th day of the academic year is the official enrollment cut-off date for the institution that this study investigated. Students not registered for classes by the 10th day of school were classified as non-returning students. Surveying the non-returning students further identified participants who transferred to another college (*Persisters*) from those who failed to persist in college altogether (*Non-persisters*).

A delimitation of this study was that it intentionally limited its focus to examining only the use of ICTs instead of a broader set of communication technologies. Students

may have used other communication methods to stay in contact or to reach out to new networks of people. For example, the use of cell phones, particularly text messaging, has become a pervasive form of communicating among college students (Harley, Winn, Pemberton, & Wilcox, 2007; Ling & Baron, 2007). Some students may choose to use cellular technology instead of ICTs for communicating with persons in their bridging and bonding networks. Therefore, the use of texting and other non-Internet communication mediums by students at the expense of using ICTs may have confounded the results of this study. Future studies may wish to consider adapting this study to include cellular technology.

This study used an institutional approach and, therefore, any findings generated are limited to a similar setting and treatment (Creswell, 2005). That is, this study focused on first- to second-year students attending one, small, private, 4-year school in the Midwestern U.S. This study utilized a survey instrument designed to examine the TEBD and TEBR behaviors of students in this single institution. Therefore, any conclusions generated by this study may only be generalized to students completing this survey with populations similar to the one sampled in this study.

Definitions of Terms

Academic Integration – One of two components of the incorporation stage in Tinto's (1993) theory of college persistence. Tinto defined academic integration as the formal education of a student whose activities center around the classroom and laboratories of the institution and involves various faculty and staff.

Continuing-Generation (CG) - Continuing generation college students are defined as students with at least one parent who had some type or quantity of college education (Lohfink & Paulsen, 2005).

Bonding Social Capital – Bonding refers to the type of social capital that is developed through relationships that "are by choice or necessity, inward looking and tend to reinforce exclusive identities and homogeneous groups" (Putnam, 2000, p. 22). Examples of bonding relationships include persons in dense networks, such as family members, close friends, and neighbors (Briggs, 1997; Putnam; Woolcock & Narayan, 2000).

Bridging Social Capital – Bridging refers to the type of social capital that is developed through relationships that are more heterogeneous and "are outward looking and encompass people across diverse social cleavages" (Putnam, 2000, p. 22). Bridging relationships are formed through linkages to external acquaintances, such as distant friends, associates, and colleagues (Briggs, 1997; Putnam, 2000; Woolcock, 2001).

First-Generation (FG) – First-generation status is defined as college students whose parent or guardian has had no post-secondary educational experience beyond high school (Lohfink & Paulsen, 2005).

Incorporation Stage – Necessary third stage of Tinto's (1993) college persistence theory that posits that college students learn to integrate both socially and academically into college life in order to move successfully towards persistence in college.

Internet Communication Technologies (ICTs) – Devices used for communicating with individuals or groups of people by means of the Internet, such as email, IM, social networking Web sites, and blogs.

Persistence – In higher education, persistence in college is the successful completion of courses by students within a program of study while continuing towards the goal of degree attainment (Leppel, 2005). For purposes of this study, persistence in college will be measured as a student's continuous enrollment, at the same or a different institution, from the first- to second-year.

Separation Stage – This is a necessary first stage of Tinto's (1993) college persistence theory that posits that college students learn to separate from communities of their past in order to successfully move towards persistence in college.

Social Capital – Social capital is defined as "resources embedded in a social structure which are accessed and/or mobilized in purposive actions" (Lin, 1999, p. 35).

Socioeconomic Status (SES) – Socioeconomic background factors related to parental education, occupation, income, and wealth (Horn & Carroll, 1998; Marks et al., 2000; Rowan-Kenyon, 2007).

Sociotechnical Capital – Term defined by Resnick (2002) to describe the development of social capital as the "productive combinations of social relations and information and communication technology" (p. 3).

Social Integration – One of two components of the incorporation stage identified in Tinto's (1993) theory of college persistence. Tinto defined social integration as the formal and informal social system of the college that centers about the daily lives and personal needs of students. According to Tinto, examples of formal

systems would include co-curricular activities such as athletics, sororities, fraternities, clubs, and other types of organizations. Examples of informal systems would include student interacting with other students in residence halls, cafeterias, hallways, and other meeting places on campus.

TEBD$_{AR}$ –A separation behavior measured as the extent to which students access the resources (AR) of family and high school friends, as well as one of the three dimensions of TEBD.

TEBD$_{ES}$ – A separation behavior measured as the extent of emotional support (ES) students receive from family and high school friends, as well as one of the three dimensions of TEBD.

TEBD$_{SB}$ – A separation behavior measured as the positive and negative sociability behaviors (SB) students engage in when interacting with family and high school friends, as well as one of the three dimensions of TEBD.

TEBR$_{AA}$ – An academic integration behavior measured as the extent students engage in academic activities (AA) and one of the four dimensions of TEBR.

TEBR$_{CA}$ – A social integration behavior measured as the extent students get involved in campus activities (CA) and one of the four dimensions of TEBR.

TEBR$_{SB}$ – A social integration behavior measured as the positive and negative sociability behaviors (SB) students engage in when interacting with others on campus and one of the four dimensions of TEBR.

TEBR$_{UY}$ – A social integration behavior measured as the extent students make connections to others unlike them (UY) and one of the four dimensions of TEBR.

Technology-enabled bonding (TEBD) – This is a term used to describe the use of
Internet communication technologies (ICTs) for maintaining and strengthening
bonding relationships with family, high school friends, and hometown neighbors.

Technology-enabled bridging (TEBR) – This is a term used to describe the use of
Internet communication technologies (ICTs) for developing bridging relationships
with faculty, administration, staff, and college peers.

Transition Stage – Necessary second stage of Tinto's (1993) college persistence theory
that posits that college students learn to shed the old norms and behaviors of high
school and adopt the new norms and behaviors of college life in order to move
successfully towards persistence in college.

Summary

Prior research has shown that students who are the first in their families to attend
college often encounter major hurdles in the college-going process. In comparison to CG
students, FG students experience greater challenges when it comes to persisting in
college. Past research has shown there to be many underlying causes that can influence
student persistence in college. Yet, while there have been "many programs, courses and
new structures that have reduced student dropout to some degree, they have neither
yielded consistent results nor markedly changed the overall retention picture" (Barefoot,
2004, p. 16). Braxton, Brier, and Steele (2007) reported that despite the long history of
research on student departure, there has been little gain in improving college persistence
rates. Specifically, the college persistence rates of FG students continue to lag behind CG
students.

There is evidence that social capital improves college persistence rates (Westwood & Barker, 1990; Pascarella et al., 2004; Wells, 2008). Additionally, there is growing evidence that the Internet provides a rich resource for the creation of social capital (Duggan, 2005; Gatz & Hirt, 2000; Resnick, 2002; Williams, 2006). This study examined the contributions of ICT-related behaviors and the potential impact they had on the persistence of full-time college students from their first- to second-year. Specifically, this study examined the contributions of technology-enabled bonding (TEBD) and technology-enabled bridging (TEBR) behaviors, as well as SES and GPA on college persistence of full-time students, from their first- to second-year experience in a small, private, 4-year Midwestern U.S. college.

The significance of this study was that it provided insight on factors that are predictive of improving students' persistence in college, particularly through the use of ICTs. Additionally, this study hoped its findings would benefit higher education administrators who formulate policies and programs designed to improve student persistence in college. Because this study was limited to a small sample of students who attended a private, 4-year college in the Midwestern U.S., care must be given not to generalize its findings too broadly.

Chapter 2

Review of the Literature

Introduction to the Literature Review

The purpose of this literature review was to provide background information for this study. This literature review examined four major theoretical constructs that were used as the basis for this study. These constructs included college persistence, FG college students, social capital, and sociotechnical capital theories.

The literature review begins with an explanation of Tinto's (1993) theory on college persistence as well as challenges to his theory, specifically by Tierney (1992) and Tucker (1999). Past research, such as Kiser and Price (2007), Lohfink and Paulsen (2005), as well as Tinto, (2006), have made it clear that there are many factors that influence college persistence. This literature review examines several of these studies and the findings from their works. Specifically, studies, such as Astin (2005), Fischer (2007), as well as Cavote and Kopera-Frye (2006), on student background characteristics such as high school preparatory coursework, high school GPA, gender, race, ethnicity, SES, and parental support, are reviewed. This literature review also examines studies conducted by Astin (1975, 2005) and Cabrera et al. (1992), on post-enrollment factors (such as goal and institutional commitments) and how these have affected student persistence in college.

A second major research stream reviewed is that of FG status. There has been a growing body of research on the influence of parental education status on college persistence. Prior studies, such as HERI (2007b), Lee, Sax, Kim, and Hagedorn (2004), as well as McCarron and Inkelas (2006) are reviewed in order to identify the demographic characteristics of FG students and the challenges they face in transitioning from high school to college. Additionally, this literature review discusses the work of Nuñez and Cuccaro-Alamin (1998) who compared the college experiences of FG and CG students on their persistence during college, degree attainment, and career outcomes.

Social capital theory is the focus of the third major research stream reviewed. An overview of the theoretical perspectives of social capitalist theorists, such as Bourdieu (1986), Coleman (1988) and Lin (1999), are provided. This review also discusses studies that have shown how social capital has helped students persist in school (Westwood & Barker, 1990). Additionally, this literature review discusses the theoretical perspectives of Putnam (2000) and Granovetter (1973), as well as others, who further differentiated social capital into its bonding and bridging forms.

This literature review continues with a discussion on how technology, particularly the Internet, can be a conduit for the creation of social capital. An explanation of Resnick's (2002) theory of sociotechnical capital is provided as the fourth major theoretical construct used in this study. Various scholarly works, such as Lin (1999), Markus (1994), as well as Wellman, Quan Haase, Witte, and Hampton (2001) who examined the role the Internet has played, and continues to play, in sociotechnical capital development, is reviewed. Specifically, studies such as Duggan (2005) as well as Gatz and Hirt (2000) on email usage by college students and persistence in college are

discussed in order to provide a more detailed view of social capital derived from Internet access. Additionally, this literature review examines the contribution by Williams' (2006) who created and validated an instrument for measuring bonding and bridging forms of sociotechnical capital.

The literature review concludes with a discussion of synchronous and asynchronous types of ICTs. A brief discussion on findings from prior ICT research, such as Fu, Liu, and Wang (2008), Herring, Scheidt, Wright, and Bonus (2005), as well as To, Liao, Chiang, Shih, and Chang (2008) on the use of ICTs among college students is provided. Specifically, studies on email, social networking Web sites, Web blogs, chat rooms, and IM are discussed.

Persistence in College

Introduction to College Persistence Theory

One of the most widely studied phenomenons in higher education has been the failure of students to persist in college (Barefoot, 2004; Tinto, 2006; Tierney, 1992). Empirical studies on college persistence has spanned over 80 years, dating as far back as Johnson's (1926) work (Braxton et al., 2007). Tinto is one of the more prominent scholars noted in studies on college persistence with well over 400 other studies and 170 dissertation citations that have referenced his theory on college persistence (Braxton, Sullivan, & Johnson, 1997). Tinto's (1993, 1975) theoretical framework has been used to help provide insight as to why some students persist towards degree attainment while others decide to depart the college scene altogether.

Care needs to be given so as not to fall into the trap of stereotyping students when investigating the underlining determinants of college persistence (Tinto, 1993). Explaining the determinants that affect a college student's decision to persist or depart can be quite complex (Kalsner, 1991; Leppel, 2005). For example, some students will fail to persist due to academic dismissal while others may leave because of inadequate financing, institutional misfit, mental health issues, or any combination of these or other reasons (Kalsner). According to Tinto, quite often, there is not just one single reason as to why a student decides to persist or depart from college. Tinto observed that studying the persistence phenomenon has proven in itself to be a challenge. Prior works of Tinto and others, such as Astin (1975, 2005), Fischer (2007), as well as Kiser and Price (2007) have helped to identify some of the characteristics and interactions of and between students and their institution that play a role in college persistence. Several of these underlying factors will be discussed in the forthcoming sections.

Definition of College Persistence

Before discussing factors that influence college persistence, it is first necessary to provide a clear definition as to what college persistence means. Even though there are numerous studies on college persistence, they do not consistently use the same definition (Braxton et al., 2007; Tinto, 1993). For example, past studies have used terms such as persistence, retention, attrition, departure, withdrawal, dropout, and stopout to help explain why students stay in or leave college (Barefoot, 2004; Escobedo, 2007; Tinto, 1975). There are subtle, yet distinct differences between these terms. For example, the term *retention* is a term institutions use commonly to account for their enrollment

numbers (Escobedo). That is, retention refers to the rates (or percentages) at which an institution is able to retain its students. *Attrition* is generally defined as meaning the opposite of retention. Attrition is another commonly associated term used by institutions (as in attrition rate) to refer to a student's voluntary or involuntary leaving from the college system (Bean, 1980; Muse, 2003). The term, *dropout,* which has also been used to refer to leaving the college system, is a term more associated with an action the student takes (Muse; Tinto). Another term, *stopout*, has been used in literature to describe the action of a student who has temporarily left the institution for a specified period (e.g., four months) with the intention of returning (Horn & Carroll, 1998; Ishitani, 2003).

Persistence has the opposite meaning of departure. That is, *persistence* is the act of staying, or continuing in the education system (Escobedo, 2007), whereas *departure* is the act of leaving (Tinto, 1975). Like persistence, the term departure can have multiple meanings. For example, Levy (2007) defined departure as a student's failure to complete a course. Whereas, Tinto explained that departure can refer to a student either leaving the institution (such as transferring to another school) or leaving the college system altogether (such as in the case of dropout). Like Tinto, Elkins et al. (2000) used the term *withdrawal* when referring to leaving school. Therefore, it becomes necessary to make a clear distinction between these three departure outcomes so as not to produce contradictory or misleading findings (Tinto).

Institutional departure or (institutional withdrawal) is defined as the act of leaving one's initial institution, perhaps, but not necessarily, in pursuit of an academic program of study at another school (Tinto, 1975, 1993). Tinto (1975) posited that institutional departure should not be confused with the student's failure to persist in their academic

studies. On the contrary, students may have transferred to another institution to enroll in a different program of study or to look for a more academically challenging or less costly school (Paulsen & St. John, 2002; Wohlgemuth, Whalen, Sullivan, Nading, Shelley, & Wang, 2006). In some circumstances, students may reassess their academic goals and choose to move from a 2-year program of study to a 4-year program or vice versa (Tinto, 1975). Tinto (1975) wrote, "Where expectations have diminished, downward transfer may be likely when such transfers are possible.… Where expectations have been enhanced as a result of one's experience in college, upward transfer may be the outcome" (p. 97).

Adelman (1999) found that nearly 60% of students attend more than one institution in pursuit of their undergraduate degree. Adelman also noted that the number of institutions a student attended had no effect on degree completion. Leppel (2005) postulated that students who found the college-going experience more appealing were more likely to transfer over dropping out. Therefore, according to Tinto (1975) and Wells (2008), students who transfer to another school should be classified as persisters, even though they are institutional departers. Adelman also posited that findings from studies that examine the underlying reasons for institutional departure could help shape policies and programs specific to the institution.

The second type of departure outcome is system departure. *System departure* (or system withdrawal) is the examination of the underlying reasons why students leave the educational system altogether (Tinto, 1975, 1993). Studies on system departure examine both the voluntary and involuntary reasons as to why students fail to persist in college. System departers are thereby defined as non-persisters (Wells, 2008).

For purposes of this study, persistence in college is defined as the continuous enrollment in a program of study within the college system with the goal of degree attainment. Whether a student remains at the same institution or transfers to another, they will be classified as a persister. Non-persistence is thereby treated synonymously with system departure and will refer to a student's failure to return to school altogether.

Tinto's Theory on College Persistence

Tinto (1993) based his theory of college persistence from the work of Van Gennep (1909/1960). Van Gennep, a 20th century Dutch anthropologist, focused his research on various cultural rituals and ceremonies (Elkins et al., 2000). Van Gennep coined the phrase "rites of passage" to characterize three distinct stages youth pass through as they mature into adulthood. These stages include separation, transition, and incorporation. Each stage is marked by a change in the patterns of interactions between the individual and other members of their culture. Van Gennep encouraged other researchers to extend his work to include circumstances that involve the movement of individuals from one culture to another. Subsequently, Tinto extended Van Gennep's rites of passage theory to the process by which students establish membership into the community of their college. That is, Tinto viewed college as an institution, designed as a rite of passage, which functions similarly to ritualized cultures.

In extending Van Gennep's (1909/1960) rites of passage theory, Tinto (1993) also defined separation as the first stage of college persistence. According to Tinto, as well as Elkins et al. (2000), separation occurs prior to and at the outset of the first year experience. In the separation stage students begin to disassociate themselves from the

communities of their past, such as family and high school friends (Elkins et al.; Tinto). Tinto characterized separation from home as a necessary step, as it helps students shed the norms and values of their past as they move towards adopting the norms and values of college life.

Separating from one's home is often stressful and not without physical and emotional pain for both the student and his or her family. London (1992) wrote, "such passages inevitably call into question the very meaning of allegiance and love, over which people can intensely disagree" (p. 6). Family members who cannot fully accept the changes in behavior and values taking place in the student's new life can potentially sabotage the student's effort at succeeding in college (Tinto, 1993).

Students who successfully negotiate the separation stage are ready to move towards the transition stage in the rites of passage. Transition is the period that vacillates between the separation and incorporation stages (Tinto, 1993). Tinto referred to transition as "a period of passage between the old and the new, before the full adoption of new norms and patterns of behavior and after the onset of separation from old ones" (p. 97). Tinto explained that the transition stage can be a confusing period for students in that they are neither bound to the associations of their past, nor have they been fully incorporated into the academic and social norms of college life. Tinto posited that the degree to which a student manages the transition stage is often dependent on the degree of difference between the norms and patterns of behavior of a student's home life and that of their college life. Students who come from backgrounds quite different from college may find the transition stage difficult to manage (Pascarella et al., 2004). London (1992) wrote of students from diverse backgrounds, that they "live and share in the life and

traditions of two distinct cultures, never quite wanting or willing to break with their past, even if permitted to do so, and never fully accepted, because of prejudice, in the culture in which they seek a place" (p. 7).

For students from families where one or both parents have attended college, transitioning to college life can be easier, as it is more reflective of the norms and values under which they were raised (McCarron & Inkelas, 2006). McCarron and Inkelas wrote, "Parents who have earned a college degree are more likely to transmit the value of higher education to their children in the form of knowledge-based resources such as guidance with SATs and college applications" (p. 536). Additionally, college-educated parents may "know how to acquire the means to finance their children's college education" (Lee et al., 2004, p. 2).

The final stage in Tinto's (1993) theory of college persistence is that of incorporation. In the incorporation stage students establish themselves as fully integrated members of the college community by exemplifying the patterns of interactions of its membership. According to Gatz and Hirt (2000), once the new norms and behaviors have been fully adopted, students are said to have achieved incorporation, "meaning the degree to which [they] are academically and socially integrated into campus life" (p. 300). Furthermore, it is the student's ability to successfully integrate into the social and academic structures of the institution that influences his or her decision to persist or not persist in college (Tinto).

Tinto (1993) defined *social integration* as the engagement by students in the formal and informal social opportunities of the college that center about their daily lives and personal needs. Examples of formal social opportunities include student participation

on athletic teams, clubs, fraternities, sororities, and other co-curricular programs (Astin, 1999). Examples of informal social opportunities of college include the recurring interactions among students that go on in residence halls, cafeteria, hallways, the library, and other meeting places on campus. Attinasi (1989) found social integration to be important because it assists students in developing specific strategies for negotiating the physical, social, and academic geographies of campus life. The degree to which a student integrates socially in school can have varying effects on his or her persistence in college.

A second component of the incorporation stage is that of academic integration. Tinto (1993) defined *academic integration* as the adjustments students undergo to the rigor and demands of the formal educational requirements of the institution. Tinto wrote, "Its [academic integration] activities center about the classroom and laboratories of the institution and involve various faculty and staff whose primary responsibility is the education of students" (p. 106). Prior research, such as Pascarella and Terenzini (1980), have shown that students, who make connections with faculty, whether regarding coursework or assisting in research projects, persist in school at higher rates than students who have less contact with faculty.

Academic integration is often operationalized in research studies by examining the student's academic performance (Gatz & Hirt, 2000; Pascarella, Terenzini, & Wolfle, 1986). For example, cumulative grade point average is commonly used as an indicator of a student's adjustment to the academic rigor of college (Cabrera et al., 1992; DesJardins et al., 2002; Horn & Carroll, 1998). The literature discussed by Kiser and Price (2007) suggested that the likelihood of academic performance, and ultimately college persistence, "is enhanced through an increase of a student's academic self-confidence,

achievement motivation, academic related skills, and goal and institutional commitment"
(p. 424).

Students who are able to navigate successfully through the three stages of
persistence in college have an increased probability of reaching degree completion
(Tinto, 1993). However, Tinto noted that not all students pass through the three stages as
distinctly sequenced as he defined them. For some students these stages may overlap or
occur in a different order. For example, some students may manage the separation stage
quickly, while others labor through it throughout their entire college experience. Further,
Tinto acknowledged that even though many students pass successfully through these
three stages, their experiences along the way are often quite different given their unique
backgrounds. For example, minority students may experience academic and social
integration quite differently than students from the dominant culture (Fischer, 2007;
Tierney, 1992).

Challenges to Tinto's Theory on College Persistence

Tinto's (1993) theory on college persistence has been challenged by other
researchers, such as Tierney (1992) and Tucker (1999). Tierney claimed that Tinto
misrepresented Van Gennep's (1909/1960) rites of passage theory in explaining college
persistence. Specifically, Tierney wrote that Tinto's theory had potentially harmful
practical implications for racial and ethnic minority students. That is, Tinto's model of
college persistence did not take into consideration the cultural differences of racial and
ethnic minority students. Tierney criticized Tinto for wrongly trying to explain how one
culture's rituals were used to initiate members of a different culture. For example,

according to Tierney, Tinto would have his theory explain how "individuals from one culture, such as Apache, are to undergo a ritual of another culture, such as Anglo" (p. 609). Specifically, Tierney criticized Tinto for applying the rites of passage theory to explain how minority students persist in a predominantly white Anglo college.

A second criticism by Tierney (1992) is that Tinto (1993) claimed his theory is rooted in anthropology yet failed to consider group characteristics. Tierney argued that Tinto applied an individualistic approach to account for student persistence in college, and did so without any accommodation for group characteristics. For example, should students from a different cultures fail to persist in college, the failure is perceived as their inability to adequately separate from their past in order to transition and incorporate into the new culture of college. Tierney wrote, "Up until very recently in American higher education colleges and universities were designed to educate a clientele that was overwhelmingly composed of white males who came from middle and upper classes" (p. 608). Tierney posited that the institution must share the accountability for failing to provide the institutional ethos that accept and provide for cultural diversity. Rather than looking at the individual's failure to acclimate to the institutional ethos (predominantly white Anglo norms), institutions need to find ways of maintaining culturally diverse students by developing programs and policies that allow transition within cultures. Tierney concluded that an alternate model "is to conceive of universities as multicultural entities where difference is highlighted and celebrated" (p. 604).

Tierney's (1992) concerns have been noted by others such as Gloria, Robinson Kurpius, Hamilton, and Wilson (1999), Flowers (2002), and Sanchez (1997). The literature discussed by Sanchez (1997) argued that investigations of minority students in

higher education have typically defined groups too broadly. For example, aggregation of data collected on Chinese, Filipino, Japanese, Asian Indian, Korean, and Vietnamese are grouped as Asian Americans, even though they "differ substantially in socioeconomic characteristics, cultural backgrounds, and historical differences" (Sanchez, p. 680). Should data be collected specific to groups, group differences and cultural identities could be taken into account when examining the results. Gloria et al. suggested that African Americans attending predominantly White colleges "experience significantly greater levels of overt racism than do their counterparts at predominantly African American colleges" (p. 257). To further support Tierney's criticisms of Tinto (1993), Flowers, found that African American students who attended historically black colleges and universities (HBCU) experienced greater gains in college over and above that of their African American peers at predominantly White institutions (PWI).

Tucker (1999) has also been critical of Tinto's (1993) theory on college persistence. Tucker pointed out several inconsistencies in Tinto's words. For example, Tucker took exception when Tinto used the term *persistence* to equate to *success,* while *departure* stood for *failure*. According to Tucker, even though Tinto explained that non-persistence (departure from school) was not the same as dropout, Tinto still proceeded to use a strong term like *suicide* as analogous to non-persistence. Tucker wrote that comparing "suicide to school leaving focuses attention on departure as a failing, a serious failing. Not only that but the failing is one of great desperation" (p. 166). Bean (1980) too noted that there is insufficient evidence for Tinto to develop the theoretical basis for equating non-persistence to suicide. Tinto intended his analogy to suicide to be of a predictive rather than descriptive theory of non-persisting behavior.

Tucker (1999) also found fault in Tinto's (1993) methodology of analyzing data collected through surveys. Tucker pointed out that even though Tinto admitted there are many factors at play when assessing the underlying reasons why students persist or depart from college; Tinto still proceeded to formulate conclusions from survey data. Tucker found Tinto's words to contradict his actions. For example, Tinto wrote, "In many respects departure is a highly idiosyncratic event, one that can be fully understood only by referring to the understandings and experiences of each and every person who departs" (p. 37). Tucker criticized Tinto for proceeding to draw conclusions on the quantitatively collected data, when instead he should have used a qualitative approach to study student persistence in college. Tucker failed to note, however, that Tinto further clarified his statement. Tinto noted that in spite of the individual experience, there are pertinent common themes that emerge from the diversity of behaviors which pertain to the "dispositions of individuals who enter higher education, to the character of their interactional experiences within the institution following entry, and to the external forces which sometimes influence their behavior within the institution" (p. 37).

Tucker's (1999) own theory of successful college transitions focused on student vision and sense of community. Tucker used an ethnographic approach to examine how students transition through college. Tucker found that students who had a more detailed vision of their futures had an easier time in transitioning through college compared to those students who had no clear path visualized. Tucker also found that students who had the greatest sense of belonging to their new college had an easier time of transitioning over students who did not share the same feelings. That is, students who saw themselves as not belonging to the college community seemed more aware that they did not fit in

their new environment. Tucker's work on vision and sense of community appear to be similar in definition to that of goal and institutional commitment, which Tinto (1993) and others, such as Cabrera et al. (1992) and Bean (1980), have studied as variables that influence college persistence.

In spite of Tierney's (1992) and Tucker's (1999) criticisms of Tinto (1975), in more recent years Tinto (2006) has come to concede the shortcomings of his own theory of persistence in college. Tinto acknowledged the many studies that have come to demonstrate the differences of diverse populations in their approach to the separation stage. Specifically, Tinto acknowledged that certain ethnic minority students may need to maintain close relationships with their past communities, and that separating from home is not necessary in order to persist through college. For example, a study by Gloria and Rodriguez (2000) showed that Hispanic students tended to maintain close family ties as they persisted through their academic studies.

Tinto (1975) also admitted his model failed to take into account adult students, and students attending non-residential campuses, where separation from communities of the past may be less relevant. Bean and Metzner (1985) described the typical non-traditional student as older than 24, commutes to school, and is enrolled part-time. Nontraditional students "will not become socialized to the values of their student peers or faculty members because their net climate of socializing agents remains largely what it has been" (Bean & Metzner, p. 489). In spite of the criticisms of Tinto's theory on college persistence, his work has encouraged educators to acknowledge the academic and social dimensions of student success in higher education and the complexity of the retention problem (Barefoot, 2004).

Background Characteristics and Student Persistence in College

Prior research has shown that even before stepping foot on campus students bring with them background characteristics that can be predictive of how they may fair in the college environment. Some of these background characteristics include high school preparatory courses, high school GPA, gender, race, ethnicity, SES, parental education status, and psychological type (Astin, 2005; Cavote & Kopera-Frye, 2006; Fischer, 2007; Terrell, 2005). The sections that follow will look more in-depth at some of the research findings on these various background characteristics, which have been shown to be predictive of student persistence in college.

High School Preparatory Courses and Persistence in College

High school preparatory courses have historically been good predictors of college success (Astin, 2005; Choy, Horn, Nuñez, & Chen, 2000). For example, Choy et al. found that students who took more rigorous high school courses were more likely to enroll in college. Based on a data set taken from the 1988 National Educational Longitudinal Study (NELS), Choy et al. found that 76% of the 39% of students who took advanced mathematics in high school, went on to enroll in college. Even still, the odds of students enrolling in college increased for those who were exposed to algebra before high school. That is, students who took algebra in the eighth grade (22% of high school graduates) were more likely to have taken higher level mathematics in high school, which in turn, increased their odds of going on to college. Astin used a step-wise linear regression analyses to measure the predictability of entering freshman's academic preparation on degree completion. Astin found that the years of foreign language study and years of

physical science study taken in high school had regression weights of ß = .05 and .03,

respectively, as well as a regression weight of (ß = .03) for hours per week spent studying

or doing homework. All three academic factors were positive predictors of persistence in

college. Additionally, Astin found all betas to be highly significant statistically at *p* <

.0001.

High School GPA and Persistence in College

Prior studies have also shown high school GPA to be one of the best predictors of

persistence in college (Astin, 2005; Bryson, Smith, & Vineyard, 2002; Harackiewicz et

al., 2002; Ishitani, 2003; Zheng, Saunders, Shelley, & Whalen, 2002). This is perhaps

because past behavior is often a good predictor of future behavior (Bentler & Speckart,

1979). Students who academically perform well in high school are more likely to perform

well in college (Astin, 2005; DesJardins et al., 2002). Likewise, students who

academically perform well in college are more likely to persist towards degree attainment

(Cabrera et al., 1992; DesJardins et al.; Horn & Carroll, 1998). Zheng et al. (2002),

Ishitani, as well as Cavote and Kopera-Frye (2006) are examples of three such studies

that reported high school GPA to be a significant predictor of college persistence. Zheng

et al. administered the Cooperative Institutional Research Program (CIRP) survey to all

first-time, full-time freshmen attending Iowa State University in the fall of 1999. Using

hierarchical regression analysis, Zheng et al. found that high school GPA easily trumped

all competing background variables (gender, race, parents living or deceased, parent

marital status, parent income, parent education, FG status, and in-state residency) in

predicting persistence in college. Additionally, Zheng et al. found that high school GPA appeared to be more significant than first-year college GPA.

Similar to Zheng et al. (2002), Ishitani (2003) also concluded that past high school academic performance was a good predictor of academic success in college, but only in the first year. Cavote and Kopera-Frye (2006) had similar results as Ishitani in that high school GPA had a significant effect on spring-to-fall semester persistence in school. However, Cavote and Kopera-Frye did not find high school GPA to have a significant effect on persistence from fall-to-spring semesters, nor fall-to-fall academic years. Cavote and Kopera-Frye, Bryson et al. (2006), as well as Hoffman and Lowitzki (2005) found that other performance indicators, such as high school rank and scores on standardized test, like the SAT or the ACT, were strong predictors of student success in college.

Other studies, such as Leppel (2005), have shown that students can persist to degree completion in spite of having low high school GPAs. For example, Leppel demonstrated a compensatory affect from high involvement in the academic and/or social opportunities of the campus that can overcome low high school GPA. Further, Hoffman and Lowitzki (2005) wrote, "With few exceptions, recent studies suggest that student involvement positively mitigates the relationship of precollege characteristics including high school GPAs and test scores . . . with measures of student success" (p. 458).

Gender and Persistence in College

Prior to World War II, college-going students were comprised mostly of traditionally aged, young, White, upper class males who lived on campus (Cavote &

Kopera-Frye, 2006; London, 1992; Tierney, 1992). The demographics of today's college-going students have changed dramatically over the past 60 years. According to Cavote and Kopera-Frye, "Growth in today's college-bound population consists of students whose opportunities to attend college prior to 1950 were limited" (p. 478). A substantial portion of enrollment growth in American higher education has been the result of an increased accessibility to women and minorities and a growing number of students attending school on a part-time basis (ACE, 2005; Cavote & Kopera-Frye; Dixon Rayle, Robinson Kurpius, & Arredondo, 2006).

According to the National Center for Educational Statistics (NCES) (2008), since 1979, women have become the majority of full-time students enrolled in degree-granting institutions. Women now comprise 57% of full-time students, up from 29% since 1947 (NCES, 2008). Between 1993 and 2003, total female enrollment (full- and part-time) in post-secondary education increased by 22.7% (ACE, 2006). The rise in enrollment may be due in part to the growing numbers of female undergraduates attending on less than a full-time basis (61%) (ACE, 2005). Additionally, Jacobs (1996) found that starting in 1982, more women than men in the U.S. began to earn college degrees. The American Council on Education (ACE) (2006) reported that by the end of the 2003-04 academic year, 57.6% of the bachelor degrees granted were conferred upon women compared to 42.4% of men. Additionally, the NCES (2007) reported that in 2006 the non-persistence rate of female students was lower than that of their male counterparts (31.9% compared to 35.6%).

Not only do men and women differ in their academic performance there are significant differences between their experiences with higher education (Bean, 1980;

Harrop, Tattersall, & Goody, 2007; Pyke, 1997). In a review of six prior studies, Pyke

observed that universities can be inhospitable environments where female students have

been made to feel "alienated, marginalized and misunderstood" (p. 154). Pyke noted that

while attending universities, women sometimes experience expressions of sexist humor,

stereotypic views of women, sexist language, and more attention given to male students

by their professors. Harrop et al. noted that females visited their professors on course-

related matters whereas male students visited their professors more so on an informal

basis. Pyke noted that under such conditions women may find their motivation and

enthusiasm diminished and possibly drop out of college.

　Despite the differences in experiences that men and women face in higher

education, Harrop et al. (2007), Pyke (1997), as well as NCES (2007) found that women

persisted in college at a higher rate than men. Harrop et al. concluded, that as "a

consequence, it is suggested that researchers ought to be wary of conducting research into

various aspects of higher education without considering potential gender differences" (p.

385).

Race, Ethnicity, and Persistence in College

　In addition to the increase in women enrollment, since the mid 1970s, the number

of minority students enrolled in colleges and universities has also been on the incline

(Fischer, 2007). In a report by the ACE (2006), between 1993 and 2003 minority

enrollment increased by 48.1% to 4.2 million students, representing 29% of the total

undergraduate population. In particular, Hispanic student enrollment grew 67.3%,

representing the largest enrollment growth of all race and ethnic groups attending

undergraduate schools. ACE (2005) examined data from the U.S. Department of Education's National Postsecondary Student Aid Study of 2003-04, and reported that Hispanic students comprised 13% of the total undergraduate population in U.S. colleges. African-American college students were the largest of all minority groups, representing 14% of the total undergraduate enrollments. Asian-Americans students comprised 6% of the undergraduate population, while American Indian students were 1%.

Even though there have been significant gains in minority enrollment, minority students still face many challenges when it comes to persisting in college (Fischer, 2007). Prior studies have shown that, with the exception of Asian American's, minority students continue to have lower persistence and degree attainment rates than White students have (Gloria & Ho, 2003; NCES, 2007). Gloria and Rodriguez (2000) observed that, "Although all students contend with academic stresses and adjustment difficulties, transition to college life is generally more difficult for racial/ethnic minority students than for White students" (p. 145).

Some of the difficulties minority students face comes from adjusting to a college life that is centered on a predominantly White culture (Flowers, 2002). Examples of such adjustment difficulties include interacting with faculty whom are primarily White, trying to retain connections to off-campus friends and relatives, and dealing with feelings of isolation, alienation, and discrimination (Dolan, 2007; Gloria & Ho, 2003).

Prior studies by Gloria et al. (1999), as well as Fischer (2007) found that institutional satisfaction played a key role in minority student persistence in college. Fischer used data from a 1999 National Longitudinal Survey of Freshman to examine differences between ethnic groups on college satisfaction and academic achievement

variables. Fischer found that a more negative perception of the campus racial climate by minority students increased their likelihood of leaving college. For example, Fischer reported, that for "each one-point increase in the campus climate scale for Blacks resulted in a 10% increase in the odds of leaving college" (p. 148). Fischer stated, "Students who fail to form sufficient informal and formal social connections to others on campus, regardless of race/ethnicity, are significantly more likely to leave than are more connected or involved students" (p. 151). Flowers (2002) comparative research on HBCU and PWI found that the former significantly enhanced the academic and social growth of African American students.

Similar to Fischer (2007) and Flowers (2002), Gloria et al. (1999) found that higher levels of social support, more comfort in the university environment, and positive self-beliefs were associated with positive academic persistence decisions of African American students. Gloria et al. purported "Comfort in the university environment as a predictor of persistence supports the existing literature that indicates institutional climate plays a significant role in the persistence of African American students" (p. 263).

A commonly drawn conclusion from studies on minority students in higher education has been that institutions need to do more about retaining minority students by providing more social and academic opportunities that recognize and incorporate cultural diversity into campus life (Braxton et al., 2007; Fischer, 2007; Tierney, 1992). Braxton et al. wrote, "For students whose cultures of origin are quite different from the predominate culture of the institution, finding a culture affinity group facilitates the retention of such students" (p. 389). Fischer wrote, "Empirical work has suggested that minority students

who create their own social and cultural networks at predominantly White schools have more positive outcomes" (p. 137).

SES and Persistence in College

In studies on college persistence, SES is another demographic variable that has been widely studied (Wells, 2008). According to Wells, researchers have usually recognized that SES has an effect on student persistence in college. Prior studies, such as Cabrera et al. (1990), Entwisle, Alexander, and Steffel Olson (2005), as well as Lohfink and Paulsen (2005), have demonstrated SES to be one of the strongest predictors of degree attainment. There is no clear consensus, however, upon how SES is defined or measured (Hauser, 1994; Marks et al., 2000).

Magnuson and Duncan (2006) defined SES as a person's "access to economic and social resources and the social positioning, privileges, and prestige that derive from these resources" (p. 372). Spenner, Buchmann, and Landerman (2004) wrote that the most frequent measures of SES have included family income as well as parent's occupation and education level. Other studies, such as Cabrera et al. (1990) included these, plus other dimensions, such as access to household items. Marks et al. (2000) recommended measuring the SES of college students on the dimensions of their parent's employment status, occupation, income, and educational attainment since students have yet to develop their own socioeconomic characteristics.

A study by Lohfink and Paulsen (2005) demonstrated how one dimension of SES was used to evaluate the effect of family income on persistence in college. Using data taken from the 1996-2001 Beginning Postsecondary Students (BPS) Longitudinal Study,

Lohfink and Paulsen found lower college persistence rates among students with lower

family income. For example, for each $10,000 increase in family income the probability

of persisting in school increased by 2%. The BPS 2003-2006 survey showed similar

results in that the higher the dependent student family income rose, the higher the % of

persistence in school climbed. Ishitani (2003) also found that when compared to a

reference group (annual family income of $45,000 or more) students from families with

lower income ($25,000 or less) were at a 49% higher risk of leaving college in their first

year. Lohfink and Paulsen also found that 33.8% of students from households of less than

$32,000 annual incomes failed to persist in school compared to only 16% of students

from families with annual incomes of $92,000 or more.

Mueller and Parcel (1981), however, wrote that income is not a desirable "single

best indicator of SES since it does not vary monotonically with either prestige or power,

and there exists considerable income heterogeneity within occupation categories, even

with fairly detailed classifications" (p. 16). Marks et al. (2000) also noted that household

income alone does not provide an adequate picture of the effects of SES on persistence in

college. For one, students do not always know the income of their parents, so reporting

accuracy can be questionable. Second, certain occupations can provide households with

higher incomes, yet other factors, such as lack of a post-secondary degree, may suppress

the family from rising to a higher social status. Mueller and Parcel also noted that

measuring SES by income could be unstable as it is influenced by other factors, such as

strikes, layoffs, or illness. Therefore, other dimensions of SES, such as parental

occupation and parental education attainment level, have been known to provide a more

accurate measurement of social status (Marks, 2008; Marks et al.). In general,

occupations that require more education tend to yield higher salaries and in turn engender a higher social status. Marks et al. observed, "The most prestigious or highest income occupations (such as surgeons) would be at the top of the hierarchy and the least prestigious at the bottom" (p. 10).

Marks (2008) examined data from the OECD's 2000 Program for International Student Assessment (PISA) to determine the contribution of parental occupation status on student performance. Marks noted that the father's occupational status had a stronger affect (five score points or more) than the mother's occupational status. In prior studies, it has been common practice to collect data on the father's occupational status (Marks; Marks et al., 2000). According to Kalmijn (1994), a reason is that historically, national data on mother's occupation is scarce. That is, few mothers worked outside the home when status attainment research was being conducted (Kalmijn). However, since the women's movement of the mid-1970s, collecting data on the mother's occupations has become more prevalent (Marks et al.). Marks et al. recommended collecting data on the father's occupation, and when that is missing, or unavailable, then data on the mother's occupation should be gathered.

Parent educational attainment is another common dimension of SES. Past research has shown a positive correlation between the parents' and child's education attainment levels (Marks, 2008). Marks found that a 12% variation in student performance was attributed to parental education. In another study Marks et al. (2000) reported, "Highly educated parents are more likely to instill more positive values about education to their children, have a better understanding of what school requires and are probably better equipped to help their children in their school-work" (p. 10).

Prior studies that included parental education as a dimension of SES, tended to collect data on the mother's educational attainment over that of the fathers (Green, 1970; Marks, 2008). Marks found that particularly in western European countries, mother's educational attainment level tended to have an increased affect on their children's academic performance than fathers. This may be because in many cultures, mothers have traditionally assumed the role of overseeing their children's education. Marks et al. (2000) wrote, "The argument is that mothers (compared to fathers) are more involved with the socialization of a child; they spend more time with the child, spend more time reading and helping with the child's homework, and generally are more aware of the child's world at school" (p. 15).

Other studies, however, have found that the father's education level to be as good a predictor of their children's educational attainment level as that of the mother's. Marks (2008) found that in the U.S., the effect of the father's education on student academic performance was between one and four score points higher than the mother's. Astin (2005) also found that students completing a bachelor's degree in four years were also positively related to their father's level of education. Therefore, studies such as Entwisle et al. (2005) have used both parents' education attainment levels when defining the dimensions of SES.

In addition to the lack of consensus on the dimensions of SES, there also have been different approaches used in how SES is measured (Hauser, 1994). In prior studies, SES has been measured as a single dimension, multiple dimensions measured separately, and as a composite measure (index) on several combined dimensions (Marks et al., 2000). When SES is measured on a single dimension, Mueller and Parcel (1981) as well

as Miller and Salkind (2002) noted considerable agreement that occupational status is the most reliable and valid measure used by sociologist. Miller and Salkind reported that occupation "has been shown to be the best single predictor for social status, and overall occupational prestige ratings have been found to be highly stable" (p. 455). Mueller and Parcel posited that occupational status includes elements of economic status, power, and prestige.

Magnuson and Duncan (2006) as well as Spenner et al. (2004) preferred to measure SES on multiple dimensions, but separately. Magnuson and Duncan posited, "Components of SES have differential effects on parenting and children's development, and should not be combined into a single scale" (p. 373). Magnuson and Duncan further explained that "although parents' educational attainments, incomes and occupations are related, each may affect children in different ways. Rather than using a summary SES measure, proponents of this approach consider each component separately" (p. 373).

A third method for measuring SES is to use a composite measurement on multiple dimensions of SES (Marks et al., 2000). The Hollingshead Index is an example of a popular composite score derived from the sum of two-weighted dimensions—education and occupation (Cirino, Chin, Sevcik, Wolf, Lovett, & Morris, 2002; Mueller & Parcel, 1981). Marks et al. (2000) noted several difficulties with using composite scores which included: missing data, lack of consensus on how to weight various dimensions, and interpretation of the resultant scale. Marks et al. wrote, "How the component parts are combined (that is, their relative weights) is open to debate, a debate that cannot be readily resolved" (p. 13). Marks et al. recommended using several single measures when investigating the process by which SES influences educational outcomes.

Studies on the affect of SES on student performance have tended to conclude that students with higher SES have improved educational outcomes over students with lower SES (Cabrera et al., 1990; Entwisle, 2005). For example, Cabrera et al. (1990) conducted a national longitudinal study of 1,375 college students who attended a 4-year institution in spring of 1982 to investigate various variables associated with student persistence in college, inclusive of SES. Cabrera et al. used the NCES's definition to define five dimensions of SES. The five dimensions included father's education, mother's education, family income, father's occupation, and household items. Equal weighting was given to each of dimensions of SES to form a composite score. Using logistic regression, Cabrera et al. found that students in the upper SES quartile were more likely to persist in college then students from the lowest SES quartile (.456 at $p < .01$ one-tailed). Cabrera et al. also found that for low-SES students, inadequate financial aid interfered with their ability to persist in college.

Other research, such as Pascarella et al. (1986) found that SES had very little effect on college persistence. Pascarella et al. sampled 1,906 incoming freshmen from a medium-sized, independent residential university on the effect of selected background variables on the student's initial commitment to the institution and graduation goals from the institution. Pascarella et al. defined SES on the dimensions of parents' combined level of education and parents' combined annual income. Of the 14 variables that contributed to freshmen persistence, SES only ranked tenth.

A reason for mixed findings in research may be that the effect of SES on persistence in college is not the same for all groups of students (Paulsen & St. John, 2002). For example, Paulsen and St. John found that the effects of SES have been shown

to differ based on a student's race or ethnicity. Paulsen and St. John found that African American students from poor and working class families were more likely to persist in school than their White peers were. They also found that white students from middle- and upper-class families where more likely to persist in college over all other groups. Further, Paulsen and St. John found that poor Asian Americans students were less likely than students from any other race to persist in school. These findings are inconsistent with the widely held belief that Asian American students are more likely to achieve academically than other groups (Gloria & Ho, 2003). Paulsen and St John's findings also suggest that SES is a stronger predictor of college persistence than race and ethnicity.

Post Matriculation Characteristics and Student Persistence in College

Prior research, such as Astin (1975), Cabrera et al. (1992), DesJardins et al. (2002), and Tinto (1993) have shown that persistence in college is influenced by the attitudes and behaviors students bring with them upon successful matriculation. Tinto characterized such attitude attributes as a set of traits that influence the level of commitment a student has to his or her personal educational goal, and to the specific institution. The next two sections of this literature review will discuss past findings from studies on goal and institutional commitment and the impact these attitude attributes have on student persistence in college.

Goal Commitment

Tinto (1993) defined *goal commitment* as a commitment to one's personal educational and occupational goals. Tinto wrote that goal commitment "specifies the

person's willingness to work toward the attainment of those goals" (p. 43). Additionally, Cabrera et al. (1990) wrote, "a student's goal commitment is determined by the degree to which he or she becomes integrated into the academic life of the institution" (p. 305). Academic performance (measured as GPA), number of cumulative courses completed, and enrollment status (part-time/full-time) are several of various types of data that have been collected to measure a student's goal commitment (Cabrera et al., 1992; DesJardins et al., 2002; Horn & Carroll, 1998). Findings from Astin's (2005) CIRP survey found that increased academic involvement (operationalized as number of hours students spent studying, degree of interest in courses, and good study habits) was positively related to persistence in college.

In the longitudinal study by Cabrera et al. (1992), two survey items were used to measure student goal commitment. These two items included the importance of completing a college degree and the importance of completing a program of study. The longitudinal study consisted of 466 first-time freshmen, less than 24 years of age, not married, and who attended a large commuter urban institution in 1988. Cabrera et al. used a structural equation model to test various variables of interest on the dependent variable—institutional persistence. Participants who had re-enrolled at the same institution the following fall semester were classified as institutional persisters. Students who did not re-enroll were classified as non-persisters. Cabrera et al. found that commitment to completing a college degree had a significant direct effect on a student's intent to persist in school (regression weight of $\beta = .185$). Additionally, Cabrera et al. reported that cumulative GPA (regression weight of $\beta = .263$) and one's intent to persist

(regression weight of ß = .595) were found to have direct effects on student' persistence decisions (the actual outcome of persisting in school).

Other studies, such as DesJardins et al. (2002), as well as Horn and Carroll (1998), measured goal commitment as cumulative college GPA. These studies showed that the higher the GPA a student attained in college, the more likely he or she was to persist towards degree attainment. For example, DesJardins et al. used the NCES transcript files from the High School and Beyond (HSB) Sophomore Cohort longitudinal study (from 1980 to 1992) to determine which among a number of factors affected a student's ability to persist towards degree attainment. Of the 14,799 high school sophomores, DesJardins et al. found that for every one-grade increase in GPA, a student's chance of graduating from college more than doubled.

Horn and Carroll (1998) used data from the NCES 1989-90 BPS and found that on average, students who failed to persist had lower cumulative GPAs than students who persisted (at the same or another institution). The average GPA of all first-year persisters was 2.71 (on a scale of 4.0) while the average GPA of non-persisters was 2.53. Similar differences in values were reported when compared by institutional type (4-year public, 4-year private and 2-year public). According to Horn and Carroll, first-year non-persisting students who had attended 4-year public schools had the lowest average GPA (2.11) when compared to students who attended private 4-year (2.35) and public 2-year schools (2.53).

Goal commitment has also been measured by the cumulative hours of academic credits a student completes. Studies have shown that students who completed more course credit hours were more likely to persist in school than students who completed

fewer course credit hours (Horn & Carroll, 1998; Kiser & Price, 2007; Pascarella et al., 2004). For example, Kiser and Price (2007) examined the predictive accuracy of selected variables (high school letter grade, first-year college GPA, residence location, cumulative hours taken, mother's education level, father's education level, and gender) on the persistence of college freshman to their sophomore year at the same institution. Kiser and Price found that when students' increased their course load by one credit hour, they were 1.2 times more likely to persist to their sophomore year.

Horn and Carroll (1998) found that students who attended a 4-year public school (lowest GPA group) were more likely to be enrolled part-time in school, thus taking fewer courses each semester. Horn and Carroll reported that students who worked full-time failed to persist in college at higher rates than students who did not work or worked part-time while enrolled in school (46.6% of 4-year students and 54.9% of 2-year students failed to persist). Pascarella et al. (2004) noted similar outcomes for FG students who "completed significantly fewer credit hours and worked significantly more hours per week than their peers whose parents had a high level of post secondary education" (p. 265). Further, Pascarella et al. found that in spite of their lower course load, FG students tended to have lower GPAs through their third year in college than that of their CG peers.

The ability to pay for college has had a positive effect on goal commitment (Cabrera et al., 1990; Cabrera et al., 1992). Cabrera et al. (1990) found that the ability to pay for college moderates the goal commitment on the propensity to persist. Cabrera et al. (1992) noted that the number of course hours a student enrolls in could be related to their financial status. Since the high cost of college can impose restrictions on a student's ability to afford school, students who struggle with the cost of college may postpone

attendance, begin at a 2-year school, attend on a part-time basis, or fail to enroll in school altogether. Students who find the financial resources, such as grants, scholarships, loans, or work-study awards, tend to have higher college persistence rates (Cabrera et al., 1990). Cabrera et al. (1992) noted that there are increasing numbers of lower income students who have taken on student aid as a means to finance their education. Cabrera et al. (1992) found the college persistence rates of lower-income aided students have equalized to a level similar to more affluent non-aided students. Their findings do not suggest that financial aid directly effects persistence in college, rather that student attitudes about finances (financial aid) were found to exert a significant effect on goal commitment (Cabrera et al., 1992).

Institutional Commitment

Tinto's (1975) second attitude attribute associated with higher college persistence rates is institutional commitment. Tinto defined *institutional commitment* as "a person's commitment to the institution in which he/she is enrolled" (p. 43). Cabrera et al. (1990) wrote that a "student's institutional commitment is shaped by the degree to which he or she becomes integrated into the social life of the institution" (p. 305). Cabrera et al. (1992) measured institutional commitment on five dimensions. These dimensions included students' 1) feelings of belonging at the institution, 2) level of certainty and confidence of their institutional choice, 3) assessments regarding the importance of graduating from the institution, 4) feelings about the practical value of the education obtained from the institution, and 5) awareness of institutional prestige. Bean (1980) also

added degree of loyalty toward membership in an organization as another dimension of institutional commitment.

What Tinto referred to as a student's *institutional commitment*, Astin (1984, 1999) called *student involvement*. Astin (1999) referred to student involvement as "the amount of physical and psychological energy that the student devotes to the academic experience (p. 518). Astin (2005) wrote, "A great deal of empirical evidence suggests that the greater the student's level of involvement or engagement, the greater the chances of degree completion" (p. 12).

Astin's (1984, 1999) theory of student involvement is rooted in his longitudinal study on non-persisters. In this early work, Astin (1975) found that students who joined fraternities or sororities, participated in extracurricular activities of almost any type, were more likely to persist in college. Participation in sports, honors programs, student government, ROTC, and undergraduate research projects were shown to have enhanced college persistence rates as well.

Studies, such as Leppel (2005) and Wohlgemuth et al. (2006), on student participation in campus activities, have supported Tinto's (1975) and Astin's (1984, 1999) findings that commitment (involvement) leads to increased persistence in college. For example, Leppel's study on student participation in sport and non-sport activities found higher college persistence rates among student athletes. Leppel found that even though male athletes had lower GPAs than students involved in non-sport activities, there appeared to be a compensatory effect from participating in intercollegiate sports that improved their chances at persisting in college. Leppel also found that regardless of the institution, students involved in non-sport activities were more likely to persist in college.

Leppel posited that the more students were involved in school activities, the more likely they were to persist in college. In another study, Wohlgemuth et al. found that student-athletes were more likely to persist from the first-to-second year of school due to the increased attention focused on them by the athletic department. Wohlgemuth et al. found that even though student-athletes were much less likely to graduate in four years, the difference in graduation rates faded after the fifth and sixth years.

Commitment to an institution has also been associated with the institution's reputation (Barefoot, 2004). Barefoot wrote, "The most prestigious colleges and universities—those with strong academic reputations, selective admissions policies, massive resources, supportive alumni and winning athletic teams—are more likely to engender a high level of institutional commitment" (p. 12). Barefoot noted that the reason some students leave college is due to poor institutional fit, failure to connect to the campus social life, and general dissatisfaction.

Astin's (2005) study supports Barefoot's (2004) observations. Astin used a CIRP survey to gather data from 56,818 full-time freshman students enrolled in one of 262 participating baccalaureate-granting institutions. Astin reported that the most important college characteristic affecting student persistence is institutional selectivity. The correlation between institutional selectivity and 4-year degree completion was found to be even stronger than high school GPA. Astin (2005) wrote, "By far the most important college characteristic affecting the student's chances of completing the baccalaureate degree is institutional selectivity" (p. 10). Astin noted that the superior resources of an institution, and the motivating effects of peer groups, had positively influenced college persistence rates.

In summary, goal and institutional commitment are closely aligned with student behaviors observed during the incorporation stage of Tinto's (1993) model (Cabrera et al., 1990). Goal attainment is driven by a student's ability to academically integrate into the college system, such as working hard for good grades. Tinto found that students high in goal attainment tended to persist towards degree completion at the same or a transferring institution. Institutional commitment is primarily driven by those activities that help students socially integrate into the school community. Students high in institutional commitment are more likely to persist at the same institution unless low goal attainment results in permanent withdrawal from the college system (Tinto). Table 15, located in Appendix F, contains a summary of the various studies on goal and institutional commitment, as well as studies of other variables associated with college persistence that were discussed previously in this section of the literature review.

First-Generation College Students

Most research on parental education status, such as Lohfink and Paulsen (2005), Pascarella et al. (2004), as well as Terenzini, Springer, Yaeger, Pascarella, and Nora (1996), has found that FG students were more likely to be underprepared academically, experienced transition problems, and failed to persist in college at higher rates than their CG counterparts. For example, in a national longitudinal study by Lohfink and Paulsen, 76.5% of FG students persisted in college compared to 82.2% of CG students. Reasons for the differences in college persistence rates between FG and CG students have been the focus of prior research studies such as those conducted by Lohfink and Paulsen, McCarron and Inkelas (2006), Kojaku and Nuñez (1998), as well as Warburton et al.

(2001). This next section of the literature review will discuss the various factors which have contributed to the challenges FG students face in the college-going process.

Definition of FG Status

There is no clear consensus in literature on the definition of FG status (Longwell-Grice & Longwell-Grice, 2008). The NCES (2006) defined FG status as students who are the first member in their family to attend college. Other research has defined FG status as students whose parents have not pursued studies beyond a high school diploma (Lohfink & Paulsen, 2005; Nuñez & Cuccaro-Alamin, 1998; Ting, 2003). Unlike the first definition, the second acknowledges that FG students may have had siblings who attended college. A third definition used by Pike and Kuh (2005) loosely defined FG status as students who come from families where no parent or guardian earned a college degree. This later definition of FG status includes students whose parents or guardians had some post-secondary school experience, but had fallen short of degree attainment. For purposes of this study, FG status is defined as students whose parent or guardian has had no post-secondary educational experience beyond high school.

FG Students in College

The later decades of the twentieth century saw a rise in the enrollment of FG students. Nuñez and Cuccaro-Alamin (1998) reported 43% of new students attending post-secondary institutions in 1989-90 were of FG status. This increased another 4% in 1995-96 (Kojaku & Nuñez, 1998). However, when accounting for only full-time students there has actually been a decline in the proportion of first-time FG students enrolling in

post-secondary schools (HERI, 2007a). This decrease reflects the increasing levels of

education among the majority U.S. population. In spite of this decrease in full-time

enrollment, FG minority enrollment (in particular, Hispanics) is on the incline (Lee et al.,

2004).

A substantial portion of the overall growth in FG students' enrollment has been in

2-year schools (Kojaku & Nuñez, 1998; Nuñez & Cuccaro-Alamin, 1998). Kojaku and

Nuñez reported FG enrollment in 2-year schools (51.1%) was much higher than 4-year

public institutions (35.4%) and 4-year private institutions (29.7%). The numbers of FG

students will likely continue to grow as college degrees become necessary for the 10

million jobs that will be created in the next decade—most of which will require skills and

competencies beyond those acquired in high school (Longwell-Grice & Longwell-Grice,

2008; Pike & Kuh, 2005).

Research on FG Students

Prior research on FG students has typically fallen under one of three categories

resembling the order of the college-going process (Pascarella et al., 2004; Terenzini et al.,

1996). The first category of research is on the demographic characteristics of FG

students. These types of studies have examined the expectations, planning, and college-

choice processes. The second category of research has focused on the descriptions and

understandings of the difficulties FG students face in the transitional period between high

school and college. The third category of research has compared FG and CG students on

the effects of their college experiences on persistence during college, degree attainment,

and career outcomes. What follows next is a discussion of prior studies from each of these three research categories.

FG Students Demographic Characteristics

Past studies have shown that FG students differ significantly from their CG peers (Bui, 2002; Ishitani, 2003). Demographically, FG students possess many of the same at-risk characteristics discussed earlier under the *Persistence* section of this literature review. For example, prior studies have shown that FG students are disproportionately overrepresented by the most disadvantaged racial, income, and gender groups (Lohfink & Paulsen, 2005; Lee et al., 2004; McCarron & Inkelas, 2006; Pascarella et al., 2004; Zalaquett, 1999). FG students are more likely to come from low-income families, to be Hispanic, to have weaker cognitive skills, and to have lower degree aspirations (Bui; Terenzini et al., 1996). Zalaquett wrote that FG students "face unique challenges in attaining a degree, such as conflicting obligations, false expectations, poor preparation, and lack of support, which may hinder their success" (p. 417).

Nuñez and Cuccaro-Alamin (1998) reported that FG students "were more likely to be older, to be married, and to have dependents" (p. 11). For financial reasons, FG students tend to be employed, attend school on a part-time basis, as well as live at home. A disproportionate number of FG students are enrolled in 2-year over 4-year colleges than CG students (London, 1992).

A study by Choy et al. (2000) examined various characteristics that placed students at risk of not completing high school and not entering college. Choy et al. found that FG students averaged 2.0 risk factors compared to 1.6 for students whose parent had

some college experience and 1.3 for students whose parent had a college degree. Examples of some of the at-risk factors included low SES, single-family household, changing schools, and repeating one or more grades.

Choy et al. (2000) also compared how FG and CG students measured-up on five steps in the college decision-making process. The five steps included (1) aspiring to attain a 4-year degree (by the 10th grade); (2) prepare academically; (3) take admissions test (like ACT or SAT); (4) apply to a 4-year college; and (5) gain acceptance and enroll in college. Choy et al. found that FG students were much less likely than their peers with more educated parents to complete any of the steps, with most dropping off after the second.

In studies on racial demographics of FG students, Bui (2002) and Lee et al. (2004) reported that FG students were more likely to be of minority status than CG students. The Higher Education Research Institute *(*HERI) (2007a) and Lee et al. have shown that of all race and ethnic groups, the largest populations of FG students are Hispanic. In a national study, HERI (2007a) reported that Hispanics' make up about 38.2% of the FG student population enrolled in 4-year schools. A study by Lee et al., of students attending one of nine Los Angeles community colleges, found that Latino/a (nearly 65%) and Mexican American (nearly 76%) students were more likely to be of FG status, with the greatest proportion of these students' parents having only attained a junior high level of education or less. Lee et al. found that more than 65% of Black and African American students' parents attained less than a 4-year bachelor's degree, with the largest proportion (30.2%) having attained a community college education. Lee et al. also reported that the largest

proportion of White/Caucasian students (25.9%) had parents that obtained a 4-year

bachelor's degree while another 23% obtained a post-graduate degree.

FG students are at an academic disadvantage even before first stepping onto the

college campus (Bui, 2002). For many FG students, their past has not adequately

prepared them for college life. Bui reported that FG students felt less prepared for college

life and feared failing in college more so than CG students did. Other studies, such as

Lohfink and Paulsen (2005) as well as Warburton et al. (2001), found that FG students

often entered college underprepared academically from having avoided higher-level

math, science, and English courses while in high school. For example, according to

Warburton et al., FG students were more likely to have taken algebra II (25.5%) as their

highest high school mathematics course compared to the 31.3% of CG students who took

calculus.

In a national longitudinal study, Warburton et al. (2001) found that FG students

were less likely to take college entrance exams, and when they did, they scored lower

than their peers did. Specifically, Warburton et al. found that 86% of FG students took a

college entrance exam compared to 93% of students whose parent had some college

experience and 96% of students whose parent attained a college degree. In addition, the

average score on the SAT for FG students was 858 points compared to 899 for students

whose parent had some college experience and 1011 points for students whose parent

attained a college degree.

Lee et al. (2004), Lohfink and Paulsen (2005), as well as McCarron and Inkelas

(2006) observed that FG students also lacked the intergenerational college experience that

has proven advantageous for students who prepare for and subsequently enroll in college. Lee et al. wrote:

> Parents with firsthand knowledge of postsecondary education may provide their children with better access to information about college, such as course requirements, and they may know how to acquire the means to finance their children's college education.… Parents who have not attended college, on the other hand, tend to have less direct knowledge of the economic and social benefits of a postsecondary education. (p. 2)

Students from homes where at least one parent went to college tend to receive more support and encouragement for attending college than FG students do (McCarron & Inkelas, 2006). McCarron and Inkelas found that many FG students failed to persist in college because their families did not adequately support them in their educational goals. When in high school, FG students often do not receive clear messages about the demands and expectations of higher education. McCarron and Inkelas wrote, "Overall, evidence suggests that [FG] students encounter a lower perceived level of family support, a lower level of importance placed on college by parents, and less knowledge of the college environment and campus values among parents" (p. 536).

Lee et al. (2004) wrote, "A notable body of literature has established that parents can play a key role in a student's college enrollment and success" (p. 3). In a national survey, McCarron and Inkelas (2006) examined the influences of parental involvement on the educational aspirations of their children. Parental involvement was aggregated using survey items that asked questions such as how often students discussed their school courses and college plans with their parents, as well as how often students sought help on

homework from their parents. Using a survey item that asked how far in school each student thought they would get aggregated the variable of aspiration. McCarron and Inkelas found that more of the variance in educational aspirations was explained by parental involvement (5.2% for CG students, and 5.9% for FG students) than any other variable. McCarron and Inkelas also found that even though parental involvement was the best predictor of educational attainment (of the variables studied), much of the variance was still left unexplained.

HERI (2007b) found significant differences in how FG and CG students perceived parental involvement. HERI surveyed 272,036 first-year, first-time college students from 356 institutions of higher education on six items regarding their perception of parental involvement in the college-going process. The six items on parental involvement included: choosing college activities, choosing college courses, dealing with officials at your college, decision to go to this college, application(s) to college, and decision to go to college. HERI reported that overall, college students felt the amount of parental involvement was just right. However, when controlling for parental education status, FG students were more likely to report "too little" parental involvement than their CG counterparts on all six items. Specifically, there was about a 20% gap between FG and CG students who reported "too little" parental involvement in choosing college activities (38.9% to 19.4%) and choosing courses (40.3% to 20.9%).

FG Students and Transitional Challenges

Prior studies on the transitional period between high school and college have shown FG students have more difficulties in adjusting to college than CG students do

(Lohfink & Paulsen, 2005; Pascarella et al., 2004; Terenzini et al., 1996; Tinto, 1993).

Pascarella et al. stated "not only do [FG] students confront all the anxieties, dislocations, and difficulties of any college student, their experiences often involve substantial cultural as well as social and academic transitions" (p. 250). For many FG students, enrollment in college represents a departure from family tradition (London, 1992; Tinto, 1993).

Like HERI (2007b), Tinto also observed that FG students do not have the same level of encouragement and expectations for completing college that CG students often receive from their families. For CG students, it is simply expected that they will graduate from college and the difficulties of separating from home is a natural part of the process (Tinto). For many FG students and their families the value of a college education may not be worth the discomfort of separation. As a possible consequence, many FG students fall short of their educational aspirations because they are compelled to return home (Pascarella et al., 2004; Tinto).

Terenzini et al. (1996) conducted a nation-wide study on the characteristics, experiences, and cognitive development of FG students. In sampling 3,840 new students entering 2- and 4- year colleges in Fall 1992, Terenzini et al. found that FG students were more likely to take longer to complete their degree and received less encouragement from parents to attend college. Additionally, they found that FG students differed in their curricular, instructional, out-of-class experiences, and perceptions of campus life compared to their CG peers. For example, FG students took fewer courses in the humanities and fine arts. Perhaps because they work more hours off campus, FG students were less likely to develop relationships with faculty than their CG peers. Terenzini et al.

also found that FG students were less likely to perceive faculty as concerned with their development.

Lohfink and Paulsen (2005) observed that not only is it common to find FG students struggling academically in college, they also struggle to fit into the social life of college. For students who do participate in the social opportunities of the campus, Pascarella et al. (2004) found that FG students were more likely to derive better outcomes through participation in co-curricular activities than their peers. Yet, FG students appear to have limited involvement in on-campus social activities due in part to living off-campus and holding down jobs (Pascarella et al.).

FG Students and Goal Attainment

Studies on the college experiences of FG students consistently report that they are at greater risk of non-persistence in school than CG students because of deficiencies in academic and social integration (Ishitani, 2003; Terenzini et al., 1996). For example, Pascarella et al. (2004) found that FG students typically completed fewer credits hours than CG students did. Additionally, the GPA of FG students tend to be lower than CG students (Warburton et al., 2001).

In a national longitudinal study, Warburton et al. (2001) used data from the BPS where they tracked the experiences of a cohort of students who began their postsecondary education in 1995–96 school year. Warburton et al. found that at the end of three years, FG students were less likely than CG students to have earned a degree or still be enrolled in school (73% and 88%, respectively). FG students were less likely to stay on the persistence track than CG students were (58% compared to 77%), and were almost twice

as likely to have left the institution through a stopout or downward transfer (14%

compared to 8%).

Ishitani (2003) used event history modeling to examine the persistence trends of

FG and CG students over academic semesters. Ishitani found that the persistence rate in

the first-semester was about 9% lower for FG students than for students who came from

families where both parents attained college degrees. By the end of the sixth semester,

persistence rates of FG students had substantially declined to 22% lower than students

with two college-educated parents.

Warburton et al. (2001) also found that on average, FG students tend to

academically underperform when compared to their CG counterparts. For example,

Warburton et al. found that the overall cumulative first-year GPA of FG students were

lower than CG students (2.6 compared to the 2.8 on a 4.0 scale). Lohfink and Paulsen

(2005) had similar findings over a longer period of study—2.54 (FG GPA) compared to

2.76 (CG GPA). Additionally, Warburton et al. found that FG students were more likely

than students whose parents earned a college degree to have taken one or more remedial

courses during their first year in college (21% versus 10%). When FG and CG students

took more academically rigorous high school courses, however, there was no difference

in their college GPAs. ACE (2002) wrote that FG students could at least "mitigate their

disadvantage by enrolling in a rigorous high school program" (p. 15).

There have been inconsistent findings in studies on the college grades of FG and

CG students. For example, in an institutional study, Zalaquett (1999) discovered no

significant differences in the GPA and retention rates of FG students and students whose

parents had a college degree. Additionally, Inman and Mayes (1999) surveyed 5,037

students at 11 different schools in the University of Kentucky Community College system and found no significant difference in college GPA between FG and CG students at the end of their first-year.

Nuñez & Cuccaro-Alamin (1998) reported that once FG and CG students attained degrees, there were no significant differences when competing for jobs. According to ACE (2002), "FG status does not appear to affect occupation or income, at least in the first few years after graduating" (p. 31). Nuñez and Cuccaro-Alamin also found that for FG students who attained a bachelor or associate's degrees, they earned comparable salaries and were employed in similar occupations as their CG counterparts were. For example, the average annual salary in April 1994 for both FG and CG students who had earned a bachelor's degree was $23,000. Table 16, located in Appendix F, contains a summary of the various studies on FG students discussed in this section of the literature review.

Social Capital

Definition of Social Capital

This literature review has discussed how factors, such as parental education status, SES, and GPA, have been shown to affect student persistence in college. Wells (2008) suggested using the lens of social capital as another way to explore this topic. Social capital is a concept rooted in the works of Bourdieu (1986) and Coleman (1988). Bourdieu defined the term social capital as resources made available through the mutual relationships of members of a group. These resources are collectively owned by the group

and can be used for the benefit of its membership (Bourdieu; Putnam, 2000). "Whereas economic capital is in people's bank accounts and human capital is inside their heads, social capital inheres in the structure of their relationships" (Portes, 1998, p. 7). "The term refers in general to the glue that holds groups and societies together –bonds of shared values, norms and institutions" (Narayan, 1999, p. 1).

Bourdieu (1986) discussed that the volume and value of social capital depends on the number of relationships between members in the group. Bourdieu posited that the larger the group size, the greater the number of resources available to its membership. An example of the group perspective of social capital is evidenced in politics when members of a community participate in the electoral process. The incumbent, in return for voter support, advocates for policies that are in the interest of his or her constituents.

Not only is social capital produced through relationships, it can be reproduced (Resnick, 2002). For example, neighborhoods that organize and participate in block parties may later mobilize to organize an activity of mutual interest, such as a neighborhood watch program. According to Resnick, "Use doesn't use it up; when a group draws on its social capital to act collectively, it will often generate even more social capital" (p. 648).

Coleman (1988) expanded the work of Bourdieu (1986) and proposed that individuals can develop and benefit from social capital as well as groups. That is, individuals can acquire social capital, which can be spent towards the attainment of personal goals (Coleman; Lin, 1999). "Actors establish relations purposefully and continue them when they [relationships] continue to provide benefits" (Coleman, p. S105). For example, a college student chooses to participate in a study group in

anticipation that doing so will help obtain a satisfactory grade. The student may be inclined to continue to participate in more study groups if he has a reasonable expectation that in doing so will result in better grades (Bentler & Speckart, 1979). The student, thus, acquires social capital through the positive interactions with his peers and continues the behavior so long as it produces personal benefits.

Lin (1999) also saw that social capital could be acquired by individual means. Lin wrote, "The premise behind the notion of social capital is rather simple and straightforward: investment in social relations with expected returns" (p. 30). Lin furthered defined social capital as "an investment in social relations by individuals through which they gain access to embedded resources to enhance expected returns of instrumental or expressive actions" (p.39). Lin's definition of social capital imbues three key elements. First, social capital is inhered in the structure of the relationships between and among persons in the network. It is "lodged [n]either in the actors themselves [n]or in physical implements of production" (Coleman, 1988, p. S98).

Lin's (1999) second key element is that social capital requires the individual to be able to gain access to using it. Without the capability of accessing the resource, it has no value to the individual. It exists only if it can be used (Narayan, 1999).

The third key element of Lin's (1999) definition of social capital is that there is a reciprocal nature to it. Coleman (1988) described this reciprocal nature as, "If *A* does something for *B* and trust *B* to reciprocate in the future, this establishes an expectation in *A* and an obligation on the part of *B*" (p. S102). According to Lin, the nature of the reciprocity, or return, can be either in an instrumental or in an expressive action.

"Instrumental action aims at an increase in the control on individual resources, and have separate means and ends" (Van Der Gaag & Snijders, 2005, p. 21). An instrumental action requires the return to be economic, political, or social (Lin, 1999). An example of a return that is economic or political is getting a better job or a political appointment because of who you know. A social return is demonstrated when members of an organization perceive the reputation of a contributor as being favorable because of the work and contributions the contributor makes. These types of social engagements, "facilitate gossip and other valuable ways of cultivating reputation—an essential foundation for trust in a complex society" (Putnam, 1993, p. 3).

Lin (1999) defined expressive action as the mobilization of "others who share interest and control of similar resources so that embedded resources can be pooled and shared in order to preserve and protect existing resources" (p. 40). Expressive actions have returns that are in physical health, mental health, and life satisfaction terms (Lin; Van Der Gaag & Snijders, 2005). Van Der Gaag and Snijders wrote, "Expressive actions have the intention to maintain one's resources and share sentiments with other actors— for such actions, means and ends are the same" (p. 21). An example of an expressive action is a mother confiding in a neighbor about the health of her child. The act of communicating serves as both means and goal in the exchange of sympathy and empathy among the confidants (Lin, 1999).

Scholars have generally agreed that social capital can be acquired through both group and individual means (Lin, 1999; Son & Lin, 2008). Lin provided several reasons why social capital can work for both groups and individuals. First, persons within the social structure can benefit from information exchange such as job openings, stock

investments, and real estate opportunities. Second, people with power are in a position to influence others in order to exchange or obtain access to resources. For those who know people in power, they too are in a better position to gain access to jobs, better schools, information, and other valued resources. Third, people who belong to various social structures inherit the social credentials that reassure others that they have the backing of their membership. Social credentials refer to the higher regard someone might have for another because of their social connectedness (Warschauer, 2003). Fourth, Lin posited that social relations are expected to reinforce identity and recognition. That is, people who join social groups obtain the emotional and personal support of the group that reinforces (e.g., encouragement in the face of difficult times) that they are valued members of the group (Warschauer).

Studies on college students and social capital, such as Duggan (2005) as well as Gatz and Hirt (2000), generally fall under the individual perspective. That is, these types of studies demonstrate how students can acquire social capital through the relationships they develop with others, which aids in access to institutional resources, opportunities, and privileges (Stanton-Salazar, 1997). According to Stanton- Salazar, "empowering educational experiences" can expand students' access to a larger number and variety of potential network members (p. 4).

For college students, social capital can be developed through the formal and informal relationships with other students, faculty, administrators, and staff. Students can gain entry into various social structures by joining clubs, athletic teams, study groups, and other constructive social outlets (Glaeser, 2001). Students can also build social capital through academic structures by interacting with faculty, staff, administration, and

other students, through classrooms and labs, coursework, and research projects (Stanton-Salazar, 1997). Research has shown that the more involved a student is in the co-curricular activities of the school, the more likely he or she is to persist in college (Leppel, 2005).

Prior research by McNeal (1999) as well as Westwood and Barker (1990) have shown that increasing social capital can help students persist in school. According to McNeal (1999), parental involvement in their child's education was associated with increased academic achievement, more so for students from traditionally advantaged populations than for lower-SES students. Westwood and Barker found that international students who were peer-paired with students in the host country experienced better academic success and had higher persistence rates in college than international students who did not develop similar relationships with host students. However, in another study of international students, Neri and Ville (2008) did not find increased academic performance from those engaging in bridging behaviors. Neri and Ville noted, however, that international students who invested time in developing social relationships did report increased well being.

Bonding and Bridging Forms of Social Capital

Since its early formation social capital theorists, such as Putnam (2000) and Wuthnow (2002), have come to recognize two different types of social networks—bonding and bridging. Putnam's work is often cited as the first to investigate bonding and bridging social networks in the formation of social capital (Patulny & Svendsen, 2007). Bonding social capital is developed from the dense networks of people who are largely

familiar with one another, such as family and friends (Patulny & Svendsen; Putnam).

Wuthnow postulated that bonding probably occurs more easily among homogeneous

groups where it provides emotional support, camaraderie, and personal empowerment.

Bridging social capital, by contrast, is developed from connections made with less dense

networks of people outside the traditional cultural network (Putnam; Wuthnow). Bridging

is more likely to focus on relationships that span different groups, "linking heterogeneous

groups together and providing a means of strengthening the larger society" (Wuthnow, p.

670).

Bonding and bridging forms of social capital often produce different outcomes

(Briggs, 1997; Putnam, 2000; Woolcock, 2001). Putnam described bonding social capital

as "inward looking and tend[s] to reinforce exclusive identities and homogeneous

groups" (p. 22). Bonding forms of social capital can have both positive and negative

outcomes (Patulny & Svendsen, 2007). Positive outcomes of bonding social capital are

demonstrated when group members provide each other with emotional support, build

trust, reinforce cultural norms, and foster reciprocity (payback on favors) (Patulny &

Svendsen; Putnam; Woolcock & Narayan, 2000).

In contrast to the positive outcomes of bonding social capital, there can be

negative outcomes, too (Patulny & Svendsen, 2007; Portes, 1998; Putnam, 2000).

Negative outcomes of bonding social capital can result in exclusivity, particularly when it

keeps outsiders from gaining entry into the group (Kadushin, 2004). Kadushin wrote, "To

the extent that social capital depends on social connections, then connections can be

exclusionary—the insiders benefit while the outsiders are left with their noses up against

the window" (p. 81). Portes wrote, "The same strong ties that bring benefits to members

of a group commonly enable it to bar others from access" (p. 15). Such is the case when

culturally tight groups deny a person entry into their membership because of race

(Portes). Bonding social capital has kept people trapped within their close personal circle

of friends and family; preventing upward mobility (Neri & Ville, 2008; Putnam).

Negative outcomes of bonding social capital has also been seen when culturally

tight groups, whether implicitly or explicitly, make it difficult for members to leave their

cultural roots (Granovetter, 1973). This later scenario may be the case for FG students

who go off to college without the full support and encouragement of their families—and

consequently return home (Duggan, 2005; Pascarella et al., 2004). Bonding social capital

can also create demands for conformity (Portes, 1998). Portes posited that the amenities

of being a part of a close-knit community where neighbors watch out for neighbors can

also restrict personal freedoms.

Bridging networks, by contrast, are more diffuse than bonding networks

(Granovetter, 1973; Putnam, 2000). Relationships from bridging networks are formed

through linkages to external acquaintances, such as distant friends, associates, and

colleagues (Briggs, 1997; Putnam; Woolcock, 2001). Putnam described bridging social

capital as open networks that are "outward looking and encompass people across diverse

social cleavages" (p. 22). Putnam stated, "To build bridging social capital requires that

we transcend our social and political and professional identities to connect with people

unlike ourselves" (p. 411). When successful, connecting to new networks has its benefits.

Bridging to new networks allows people to negotiate their way to new opportunities that

may not have availed themselves in their traditional cultural enclaves (Granovetter).

Where bonding relationships have been known to benefit individuals within their own

communities and help people to get by; bridging social capital helps people get ahead (Briggs, 1997).

Putnam (2000) used the example of bowling to demonstrate differences between bonding and bridging behavior. When bowling with close friends, members of the group play on a single bowling lane and generally restrict their interactions to members within their own group. When bowling in leagues, teams switch lanes and meet members of other teams. Granovetter (1973) found that bridging social capital could be more effective than bonding because it can connect people to resources not available within dense networks. "Compared with bonding, bridging is perhaps more difficult to generate and sustain because it requires that people look beyond their immediate social circles and depends on institutions capable of nurturing cooperation among heterogeneous groups" (Wuthnow, 2002, p. 670). Both types of social capital have their benefits, but bridging social capital is commonly viewed as being positive, particularly when it comes to helping people get ahead (Briggs, 1997; Patulny & Svendsen, 2007).

Decline of Social Capital

Putnam (2000) warned of the erosion of social capital when he wrote of the decline in civic engagement. He noted that over the past few decades, there has been a significant decline in participation in clubs, bowling leagues, picnics, and other social outlets. According to Putnam, social engagement today has reached an all-time low since the Great Depression. Nowadays, fewer people are voting, attending religious services, volunteering, and joining civic clubs. Putnam identified television watching as the primary culprit for the decline in social capital. He hypothesized that television watching

competes for scarce time, has psychological effects that inhibit social participation, and has certain programming content that undermines civic motivation.

Putnam (2000) posited that another technology, the Internet, has the potential for counteracting this decline in civic engagement. Others, such as Lin (1999) as well as Hampton and Wellman (2001) agree that the Internet provides opportunities for people to communicate and develop social capital. Hampton and Wellman wrote, "The Internet has the capacity to foster global communities, in which ties might flourish without the constraints of spatial distance" (p. 479). In the next section on *Sociotechnical Capital*, this literature review will examine how technology, particularly the Internet is regarded by scholars and researchers alike, as a rich resource for the creation of social capital (Lin; Putnam). Table 17, located in Appendix F, contains a summary of the various studies and theoretical commentaries on social capital discussed in this section of the literature review.

Sociotechnical Capital

The Internet and Social Capital

Scholars, such as Putnam (2000) and Lin (1999) have recognized the potential of the Internet to connect people on a global scale. Putnam wrote:

Communication is a fundamental prerequisite for social and emotional connections. Telecommunications in general and the Internet in particular substantially enhance our ability to communicate; thus it seems reasonable to assume that their net effect will be to enhance community, perhaps even

dramatically. Social capital is about networks, and the Net is the network to end

all networks. (p.171)

Lin (1999) wrote, "The rise of the Internet and cybernetworks signals a

revolutionary growth of social capital" (p. 237). Entering the online community has

opened opportunities to communicate and associate with people on a wide variety of

topics (Lin, 1999; Warschauer, 2003). Additionally, the Internet has become a pervasive

technology for family, friends, coworkers, and strangers to establish, maintain, and

broaden their communication channels (Gordon et al., 2007; Wellman et al., 2001). The

Internet transcends the barriers of space and time making it easier and more affordable

for people to communicate with one another (Lin; Wellman et al.). Lin stated, "There is

strong evidence that an increasing number of individuals are engaged in [ICTs] and there

is little doubt that a significant part of the activities involve the creation and use of social

capital" (p. 46).

Warschauer (2003) posited that entering the world of computing can be complex.

Just owning a computer has caused people to rely on their social networks to obtain help.

For example, it is common for a new computer user to call upon on friends, family, or

neighbors to assist with the purchase decision, software program installation, and training

to use the computer system. Wellman et al. (2001) theorized, "when people use the

Internet to communicate and coordinate with friends, relatives, and organizations—near

and far—then it is a tool for building and maintaining social capital" (p. 451).

Social capital derived from online behaviors has been met with skepticism by

some researchers and scholars alike, such as Nie (2001) as well as Nie, Hillygus, and

Erbring (2002). For example, Nie found that online behavior atrophied offline social

relations, thus having just the opposite effect on social capital development. Hampton and Wellman (2001) observed that "contemporary dystopians suggest that the lure of new communication technologies withdraws people from in-person contact and lures them away from their families and communities" (p. 478). Nie wrote, "Whatever wonderful things the wired and wireless will bring, a hug is not one of them. At issue is whether there will remain in our society the many places where hugs can be given" (p. 434).

Resnick's Theory of Sociotechnical Capital

Resnick (2002) referred to the development of social capital through a combination of social relations from using ICTs as *sociotechnical capital*. Resnick posited that the emphasis is not on how the social relations and ICTs affect each other, "but how they jointly influence the ability of people to act together" (p. 649). Resnick described five kinds of online social relations that can produce sociotechnical capital: group awareness, brief interactions, maintaining ties, support for large groups, and introducer systems.

Enhanced group self-awareness can lead to greater investment in activities that help build networks (Resnick, 2002). For example, people can develop a sense of identity by joining a common discussion forum, or being members of the same email list. Kazmer (2006) noted that "histories maintained through ICT allow members of a group to visualize and analyze their shared interactions (p. 175). Further, Kazmer and Haythornthwaite (2001) observed that the "Internet defies designation as maintainer of just one social world—it is instead a medium through which we have the opportunity to maintain multiple social worlds" (p. 512).

A second kind of social relation Resnick (2002) identified was the brief interaction through ICT applications like IM and email, which keeps people in touch with friends and coworkers throughout the day. Within this context, email can be used for maintaining relationships with strong ties while replacing infrequent lengthy get-togethers (Kazmer, 2006). Email can also be used between strangers, whether in the same organization or those from the outside world, which can lead to information gains from weaker ties (Constant, Sproull, & Kiesler, 1996). Resnick noted that, "On a larger time scale, some college students today are exchanging short email messages with their parents, siblings, and high school friends, enabling them to maintain relations that likely would have atrophied when their counterparts went to college two decades ago" (p. 14).

Third, ICTs can allow people to maintain ties with little personal investment of their time (Resnick, 2002). People can be productive while maintaining contact from the periphery. Kazmer (2006) wrote, "ICT[s] allow individuals to stay tied to others via shorter interactions, multitasking while interacting, and/or occasional interactions" (p. 175). ICTs can free up time needed for other tasks or maintain longer, quality contact with preferred relationships (Resnick).

A fourth kind of social relation that Resnick (2002) identified was that ICTs can provide support for large groups. Kazmer (2006) wrote that ICTs "allow for coordination of effort, cooperative activity, and knowledge sharing among large numbers of people" (p. 175). For example, recommender systems, like eBay™ or Amazon.com™, can assist in building trust among large numbers of members who do not know of one another's reputation. Rating systems can then be used to provide feedback on whether the buyer or seller has had positive past transactions.

Resnick (2002) identified introducer systems as the fifth type of social relation from ICT use that can produce sociotechnical capital. Examples of introducer systems include social network applications, online dating sites, and group directories that help connect people with common interests (Kazmer, 2006). According to Resnick, introducer systems are the electronic equivalent of introducing friends and colleagues to one another, except when online, the social ties can be more diffuse. For example, Web sites, such as sixdegrees.com^{TM}, "automatically pass messages on to 'friends-of-friends', a form of automatic introduction" (Resnick, p. 17). According to Resnick, it is hard to determine who to trust on the Internet and introducer systems can help build trust through the virtual word-of-mouth.

Sociotechnical Capital Research

Prior research has shown that social relations developed online can benefit offline relationships and behaviors (Hampton & Wellman, 2001; Kazmer & Haythornthwaite, 2001; Wellman et al., 2001). For example, research conducted by Wellman et al. found that socially and geographically dispersed friends used the Internet to stay in contact with one another and such contact improved their offline relationships. Additionally, Wellman et al. found that people involved in online organizational and political activities were more likely to be involved in these same kinds of activities offline. Results from Wellman et al.'s study suggest that the effect of the Internet on social contact is supplementary. Specifically, Wellman et al. found that the Internet was primarily used to maintain ties with existing relationships. According to Wellman et al., it is becoming increasing clearer

that relationships formed online continue in the physical world and lead to "new forms of community characterized by a mixture of online and offline interactions" (p. 438).

Hampton and Wellman (2001) had similar findings as Wellman et al. (2001), in their in-depth study on Netville, a new suburb in Toronto, Canada, where 60% of the residences were provided free broadband access. Hampton and Wellman found that "wired" residents not only communicated with persons in a wider radius of their home, but also had more contact with the non-wired residents than the latter had among themselves. Hampton and Wellman concluded that the Internet fostered "glocalization"— the increase of local as well as global contact (p. 492).

In their first HomeNet study, Kraut, Patterson, Lundmark, Kiesler, Mukhopadhyay, and Scherlis (1998) reported negative effects of using the Internet on social involvement among Internet users. When Kraut, Kiesler, Boneva, Cummings, Helgeson, and Crawford (2002) revisited their HomeNet study they found that the main effect of Internet use on social involvement was found to be generally positive. Kraut et al. (2002) surmised that the inconsistency between the two studies could be due to the wide-spread use and maturation of Internet users. In their second study, Kraut et al. (2002) found that in general, participants who used the Internet more had larger increases in the size of their local social circles, distant social circles, and face-to-face interactions with family and friends. (This was just the opposite findings from the first study). Kraut et al. (2002) also found Internet users to be more involved in community activities and felt greater trust in people. There were, however, differences in social involvement between extraverts and introverts. Kraut et al. (2002) characterized this difference as the "rich get richer" phenomenon. That is, those that are more socially outgoing and have

existing social support systems will inherently benefit more from using the Internet. Kraut et al. (2002) concluded that using the Internet predicted better outcomes for extraverts and worse outcomes for introverts.

Studies of Sociotechnical Capital and Educational Gains

Studies on sociotechnical capital and higher education have generally shown positive academic outcomes for students who use ICTs (Boles, 1999; Duggan, 2005; Kelly, Duran, & Zolten, 2002). For example, a study conducted by Boles examined student attitudes about email use and the effect of email on the learning process. Boles found that the use of email improved the level of learning of the students, increased the student-student and student-instructor interactions, promoted some aspects of life-long learning, and contributed to the overall satisfaction of both the students and instructors. Specifically, about 78% of the respondents agreed that email made it possible for group members to communicate regarding assignments, and more than 61% thought that email was a good medium to facilitate group discussions.

In another study on educational gains through email use, Kelly et al. (2002) found that students who may have been uncomfortable asking a question in front of a classroom full of their peers thought nothing of asking the same question of their instructor through email. Kelly et al. observed that even though reticent (avoid communication for fear of looking foolish) and non-reticent students used email equally, reticent students felt more comfortable and preferred to use email to communicate with faculty over oral communication methods. PEW (2002) found similar results in their study, where 46% of students reported using email to contact their professors to express ideas that they would

not have expressed in a face-to-face class. PEW further reported that more than half the students emailed a professor to inquire about a grade, while two-thirds used email to report absences. Gatz and Hirt (2000), however, warned that if one were to measure the physical and psychological energy exerted in an education endeavor, then it takes less energy to contact a faculty member by email than to go to their office, as well as less energy to keep current with a club or organization by reading minutes online, then attending and participating in the meeting.

Other positive educational gains from student use of ICTs were found in studies by Duggan (2005) and Strayhorn (2006). Duggan explored differences between FG and CG students on their first-year persistence rates and found a positive correlation between having an email account and persistence in college. Specifically, Duggan found that 25% of the FG students without an email account failed to persist, compared to 15% of the CG students. For students who did have email accounts, whether first- or second-generation, 94% re-enrolled in school. Where Duggan found higher persistence rates among students who used email, Strayhorn (2006) found that students who demonstrated higher technology behaviors performed better in school, too.

Strayhorn (2006) investigated the responses from students who completed the College Student Experiences Questionnaire (CSEQ) on the quality and quantity of their involvement in college activities and their use of college facilities, including technology. Strayhorn explored differences between high- and low-users of technology with respect to their overall self-reported educational gains. Strayhorn found four technology behaviors that were strong predictors of educational gains: searched the Internet for course material, used computers to analyze data, used an index or database to find

material, and retrieved off-campus library material. Given the findings of positive educational gains from technology use, Strayhorn recommended that faculty and administrators consider increasing the adoption and diffusion of technology on their college campuses.

Other studies of the use of ICTs in education have had mixed results. In an exploratory study, Gatz and Hirt (2000) examined whether college students used email in lieu of traditional behaviors that lead to academic and social integration. Gatz and Hirt found that some students used email to avoid direct communication with one another, such as fighting and apologizing. Avoidance can have negative consequences in that it can impede students from acquiring important social skills like commitment, trust, and reciprocity, which are essential for developing social capital (Patulny & Svendsen, 2007; Woolcock & Narayan, 2000; Yuan et al., 2006). Gatz and Hirt also found that students spent significant amounts of time online and used email extensively. Specifically, the participants went online to check, send, write, and respond to email messages. The largest percentages of messages were to and from high school friends (26.6%) and parents (10.8%). Gatz and Hirt noted that the extensive sending and receiving of email to persons in the participants' bonding relationships continued far into the 11th week of classes. Gatz and Hirt reported that email was used in lieu of some traditional academic and social integration behaviors. They concluded that email provided modest gains in social integration, but less so for academic integration. Comments by some of the participants suggested that email may have had a deleterious affect with respect to academic achievement, as it took away from time better spent on school work.

Criticism of Sociotechnical Capital

While some research has provided evidence that the Internet can be a resource for the development of sociotechnical capital, others have found just the opposite to be true (Nie, 2000). Warschauer (2003) noted several arguments as to why the Internet might not promote sociotechnical capital. For one, the more time people spend online is less time spent in the "immediate social environment" (Warschauer, p. 318). A study by Nie et al. (2003) found that Internet use at home had a negative affect on the time spent with family and friends, while Internet use at work was strongly related to decreased time spent with colleagues. Nie et al. concluded that "time online is largely an asocial activity that competes with, rather than complements, face-to-face social time" (p. 2).

A second argument against positive gains of sociotechnical capital is that people can hide behind anonymity or feel less inhibited, thus expressing sharper feelings of hostility when interacting from a safe distance (Warschauer, 2003). In the literature discussed by Warschauer, he noted that some of the fastest growing uses of the Internet reinforced anti-social behaviors, such as viewing pornography and gambling. Warschauer also wrote of the concern that online communication may *supplant* rather than *supplement* face-to-face interaction: "Think, for example, of a school class that carries out an international exchange with students in another country while missing opportunities to interact more directly with different social or ethnic groups in its very own city" (p. 318). Nie (2001) observed that email promoted a superficial contact that lacked the depth or emotion of face-to-face communication. Wellman et al. (2001) warned that the "Internet can draw people's attention away from their immediate physical environment because when they are online they pay less attention to their physical and

social surroundings" (p. 439). Additionally, Wellman et al. found that larger social networks developed through online contact tended to be weaker, possibly due to negative interactions, such as flaming between strangers, which resulted in lower commitment to online communities.

For some scholars, gains from engaging in sociotechnical capital behavior can soon be lost (Kazmer, 2006). Kazmer noted that there is a transient nature to the Internet that can cause a loss of sociotechnical capital. This loss can occur when members stop engaging in the sociotechnical practice for any number of reasons (disgruntled, forcibly removed, etc.). The loss can also occur should the ICT (such as a Web site) become off-limits or is dismantled altogether. According to Kazmer, there is little research on what occurs to sociotechnical capital when members disengage from their online communities.

Skepticism on the potential of the Internet to foster sociotechnical capital has been supported in research (Kraut et al., 1998; Markus, 1994). For example, a study by Markus on email use in the workplace found that even though managers used email for convenience, there were also negative outcomes from its use. Markus conducted a descriptive case study of a single, geographically dispersed organization in order to explore the technology intentions and email use patterns of employees and managers. Markus found that managers and employees used email in the workplace to avoid negative social consequences. Email contributed to misinterpretation, anger, and depersonalization among other negative social outcomes. Managers in particular expressed concern that even though email was a preferred work-related communication media, heavy use threatened the quality of the boss-subordinate relationship. Managers found themselves taking more care in how they composed messages before sending them

out. Other unintended consequences reported from email use included compulsive documentation and aggressive accountability games.

In Kraut et al.'s (1998) first study of HomeNet they found that the Internet had a negative influence on the psychological well-being for those participants who spent extensive time engaged in online activities. Greater use of the Internet was associated with increased reports of depression and loneliness. Even though the Kraut et al.'s (2002) follow-up study found positive gains in areas of social involvement, they too found that participants reported an increase in daily life stress and hassles with Internet use. Kraut et al. (2002) found that introverts, who used the Internet extensively, were lonelier than those who used it rarely. Kraut et al. (2002) speculated that whether extensive use of the Internet has positive or negative gains, should be evaluated in the context in how people are spending their time. For example, if the Internet is used predominantly to communicate with family and friends, this behavior can be supplemental in sociotechnical capital development. There is probably little sociotechnical capital to be gained from online behavior centered about activities such as downloading music or playing computer games.

Technology-enabled Bonding and Technology-enabled Bridging Behaviors

Just as bonding and bridging are two forms of social capital, TEBD and TEBR behaviors are two dimensions of sociotechnical capital (Williams, 2006). This study will refer to the behaviors associated with the development of sociotechnical capital through bonding relationships as TEBD behavior. In contrast, TEBR behavior will be referred to

as the behaviors associated with the development of sociotechnical capital through

bridging relationships.

TEBD behavior is the use of ICTs to stay in touch with persons in one's bonding

networks, such as family and high school friends (Williams, 2006). For example, a

student who uses an ICT, such as IM, to seek emotional support from a close friend, is

exhibiting TEBD behavior. In addition to emotional support, other dimensions of TEBD

include accessibility to resources, and sociability behaviors (Gatz & Hirt, 2000; Markus,

1994; Williams). That is, when people use ICTs to access resources, such as soliciting

money or asking favors of family members, they exhibit TEBD behavior. TEBD behavior

is also exhibited when people use ICTs to socialize (e.g., organize gatherings, play

games) with others who are familiar to them.

TEBR behavior will be defined as the use of ICTs to communicate with a broad

range of people outside one's traditional culture (Williams, 2006). For college students,

this may include using ICTs to communicate with faculty, staff, or other students at

school for purposes of getting involved in campus and academic activities. For example,

students display TEBR behavior when they use an ICT, such as email, to ask questions of

their professor regarding an assignment, or contact other students regarding an

organizational meeting. Just as with TEBD, TEBR also contains the dimension of

sociability behaviors (Gatz & Hirt, 2000). That is, students can use ICTs both positively

and negatively when communicating with persons unfamiliar to them.

TEBD and TEBR behaviors are important constructs to study because both have

the potential to generate positive outcomes, such as helping students persist towards

degree attainment (Duggan, 2005; Gatz & Hirt, 2000). Depending on the circumstances,

these behaviors can produce negative outcomes (Coleman, 1988). Coleman observed,

"Social capital that is valuable in facilitating certain actions may be useless or even

harmful for others" (p. S98). For example, TEBD behavior can, under certain

circumstances, be counterproductive in aiding students in separating from the

communities of their past. That is, some students may find that their communications

with family and friends interferes with separating and transitioning into college life.

Excessive engagements in TEBD behavior can be a constant reminder of the physical

distance from home as well keep students from attending to their school work. While for

other students, communicating with family and friends may ease the pain of separation—

allowing for a smoother transition into college life. Further, students that use ICTs for

flaming (admonishing) their professors over a grade or arguing with classmates, risk the

negative consequences of TEBR behavior.

Measuring Sociotechnical Capital

Williams (2006) developed and validated an instrument for capturing the

contributions of sociotechnical capital called the Internet Social Capital Scales (ISCS).

Specifically, Williams' instrument differentiated between the bonding and bridging forms

of social capital derived from online and offline social interactions. Williams initially

defined four broad criteria for measuring online and offline bonding social capital.

Through post-test analysis Williams was able to narrow the bonding criteria to two

essential elements: (1) emotional support from family and close friends, and (2) access to

scarce or limited resources such as financial support. Williams further defined and

validated four broad criteria for measuring online and offline bridging social capital.

These elements include: (1) outward looking (curiosity about the world); (2) contact with a broader range of people; (3) a view of oneself as part of a broader group (world view); and (4) diffuse reciprocity with a broader community (favors given to others without expectation of immediate payback). According to Williams, the ISCS instrument can be adapted to specific studies on narrower sets of ICTs, such as email, IM, blogs, and chat rooms.

In addition to using the ISCS instrument on a narrower set of ICTs, Williams (2006) also recommended including measurements of the social network (bonding or bridging networks). That is, Williams recommended including measures of the network of associations for which the ICT is intended, such as friends, family, and strangers. For purposes of this study, the social network associations of FG and CG students will include family, friends, faculty, advisors, administrators, staff, coaches, and other students. Table 18, located in Appendix F, contains a summary Williams' study as well as other studies, theories, and commentaries on sociotechnical capital that were discussed in this section of the literature review.

Internet Communication Technologies

The Internet has provided faster and more affordable communication options for millions of consumers worldwide (Lin, 1999). The massive development of ICTs has led to a significant increase in the range of interpersonal interactive methods people use to communicate (Gordon et al., 2007; To et al., 2008). Gordon et al. observed that, "College students use the Internet more than any other group and have been raised in a computer-oriented society" (p. 682). Wang (2007) reported that 86% of college students are online

users, compared with 59% of the general population. Today, some of the more popular

ICTs used by students attending colleges in the U.S. include email, social networking

Web sites, blogs, IM, and chat rooms (Gooding & Morris, 2008; To et al.).

There are two broadly defined types of ICT delivery methods—synchronous and

asynchronous (Kirkwood & Price, 2005). According to Kirkwood and Price, synchronous

methods of communication occur in near real-time as participants exchange messages.

IM and chat rooms are examples of synchronous communication technologies.

Asynchronous methods of communication do not require both parties to be present during

the transmission (Hampton & Wellman, 2001). According to Hampton and Wellman, in

asynchronous communication, messages can be stored so that they can be viewed,

retrieved, and attended to at a more convenient time. Email, blogs, and social networking

Web sites are examples of asynchronous communication technologies.

Email

Email allows students to communicate to other students, faculty, friends, and

family through email client software that can access the Internet. Email provides

flexibility to both the sender and receiver of the email by allowing both to attend to

written communication at their own conveniences (Nie, 2001). According to Nie, email

can be superior to other forms of communication when it becomes necessary to send the

same message simultaneously to a large number of people. Lightfoot (2006) found that

students put significantly more thought into their email communications with instructors

and groups of their peers than into equivalent face-to-face communication. When

communicating with individual peers, there was no difference in the amount of thought

put in to crafting email messages than to the equivalent face-to-face verbal messages. Lightfoot concluded that students were able to discriminate between email behaviors that could damage them academically (those to the instructor) or socially (those to large groups of peers) from those with minimal negative consequences (casual exchange with a friend).

Research has shown that email remains a popular ICT, even among college students (Chen, Yen, Hung, & Huang, 2008). PEW (2002) reported that 62% of a nation-wide sample of college students identified email as their primary Internet medium. Chen et al., found that when compared to using IM, students who used email performed better when it came to expressing their views and position on a task to resolve an equivocal situation. The email group reported higher communication quality and effectiveness than the IM group did. Debrand and Johnson (2008) examined gender differences when it came to the use and perceived usefulness of email and IM. Debrand and Johnson had mixed results. When it came to the perceived usefulness of email and IM for communicating with persons who were geographically close, there was no significant difference between men and women. However, when communicating with persons who lived at a geographic distance, female students perceived email to be more useful than the male students did. Debrand and Johnson also concluded that "male and female college students use and perceive email and instant messaging in a similar manner" (p. 20). Other studies, such as Boneva, Kraut, and Frohlich (2001) also found that women spent more time communicating with family and friends through email, than men did. Possible implications for this study is that gender may be a mitigating factor when investigating

the TEBD and TEBR behaviors of FG and CG students and therefore will be collected as a demographic variable.

Social Networks

With advances in Internet technology, such as the authoring capabilities of Web 2.0, social networking Web sites have become another popular communication medium among students (e.g., Facebook.com[TM], Myspace.com[TM], Xanga.com[TM], and Friendster.com[TM]) (Fu et al., 2008; Hinduja & Patchin, 2008). Social networking Web sites represent online spaces that allow individuals to meet, share information, and keep in touch. Students use social networking Web sites to communicate with people whom they know from an offline context and with new people, they meet online. Students can be selective in who they will allow to access their Web space (Mayer & Puller, 2008). That is, students can restrict access to their personal information to a narrow set of close friends and family (bonding relationships) and they can allow widespread public access to potential weak-tied relationships. In general, students tend to restrict access to their social network Web site to the closest of friends (PEW, 2002).

Weblogs

A Weblog, or blog for short, is a frequently modified Web page generally ordered in reverse chronological sequence (Herring et al., 2005). Fu et al. (2008) described a blog as an interactive online Web page that acts much like a journal, which is frequently updated by the blogger. Bloggers can add text, images, and links to other Web pages to their personal blog page. Blogs can be set up to allow for a running conversation with

other people who have access to the blog. According to Fu et al., blogs are one of the

fastest growing applications on the Internet and are often included as a feature in social

networking sites. Herring et al. noted that blog Web sites have increased in popularity

among all age groups. The National Institute for Technology and Liberal Education

(NITLE) (2008) Web site reported that there are currently 2.8 million likely active blog

Web sites.

Herring et al. (2005) examined 203 randomly selected blogs to determine how

blogs were used. Herring et al. found that contrary to popular beliefs about blog sites

(e.g., Du & Wagner, 2006), there was less evidence to support blogs as being interlinked,

interactive, and oriented towards external events medium; and instead found blogs to be

used more for individualistic, intimate forms of self-expression with few or no links.

Herring et al. found that people tended to use blogs as a form of self-expression (such as

journaling) and less so for interacting with others. Du and Wagner, however, attributed

the tools of the blog site itself as determining how popular it is and how it is used. Du and

Wagner concluded that a weblog's success is mainly associated with "its ability to

provide value for its users and readers at the content, the technology, and the social

levels" (p. 789). Based on their findings, Du and Wagner speculated that blog sites that

promote community interactivity would be more popular.

Instant Messaging and Chat Rooms

Synchronous methods of communicating through Internet technologies have

become increasingly popular (PEW, 2002; To et al., 2008). IM and chat rooms allow

Internet users to communicate in near real-time. Chat rooms are text-based interactive

applications that typically address dedicated topics (Subrahmanyam, Greenfield, &

Tynes, 2004). As with other types of ICTs, users can interact anonymously. Wang (2007)

wrote, "Chats are real-time communication that requires the coordination of time for all

the participants" (p. 286). Subrahmanyam et al. noted that users can enter chat rooms as

themselves, under aliases, or even pretend to be someone other than whom they actually

are. Subrahmanyam et al. found chat rooms to be more public in nature allowing for

groups of users to join in the threaded conversations. Additionally, chat rooms are used to

discuss sensitive topics such as sexuality. Subrahmanyam et al. found participants to go

to great lengths to overcome the "facelessness" and "placelessness" of the medium in

order to present themselves and learn the identities of others (p. 663). PEW reported that

2% of college students use online chat rooms for communicating with others. Although

less popular than other forms of online media, online chat is doubly as common among

college Internet users as the public (PEW).

Like chat rooms, IM is another ICT used for sending and receiving messages

between mutual subscribers in near-real time (To et al., 2008). IM programs tend to be

more private by nature than chat rooms. Where a chat room can have many users viewing

and interacting in the same chat window, IM tends to be used for exchanging text-based

messages between two online users (Faulhaber, 2002). Additionally, IM allows users to

build and confirm a list of persons they wish to include in what is referred to as a *buddy*

list (Faulhaber; To et al.). IM has become one of the more popular applications among

Internet users (PEW, 2005; To et al.). PEW found that almost half of online teens

preferred using IM to email or text messaging when communicating with their friends.

PEW also reported that two-thirds of all teenagers in the U.S. use IM and 32% of these use IM daily.

There are other popular non-Internet communication devices available for consumer use. For example, cellular phones have enabled persons to reach family, friends, and services from just about anywhere at any time. PEW (2002) reported that the ubiquitous nature of the cell phone has made it a primary choice for students' social communication (p. 15). According to a CTIA and Harris Interactive (2008), four out of every five teens (79%) carry a wireless device, like a cell phone. Additionally, teens reported texting nearly equally as often as they talk. However, for purposes of this study, the focus will remain on studying students' use of ICTs for building social capital. For future studies, examining the effects of technology devices, such as cellular phones and text messaging on college persistence rates would be welcomed. Table 19, located in Appendix F, contains a summary of several studies on various types of ICTs.

Summary of What Is Known and Unknown about the Topic

This chapter provided a review of literature in the areas of college persistence theories, FG status, social capital, sociotechnical capital, and ICTs which served as the theoretical foundation upon which this study was based. Prior research has shown that there is no one single reason that certain students fail to persist in college (Kiser & Price, 2007; Lohfink & Paulsen, 2005; Tinto, 2006). Prior studies have shown there to be numerous background characteristics that influence student persistence in college (Table 15, Appendix F). For example, studies on parental education level found that FG students have a lower persistence rate than their CG counterparts.

Past academic performance has been found to be good predictor of future academic performance (Bean & Metzner, 1985). Studies, such as Ishitani (2003) and Zheng et al. (2002) have shown that high school GPA is a good predictor of college GPA. Students who perform well in college have an increased likelihood of persisting towards degree attainment (DesJardins et al., 2002). Prior studies, such as Warburton et al. (2001) have shown that FG students enter college less prepared and underperform academically when compared to their CG counterparts.

Prior studies, such as Paulsen and St. John (2002) as well as Pascarella et al. (1986) have shown that on average, students with lower SES are less likely to persist in college than students with higher SES are. The majority of students coming from low SES backgrounds tend to be the first in their family to go to college. Many FG students enter college with known at-risk background characteristics. FG students tend to be of a minority status, have dependent children, are non-traditionally aged, live at home, work, and attend school on a part-time basis (Lee et al., 2004; Nuñez & Cuccaro-Alamin, 1998; Pascarella et al., 2004; Terenzini et al., 1996).

Studies of social capital development have shown that people who connect (bridge) to others outside their traditional cultural networks increase their opportunities at upward mobility (Granovetter, 1973; Putnam, 2000). For college students, getting to know others unlike themselves, such as faculty, administrators, staff, and other college students, and getting involved in the social and academic activities of the college increases their chances at persisting to degree attainment (McNeal, 1999).

Studies have shown that ICTs are a potentially rich resource for acquiring social capital. Gatz and Hirt (2002) noted that students used email well into the 11th week of

school to maintain contact with family and hometown friends (bonding relationships).

Gatz and Hirt also noted that students used email more as a means of social integration

than for academic purposes. However, Strayhorn (2006) found significant educational

gains in learning outcomes from student's use of email. Duggan (2005) also demonstrated

that students with email accounts persisted at higher rates than students without.

      What has not been known from prior research were the contributions of using

ICTs for bonding and bridging purposes that may affect student persistence in college.

Specifically, what has not been known were differences in FG and CG students' TEBD

and TEBR behaviors that may have contributed to their persistence in college.

Additionally, what has not been known is a validated metric for measuring the

contributions of TEBD and TEBR behaviors on college persistence. This study addressed

each of these unknowns.

The Contribution This Study Makes to the Field

      After 70 plus years of research on the topic, there has been little change in college

persistence rates (Barefoot, 2004; Braxton et al., 2007). According to Braxton et al., one

in four first-year students fail to persist in college to their second year. Understanding the

underlying reasons for this lack of persistence in college may help formulate institutional

policies that can potentially reduce the exodus of students from the college experience.

Tierney (1992) identified three benefits for improving college persistence rates among

students: (1) students will be able to reap the rewards that a college degree affords; (2)

the institution will be able to maintain income derived from the student's attendance; and

(3) society will be able to utilize the skills of the graduates. Therefore, this study has

added to an existing body of knowledge, two additional factors that may influence student persistence in college—TEBD and TEBR behaviors.

A second contribution this study has made to the fields of social capital, sociotechnical capital, and ICT theories is the creation of a metric that measures the contributions of TEBD and TEBR on college persistence. Such an instrument could also be used in other studies on institutional as well as national persistence surveys in order to see if social capital can be derived from using ICTs under different geographic environments. Additionally, this study has implications for generating future studies that can examine the contributions of using other types of technologies, such as cell phones and handheld devices, on persistence in college.

Chapter 3

Methodology

Overview

The theoretical construct applied to this study comes from the works of Lin (1999), Putnam (2000), Resnick (2002), and Tinto (1993). Lin wrote that measuring social capital from socializing behaviors needed to include the "extent to which individuals are spending time and effort engaging others" (p. 46). Additionally, any measurement of social capital included those behaviors that produced social capital (Putnam). Resnick posited that relationship building using Internet technology is capable of producing sociotechnical capital. As illustrated in Table 1, this study measured social capital in terms of the Internet communication behaviors of FG and CG students associated with the separation and incorporation (social integration and academic integration) stages of Tinto's persistence in college theory. Because the transition stage shares many of the same activities associated with the other two stages, this study did not attempt to measure its contributions to students' persistence in college. Instead, this study assumed that any contribution from the transition stage on persistence in college was captured through data collected on the activities from the other two stages.

Table 1. Tinto's Stages of Persistence and Social Capital Forms Aligned with Dimensions of TEBD and TEBR

Stage of Persistence	Social Capital Form	Study Variables and Their Dimensions
Separation Stage	Bonding	TEBD - Emotional Support (ES) - Accessibility to Resources (AR) - Sociability Behaviors (SB)
↕ Transition Stage ↕		
Incorporation Stage - Social & Academic Integration	Bridging	TEBR - Involvement in Campus Activities (CA) - Contact with Others Unlike You (UY) - Sociability Behaviors (SB) - Academic Activities (AA)

This study addressed the following specific research questions:

RQ1   Is there a significant difference between first-year FG and CG students on their TEBD behavior?

RQ2   Is there a significant difference between first-year FG and CG students on their TEBR behavior?

RQ3   What are the contributions of TEBD, TEBR, SES, and GPA to first-year students' persistence at a 4-year private college in the Midwestern U.S.?

In order to address these specific research questions, a survey instrument was developed based on validated literature, expert panel, and a pilot study. The following sections define the relevant steps and issues on: (a) study variables; (b) study design; (c) instrument development; (d) validity and reliability; (e) population and sample; (f) pre-analysis data screening; and (g) data analysis.

Study Variables

Dimensions of TEBD

By definition, bonding social capital is developed through the interactions of persons that share a common past, such as family, high school friends, and hometown neighbors (Putnam, 2000; Williams, 2006). For students, interactions with bonding relationships take place primarily during the separation stage of Tinto's (1993) theory on persistence in college. Because of its close association with bonding, many of the dimensions of the separation stage serve as dimensions of TEBD. Dimensions of TEBD include emotional support (Williams), accessibility to resources (Putnam), and sociability behaviors (Glaeser, 2001; Markus, 1994; Nie, 2001).

The first dimension of TEBD is that of emotional support. Persons with an emotional support system have access to the social capital produced from the bonding relationship (Williams, 2006). For example, the emotional support by family and high school friends can help ease the pain and stress on students as they separate from home (Tinto, 1993). Gatz and Hirt (2000) noted that students used email to maintain extensive contact with family and high school friends well into the 11th week of school. Gatz and Hirt found that even though ICT usage slowed down in the separation stage, it did allow students to maintain access to their support system. The first dimension of TEBD was measured by the extent to which students used ICTs to seek *emotional support* from their bonding network, noted as TEBD$_{ES}$. The specific survey items, numbered ES1 to ES7, are provided in Appendix B.

The second dimension of TEBD is accessibility to resources. Accessibility to resources, or reciprocity, is the willingness of a person to exchange tangible (e.g., money) and intangible (e.g., putting one's reputation on the line to assist another) assets with others in their bonding network (Putnam, 2000; Williams, 2006). During college, there may be times when a student will call on family or friends for assistance with expenses or other limited resources. A family or friend's willingness to help the student during tough times is an indicator of the presence or availability of bonding social capital that the student may draw upon (Williams). This second dimension of TEBD was measured as the extent to which students used ICTs to *access the resources* of their bonding network, noted as $TEBD_{AR}$. The specific survey items, numbered AR1 to AR5, are provided in Appendix B.

The third dimension of TEBD is sociability behaviors. Social capital develops over time as people get to know one another through their social interactions (Glaeser, 2001). With the growth of the Internet, people are turning more to ICTs for a variety of social reasons, such as social support, friendship, and romance (Gordon et al., 2007; Nie, 2001). Prior research has shown that ICT usage has promoted the number of contacts with family and friends (PEW, 2002). By contrast, Nie reported that ICT usage can be superficial, substituting for the "more time-consuming familial face-to-face meetings or phone conversations" (p. 433). Additionally, students may use ICTs as a way to avoid conflict or argue with others from a virtual safe distance (Markus, 1994; Nie). Students who use ICTs in socially unacceptable ways risk losing access to resources derived from their bonding relationships (Gatz & Hirt, 2000; Markus; Nie). For purposes of this study, the sociability behaviors dimension is measured by the extent to which students used

ICTs for both positive and negative online interactions with family and friends. This third dimension of TEBD was measured by the *sociability behaviors* of students when using ICTs, noted as TEBD$_{SB}$. The specific survey items, numbered SB$_D$1 to SB$_D$4, are provided in Appendix B.

Dimensions of TEBR

The more students engage in social and academic activities the more likely they are to become fully incorporated into college life (Tinto, 1993). Students that successfully incorporate the norms and values of college life are in a better position to persist in college (Tinto). Given that activities associated with the incorporation stage often center around the relationships students have with persons in their bridging networks (Tinto), TEBR includes dimensions of both social and academic integration with persons they met on campus. The specific dimensions of TEBR include involvement in the social and academic activities of campus life (Gatz & Hirt, 2000), contact with a broad range of people (Williams, 2006), and sociability behaviors (Markus, 1994; Nie, 2001).

The greater the degrees of involvement in campus activities, the more likely students are to persist in college (Astin, 1984; Tinto, 1993). For example, Leppel (2005) found that students who were involved in their school's athletic programs were more likely to persist at the same institution from their first-to-second year of college. Gatz and Hirt (2000) found that ICTs could serve as a passive form of campus involvement. That is, students used ICTs to arrange social activities, make new friends, and to keep up to date on campus events (Gatz & Hirt). The dimension of involvement in campus activities examines the extent to which students use ICTs to organize and participate in school

government and clubs. This first dimension of TEBR was measured by the extent of student *involvement in campus activities,* noted as $TEBR_{CA}$. The specific survey items, numbered CA1 to CA3, are provided in Appendix B.

A second dimension of TEBR is the ability of a person to connect with a broad range of people unlike them (Williams, 2006). Granovetter (1973) found that it is the weaker ties of bridging networks that can connect people of different backgrounds. Granovetter posited that weak-tie networks can lead to meeting more people beyond one's traditional circle of family and friends. "As a result, bridging may broaden social horizons or world views, or open up opportunities for information or new resources" (Williams, p.5). Therefore, the second dimension of TEBR was designed to examine the extent to which students discussed issues with persons of different religions, ethnicity, political views, and backgrounds (Williams). This second dimension of TEBR was measured by the extent to which students *connected to others unlike them*, noted as $TEBR_{UY}$. The specific survey items, numbered UY1 to UY5, are provided in Appendix B.

The third dimension of TEBR is sociability behaviors. Just as in bonding relationships, students can use ICTs in both positive and negative ways. Additionally, depending on how ICTs are used, there can be unintended consequences (Markus, 1994). For example, students can spend too much time online in non-social activities, like surfing and game playing, that takes away from the time they could be interacting with other people, whether online or offline (Nie, 2001; Niemz, Griffiths, & Banyard, 2005). Students have also used ICTs to argue, make hostile remarks, compulsively document themselves, play accountability games, and avoid personal contact (Nie).

An unintentional consequence of engaging in negative social behaviors is that students risk losing access to resources available through bridging networks (Gatz & Hirt, 2000; Nie, 2001). Additionally, these negative social behaviors may compromise a student's success at both social and academic integration (Nie; Niemz et al., 2005). For example, Niemz et al. found that excessive Internet use caused academic, social, and interpersonal problems. For purposes of this study, measuring the sociability behaviors needed to address the extent to which students used ICTs for both positive and negative online interactions with their campus communities. This third dimension of TEBR was measured as the *sociability behaviors* of students when using ICTs, noted as $TEBR_{SB}$. The specific survey items, numbered SB_R1 to SB_R6, are provided in Appendix B.

The fourth dimension of TEBR included examining those activities that comprise a student's ability to integrate academically into the college (Gatz & Hirt, 2000). Academic integration is the extent to which students are immersed in academic activities in and outside of the classroom (Tinto, 1973). Such academic activities include the degree to which student's use ICTs to contact faculty, advisors, peers, access institutional resources (e.g., library, research and tutoring centers), and engage in actions that further their academic experience (Gatz & Hirt; Moschetti & Hudley, 2008). This fourth dimension of TEBR was measured by the extent to which students engage in *academic activities*, noted as $TEBR_{AA}$. The specific survey items, numbered AA1 to AA7, are provided in Appendix B.

Demographic Variables: Dimensions of SES and GPA

In addition to examining the contributions of TEBD and TEBR on persistence in college, this study also examined the contributions of SES and GPA. Following Spenner et al. (2004) and Cabrera et al. (1990), this study defined SES on three dimensions: parental education, parental income, and parental occupation. The three dimensions of SES were measured from median scores taken from parental education (SES_{PED}), parental income (SES_{PIN}), and parental occupation (SES_{POC}) using a 5-point Likert scale on each survey item. Scales for each dimension of SES ranged from one to five. Specifically, SES_{PED} was collected as the higher of the father and mother's level of education (Marks et al., 2000). SES_{PIN} was collected as the combined annual income of both parents (Spenner et al.). SES_{POC} was collected as the occupation of the head of the household (Marks, 2008.). The specific survey items, numbered D10 to D12, are provided in Appendix B.

Since high school GPA is known as one of the best predictors of college persistence (Harackiewicz et al., 2002), it was also examined for its contribution to persistence in college. High school GPA was measured using a 5-point Likert scale with values ranging from "< 2.0" to "3.5 or higher" (on a 4.0 GPA scale) (Salaway & Katz, 2006). The specific survey item for high school GPA, numbered D8, is provided in Appendix B.

Persistence

Horn and Carroll (1998) defined persisters as students who stay enrolled the subsequent year at the same institution as well as those whom transfer to another

institution. For purposes of this study, persistence in college was defined as a student's

enrollment from their first-to-second year experience, whether at the same or a different

institution. First-year students who re-enroll in their second year of school, at the same or

a different institution, were considered *Persisters*. Students who do not enroll in any

higher education institution from their first-to second-year were considered *Non-*

persisters. This study followed Cabrera et al. (1992), in the scale for assessing persistence

in college with the use of a nominal scale in which persistence in college was measured

as a binary value where *Persister* = 1 and *Non-persister* = 0. The specific items,

numbered E1 to E3, are provided in Appendix B.

Study Design

The study used a non-experimental design approach. Specifically, this study used

a group comparison approach for addressing RQ1 and RQ2. Survey items measuring

TEBD and TEBR behaviors were collected using Likert scales. Each dimension of TEBD

and TEBR were collected as ordinal data. Persistence was collected as a binary value (1 =

Persister and 0 = Non-persister).

The study also used a predictive design approach for addressing RQ3. According

to Creswell (2005), when using a predictive design approach "researchers seek to

anticipate outcomes by using certain variables as predictors" (p. 328). For RQ3, this

study attempted to predict students' persistence from the first-to-second year of college

based on the contributions of the independent variables of TEBD, TEBR, SES, and GPA.

Specifically, this study used ordinal logistic regression (OLR) to analyze the various

dimensions of TEBD ($TEBD_{ES}$, $TEBD_{AR}$, and $TEBD_{SB}$), TEBR ($TEBR_{CA}$, $TEBR_{UY}$,

TEBR$_{SB}$, and TEBR$_{AA}$), SES (SES$_{PED}$, SES$_{PIN}$, and SES$_{POC}$), and high school GPA, in order to determine those that can significantly predict persistence from the first-to-second year of college.

Instrument Development

A Web-based survey instrument was used for this study. Items for the survey were initially adapted from several validated instruments, such as those used by Elkins et al. (2000), Pace (1990), Wellman et al. (2001), Williams (2006), and Markus (1994). Because survey items came from different sources, an expert panel of higher education professors was assembled to examine the items in order to address issues of content validity (Straub, 1989). Additionally, a pilot study was implemented to address questions that could not be answered by the expert panel, such as the participant's perception of complexity, ambiguity of questions, protocols for administration, and potential response rates (Dillman, 2007; Van Teijlingen et al., 2001).

The survey instrument for this study was divided into four sub-sections, identified in Appendix B. The first two sub-sections of the survey contained items designed to collect data on the dimensions of TEBD and TEBR. The third sub-section of the survey instrument was used for determining persistence status on non-returning students. The fourth sub-section of the survey instrument was used to collect demographic data. Demographic data was collected in order to ensure that the sample used in this study was a good representation of the population (Creswell, 2005).

Developing Technology-Enabled Bonding Measures

The first sub-section of the survey instrument was designed to collect data on FG and CG students' TEBD behaviors. Measurements of TEBD included survey items on how FG and CG students used ICTs to manage the separation stage with persons in their bonding networks. Survey items for measuring TEBD included how students used ICTs for emotional support (TEBD$_{ES}$), accessibility to resources (TEBD$_{AR}$), and sociability behaviors (TEBD$_{SB}$).

Survey items from the First Semester Collegiate Experiences Survey (FSCES) (Elkins et al., 2000), the ISCS (Williams, 2006), and Markus' (1994) study were adapted and used to measure the three dimensions of TEBD (TEBD$_{ES,}$ TEBD$_{AR}$, and TEBD$_{SB}$). Specifically, four of seven survey items for measuring the dimension of *emotional support* (TEBD$_{ES}$) were adapted from FSCES (Elkins, et al.). These four items were derived from dimensions of Tinto's (1993) separation stage, which this study purposes is correlated to bonding behavior. Additionally, survey items from both the Markus (1994) and Pace (1990) studies were adapted for measuring the dimensions of *emotional support* (TEBD$_{ES}$) and *sociability behaviors* (TEBD$_{SB}$). Markus ran an exploratory factor analysis where she demonstrated the reliability of her study's instrument by obtaining a Cronbach's α score of .70 on survey items pertaining to emotional support and .74 on survey items pertaining to sociability behaviors. Finally, three survey items were adapted from the ISCS (Williams) instrument to measure the dimension of *access to resources* (TEBD$_{AR}$). Williams validated his instrument for measuring Internet-derived bonding social capital by eliminating survey items that had a Cronbach's α score of less than .70.

The specific items for measuring the three dimensions of TEBD ($TEBD_{ES}$, $TEBD_{AR}$, and $TEBD_{SB}$), numbered ES1-ES7, AR1-AR3, and SB_D1-SB_D4 respectively, are provided in Appendix B, Sub-Section 1. All other remaining items were added based on feedback from an expert panel (e.g., AR4 and AR5).

Developing Technology-Enabled Bridging Measures

The second sub-section of the survey instrument was designed to collect data on FG and CG student's TEBR behaviors. Measurements of TEBR include survey items on how FG and CG students used ICTs to integrate both socially and academically with their bridging networks. There were survey items for measuring each of the four dimensions of TEBR. First, there were three survey items used to measure the extent to which students used ICTs to engage in *campus activities* ($TEBR_{CA}$). Second, there were five survey items used to measure the extent of how students used ICTs when *connecting to others unlike themselves* ($TEBR_{UY}$). Third, there were seven survey items used for measuring *sociability behaviors* ($TEBR_{SB}$). Fourth, there were seven survey items used to measure the extent of student involvement in *academic activities* when using ICTs ($TEBR_{AA}$).

Survey items from the CSEQ (Pace, 1990), Wellman et al.'s (2001) study, and Markus' (1994) study were adapted and used to measure the four dimensions of TEBR ($TEBR_{CA}$, $TEBR_{UY}$, $TEBR_{SB}$, and $TEBR_{AA}$). Specifically, most survey items associated with the dimensions of $TEBR_{CA}$, $TEBR_{UY}$, and $TEBR_{AA}$, were adapted from the CSEQ (Pace) questionnaire. CSEQ is a national survey instrument of 190 items designed to measure social and intellectual development and involvement of college students. Gatz and Hirt (2000) used selected items from CSEQ for measuring the contributions of email

usage on academic and social integration into college life. The CSEQ survey items used in Gatz and Hirt's study were derived from the two dimensions of Tinto's (1993) incorporation stage—social and academic integration. This study purposed that college students were more likely to develop bridging relationships during the incorporation stage because of their opportunity to meet new people (i.e., faculty, staff, and other students). Additionally, survey items from the CSEQ survey and the Markus study were adapted for measuring the final dimension of $TEBR_{SB}$. The specific items for measuring the four dimensions of TEBR ($TEBR_{CA}$, $TEBR_{UY}$, $TEBR_{SB}$, and $TEBR_{AA}$), numbered CA1-CA3, UY1-UY5, SB_R1-SB_R7, and AA1-AA7 respectively, are provided in Appendix B, Sub-Section 2.

Determining Persistence Variable

Sub-section 3 of the survey instrument measured persistence in college. This sub-section of the survey asked participants if they were enrolled in their current institution, enrolled at another college, or had not enrolled at any college. Students who responded that they have enrolled at the same or another college were classified as *Persisters*. Students who responded that they were not enrolled in any college were classified as *Non-persisters*. The specific items for measuring persistence in college, numbered E1 to E3, are provided in Appendix B, Sub-Section 3.

Developing SES, GPA, and other Demographic Variables

In addition to measuring the contributions of TEBD and TEBR, the survey instrument was also designed to assess two specific demographic variables, SES and

GPA, in order to investigate their contributions to persistence in college. Other demographic variables were collected to assess the background characteristics of the participants in order to examine if the study sample was a good representation of the population (Creswell, 2005). Three specific demographic variables were used to define the dimensions of SES, which included parental education level (SES_{PED}), parental income (SES_{PIN}), and parental occupation (SES_{POC}) (Marks et al., 2000; Salaway & Katz, 2006). Other demographic variables collected included high school GPA, gender, and ethnicity (Chu, 1996; Harackiewicz et al., 2002; Lui & Lui, 1999). These and other demographic variables are included in Sub-Section 4 of the survey instrument.

Prior studies on FG students, such as Elkins et al. (2000), Levy (2007), McCarron and Inkelas (2006), as well as Strayhorn (2006) provided the basis for the survey items used for the development of the demographic section of this study. Additionally, an expert panel and pilot study were implemented to enhance the validity and reliability of the study (Levy, 2006; Straub, 1989). The specific items for examining the demographic variables, numbered D1 through D14, are provided in Appendix B, Sub-Section 4.

Measurement Scales

A mixture of nominal, ordinal, and interval scales were used for this study. This study followed Cabrera et al. (1992), in the scale for assessing persistence in college with the use of a nominal scale in which participants were categorized as *Persisters* or *Non-Persisters*. Persistence in college was measured as a binary value where *Persisters* = 1 and *Non-persisters* = 0.

Ordinal scales were used for survey items on the dimensions associated with TEBD and TEBR. A 5-point Likert scale ranging from (1) "Strongly Disagree" to (5) "Strongly Agree" was used for survey items on two dimensions of TEBD (TEBD$_{ES}$, and TEBD$_{AR}$). A 5-point Likert scale ranging from (1) "Not at all" to (5) "Very Often" was used for all dimensions associated with TEBR (TEBR$_{CA}$, TEBR$_{UY}$, TEBR$_{SB}$, and TEBR$_{AA}$) and one dimension of TEBD (TEBD$_{SB}$).

Data collected on most demographic items were categorical in nature. For example residency status (RES) used a nominal scale where participants were required to select from one of three choices (1) "Live on campus", (2) "Live off campus (not at home)", or (3) "Live off campus (at home)". An interval scale was used on the demographic variable AGE. This study followed Spenner et al. (2004) and Cabrera et al. (1990) in the scale for assessing SES, by using an ordinal scale containing five choices, ranging from low to high values, to measure each of the three dimensions of SES (SES$_{PED}$, SES$_{PIN}$, and SES$_{POC}$). Table 2 lists the specific values for each dimension of SES.

Table 2. Scale Values for Each Dimension of SES

SES$_{PED}$

    1 = Less than H.S.
    2 = Graduated from HS
    3 = Vocational, trade school after HS, or attended some college
    4 = Graduated from college
    5 = Attended graduate school (e.g., masters, PhD, medical, law)

SES$_{PIN}$

    1 = Less than $25,000
    2 = $25,000 – $49,999
    3 = $50,000 – $74,999
    4 = $75,000 – $100,000
    5 = More than $100,000

Table 2. Scale Values for Each Dimension of SES continued

SES$_{POC}$

    1 =   Unskilled laborer (machine operator, factory worker, construction)
    2 =   Manual skilled laborer (farmer, carpenter, plumber, electrician, military)
    3 =   White-collar skilled laborer (clerical, sales, social worker, technicians, musician)
    4 =   Mid-level professionals (teacher, nurse, clergy, small-to-mid size business owner, pilot)
    5 =   Executive, owner of large business, high-level professional (lawyer, doctor, professor, CEO)

Parental education status (PES) was determined by the response the participant provided on the survey item collected for SES$_{PED}$. Participants who selected either "Less than high school" or "Graduated from HS" as the highest education level attained between both parents, were classified as *FG*. All other responses to the SES$_{PED}$ item resulted in the participant being classified as *CG*. The variable PES was measured as a binary value where FG = 0 and CG = 1.

This study followed DesJardins et al. (2002), in the scale for assessing gender (GENDER) with the use of a nominal scale in which GENDER was categorized as *Male* or *Female*. The variable GENDER was measured as a binary value where male = 0 and female = 1. Additionally, this study followed Salaway and Katz (2006) in the scales for assessing high school GPA and first-year college GPA, with the use of an ordinal scale in which "< 2.0" = 1, "2.0 – 2.499" = 2, "2.5 – 2.999" = 3, "3.0 – 3.499" = 4, and "3.5 or higher (on a 4.0 scale)" = 5.

Validity and Reliability

Leedy and Ormrod (2005) defined validity as the "extent to which the instrument measures what it is supposed to measure" (p. 28). There are three key types of validity in

research: internal validity, external validity, and instrument validity (both content and construct) (Levy, 2006). According to Leedy and Ormrod, reliability is the "consistency with which a measuring instrument yields a certain result when the entity being measured hasn't changed" (p. 29). Further, Levy posited that reliability is an evaluation of measurement accuracy. According to Simon (2006), the most common measure of reliability is Cronbach's α. Cronbach's α scores range from 0 to 1. Scores in the high end of the range (>.70) are usually indications that the survey items are reliable (Levy; Simon; Straub, 1989). In the following sections an overview of the validity and reliability issues associated with the instrument used in this study are discussed.

Internal Validity

Leedy and Ormrod (2005) defined internal validity as "the extent to which its [research study] design and the data it yields allow the researcher to draw accurate conclusions about cause-and-effect and other relationships within the data" (p. 97). Straub (1989) further posited, "Internal validity raises the question of whether the observed effects could have been caused by or correlated with a set of unhypothesized and/or unmeasured variables" (p. 151). According to Straub, internal validity questions if there are other variables that can help explain the findings other than the explanation offered by the researcher's hypothesis. Van Teijlingen et al. (2001) concluded, "Well-designed and well-conducted pilot studies can inform us about the best research process and occasionally about likely outcomes" (p. 294). To mitigate threats to internal validity, this study conducted a pilot study in order to review the survey items and experimental

procedures (Leedy & Ormrod; Van Teijlingen et al.). An expert panel was also used to reduce the threat to internal validity (Creswell, 2005; Simon, 2006).

External Validity

Leedy and Ormrod (2005) defined external validity of a research study as "the extent to which its results apply to situations beyond the study itself …, [and] the extent to which the conclusions drawn can be generalized to other contexts" (p. 99). According to Creswell (2005), "threats to external validity are problems that threaten our ability to draw correct inferences from the sample data to other persons, settings, and past and future situations" (p. 293). Cook and Campbell (1979) identified three threats to external validity, which include: (1) the inability to generalize beyond groups in the experiment; (2) the inability to generalize from the setting of the experiment to another setting; and (3) the generalizing of findings to past and future situations.

Sekaran (2003) noted that there are trade-offs between internal and external validity when he wrote, "if we want high internal validity, we should be willing to settle for lower external validity and vice versa" (p. 151). Sekaran noted that field experiments have greater external validity than lab experiments in that the effects of the "treatment can be generalized to other settings that are similar to the one where the field experiment was conducted" (p. 158). Cook and Campbell (1979) posited that external validity could be mitigated in the sampling process. Cook and Campbell recommended several models for increasing external validity, one of which included the model of deliberate sampling for heterogeneity. This approach is used to target classes of people, settings, and times to

ensure a wide range of instances from which each class is represented in the study's design.

A threat to the external validity of this study existed and was noted as a limitation of the study. This study's findings were limited because participants were comprised of a small number of students at a small, private 4-year institution. Therefore, findings from this study should only be generalized to other first-to-second year FG and CG students attending a similar school, where the participants completed the same survey instrument.

Instrument Validity

According to Levy (2006), instrument validity includes content and construct validity. Content validity establishes how well the questions represent all possible questions the researcher can ask (Creswell, 2005). "A measure has content validity when its items accurately represent the construct being measured" (Simon, 2006, p. 77).

To enhance content validity, the instrument used in this study utilized survey items from a variety of validated sources such as Elkins et al. (2000), Pace (1990), Wellman et al. (2001), Williams (2006), and Markus (1994). To further enhance content validity, Straub (1989) suggested having a review process whereby experts in the field can evaluate versions of the instrument until consensus is reached. This study also utilized an expert panel in order to determine if the survey items were representative of the constructs under investigation. The expert panel reviewed the items in the survey to assess dimensions of TEBD (TEBD$_{ES}$, TEBD$_{AR}$, and TEBD$_{SB}$), TEBR (TEBR$_{CA}$, TEBR$_{UY}$, TEBR$_{SB}$, and TEBR$_{AA}$), SES (SES$_{PED}$, SES$_{PIN}$, and SES$_{POC}$), and GPA, as well

as other demographic variables. Survey items were slightly revised until consensus had been reached.

According to Creswell (2005), construct validity is established by "determining if the scores from an instrument are significant, meaningful, useful, and have a purpose" (p. 165). Straub (1989) posited that construct validity requires that the measures show stability across methodologies. Construct validity can be substantiated using statistical and nonstatistical procedures (Creswell, 2005). According to Creswell, scores can be examined to see if the data supports what was expected of the relationship in the theory.

Straub (1989) wrote that construct validity "asks whether the measures chosen are true constructs describing the event or merely artifacts of the methodology itself" (p. 150). According to Straub, when constructs are valid, "one can expect relatively high correlations between measures of the same construct using different methods and low correlations between measures of constructs that are expected to differ" (p. 150). Levy (2006) wrote that construct validity could be enhanced by examining the "correlations between total scores and items scores and … by examining the result of factor analysis" (p. 144). In order to strengthen construct validity, this study conducted a pilot study in which data was collected and examined for instrument modification (Simon, 2006).

Reliability

This study evaluated the reliability of TEBD and TEBR measurements by using Cronbach's α scores. Cronbach's α is the most commonly used measure of internal reliability (Simon, 2006). Cronbach's α scores of each of the three dimensions of TEBD ($TEBD_{ES}$, $TEBD_{AR}$, and $TEBD_{SB}$) and four dimensions of TEBR ($TEBR_{CA}$, $TEBR_{UY}$,

$TEBR_{SB}$, and $TEBR_{AA}$) were obtained to determine which items were and were not

measuring the intended construct. Cronbach's α scores of over .70 for a given construct

indicate that the construct is reliable (Levy, 2006). Items were evaluated for their

contribution to the overall Cronbach's α score of each construct. Items that demonstrated

a decrease in the overall Cronbach's α score for a given construct ($TEBD_{ES}$, $TEBD_{AR}$,

$TEBD_{SB}$, $TEBR_{CA}$, $TEBR_{UY}$, $TEBR_{SB}$, and $TEBR_{AA}$) were eliminated prior to final

analysis. Results for Cronbach's α scores on each construct were: $TEBD_{ES}$ (.860),

$TEBD_{AR}$ (.930), $TEBD_{SB}$ (.732), $TEBR_{CA}$ (.741), $TEBR_{UY}$ (.850), and $TEBR_{AA}$ (.817).

$TEBR_{SB}$ (was found to have two sub-constructs. One construct measured negative social

behaviors ($TEBR_{SBneg}$) and the second measured positive social behaviors ($TEBR_{SBpos}$).

Cronbach's α scores for $TEBR_{SBneg}$ and $TEBR_{SBpos}$ were .903 and .737, respectively.

Expert Panel

When survey items come from a variety of sources, it is important that the

instrument measure the constructs describing the event versus measuring artifacts of the

methodology (Levy, 2006). Content validity is typically determined through expert

agreement (Creswell, 2005; Simon, 2006). An expert panel can help eliminate irrelevant

items from the instrument, rephrase words, and add new items that assist in measuring the

study's constructs (Hyrkäs, Appelqvist-Schmidlechner, & Oksa, 2003). The expert panel

for this study consisted of four higher education professors. One expert was from the

social sciences field, two from the education field, and one from the information

technology field. The collective backgrounds of these experts included research

experience in college persistence, social capital, and sociotechnical capital theories. The

expert panel for this study made recommended wording changes, corrected typographical errors, and suggested other minor text revisions. Several rounds of reviews were conducted until consensus was reached that the constructs were adequately covered and the wording of each survey item was accurate. The conclusion of the feedback obtained from the expert panel resulted in the instrument that was used for the pilot study and subsequent actual study.

Pilot Study

A pilot study is another method for improving the internal validity of an instrument (Leedy & Ormrod, 2005; Van Teijlingen et al., 2001). Simon (2006) wrote that an advantage of conducting a pilot study is that it can "give advance warning about where the main research study could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated" (p. 79).

A pilot study is generally conducted on a small sample of the target population and can aid in identifying misleading, inappropriate, or redundant questions (Creswell, 2005; Simon, 2006). A pilot study was implemented after the survey instrument had undergone a series of reviews by the expert panel. Approximately 55 participants from the same institution, but from a different age group, were invited to participate in the pilot study. Participants in the pilot study were asked to comment on the problems they encountered with questions that did not make sense and that were poorly worded. Simon noted, "Well-designed and well-conducted pilot studies can inform the researcher on the research process and about likely outcomes" (p. 79).

Not only can pilot studies reveal problems in the survey design, they can also provide insight on response rates and whether incentives are needed (Dillman, 2007). Based on the results of the pilot study, the survey instrument and procedures for administering the survey were further modified. Because there were no non-persisters among the 19 participants who completed the survey, data from the pilot study was not examined using the same descriptive analysis, quick OLR, Mann Whitney U test, or obtaining Cronbach's α scores used in the actual study. The pilot data collected was examined to see if categories for scalar questions revealed that participants were predominantly selecting certain values. The pilot study did reveal issues with some of the questions, such as parental occupation, that were then corrected for the actual study.

Population and Sample

Full-time first-year students who attended the University of Dubuque were invited to participate in the Web-based survey in the Fall of their second year. This was a non-probabilistic, convenience sample because of this study's association with the school. According to the Office of Institutional Research at the University of Dubuque, 33.22% of the 298 first-year students enrolled in the Fall semester of the 2007/2008 school year were FG students (J. Shepherd, personal communication, February 21, 2008). This is similar to the enrollment percentages of FG students found in 1995/1996 BPS study conducted by the National Center of Education Statistics (Kojaku & Nuñez, 1998).

A Web-based survey was administered after the 10th day enrollment in the Fall semester. The 10th day enrollment is the institution's official cut-off date for enrollment into classes. This study invited the institution's returning students, who were enrolled the

prior year as first-year students to participate in the study. By default, these returning

students were classified as *Persisters*. That is, these students persisted from their first-to-

second year at the same institution. Additionally, the non-returning full-time first-year

students from the previous academic year were contacted through postal mail and email

to complete the Web-based survey. Based on how these non-returning students'

responded to the persistence question on the survey, determined whether they were

categorized as *Persisters* or *Non-persisters*. Students who transferred to another college

were categorized as *Persisters* (Horn & Carroll, 1998). *Non-persisters* were those

students who failed to enroll in any 2- or 4-year college (Horn & Carroll; Warburton et

al., 2001).

Given that the first-to-second year persistence rates of students are statistically at

their lowest, it was expected that collecting data from this population group would yield

the largest number of potential non-persisters (Braxton et al., 2007; Elkins et al., 2000;

Horn & Carroll, 1998; Warburton et al., 2001). Additionally, Fowler (2002) suggested

selecting a sample that is "likely to approximate the characteristics of the whole

population" (p. 11). First year students failing to return to school between their first and

second year should be more representative of non-persisters than those who fail to return

between semesters within the same academic year. That is, first-to-second year non-

persisters include students who not only fail to return to college for voluntary reasons, but

also for involuntary reasons, such as academic suspension (Hackman & Dysinger, 1970;

Pascarella & Terenzini, 1980). For many institutions, failure to maintain a minimal level

of performance is grounds for dismissal (Bean & Metzner, 1985). At the institution used

in this study, it takes two consecutive semesters (one year) of poor academic performance to be suspended from the institution.

Another reason for selecting first-to-second year students is that all participants had at least one year of college experience prior to completing the survey. By establishing a minimum criterion of one year of college experience each participant had the opportunity to become exposed to the ICTs of the institution, to have met with their academic advisor (e.g., for course scheduling), to have met faculty, staff, and other students, as well as to have participated in co-curricular activities. Surveying students between academic years should have provided more opportunities for students to engage in TEBD and TEBR behaviors than surveying students between their first and second semesters of their first year.

In the Spring of 2006/2007, 223 full-time first year students were enrolled at the University of Dubuque. In the following Fall, 18% of these students did not return (R. Feller, personal communication, February 21, 2008). Of the non-returning students, 19 were FG students (45%) and 22 were CG students (52%) (R. Feller, personal communication). The institution does not know, however, of the 41 non-returning students, how many persisted and how many failed to persist at another school.

Because of the small numbers of first-year students, an *a priori* approach was used to select the appropriate sample sizes (Dillman, 2007). An *a priori* determination of sample size can help minimize nonresponse because researchers can focus their efforts and costs on chasing down a smaller, more representative set of participants (Sivo, Saunders, Chang, & Jiang, 2006).

Dillman (2007) identified four factors for computing sample size for small populations. These factors include the sampling error toleration (plus or minus 3 to 10 percent), the population size, how varied the population is (using 50/50 as a conservative estimate), and the confidence level (95% for this type of study). Dillman's tailored design method for computing an *a priori* sample size uses the following formula:

$$Ns = \frac{(Np)(p)(1-p)}{(Np-1)(B/C)^2 + (p)(1-p)}$$

Where:

Ns is the completed sample size needed

Np is the size of the population

P is variation in response of the population

B is the sampling error tolerance rate

C is the confidence level

By applying Dillman's (2007) formula to this study an overall population size of 34 non-persisting students were identified by the university administration and an email list was provided for the purpose of this research. The sample population was contacted by postal mail and email, and invited to participate in the study. Additionally, several follow-up emails, and phone calls were made until a desired response rate was obtained. An incentive for completing the survey was offered to all non-returning participants in order to encourage the highest response rate possible and reduce non-response bias (Fowler, 2002).

Pre-Analysis Data Screening

To detect irregularities that may have been introduced into the data collection process, several measures were taken to improve validity. First, to prohibit participants from failing to answer survey items, a Web-based survey instrument was used to ensure that all items were answered prior to the submission of the survey (Levy, 2006). Additionally, using a Web-based survey instrument reduces the probability of errors that may come from the manual entering the data from a paper-and-pencil instrument into a computerized statistical package (Levy).

Second, pre-analyses data screening was applied to trap for response-set. *Response-set* occurs when participants submit the same score for all survey items independent of the content of the question (Levy, 2006). Surveys where all responses are equal in score were examined in order to determine whether they should be eliminated.

Because this study was based on multiple variables, it was necessary to examine the data for cases for multivariate outliers (Levy, 2006). Outliers are observations that deviate from the pattern of the majority of the data (Filzmoser, Garrett, & Reimann, 2005). For example, outliers can be caused when a survey is not properly completed or where a participant is not a member of the intended sample population. Data was examined for outliers by computing the Mahalanobis Distance using an SPSS software package. Cases of outliers were reviewed and removed from further analyses.

Data Aggregation Methods

Survey items associated with separation behaviors formed the dimensions of TEBD (TEBD$_{ES}$, TEBD$_{AR}$, and TEBD$_{SB}$). An aggregated measure for each dimension of

TEBD was calculated. Since all items were ordinal measures, the median for each dimension of TEBD was calculated as follows:

$TEBD_{ES}$ = MEDIAN (ES1, ES2, ES3, ES4, ES5, ES6, ES7)

$TEBD_{AR}$ = MEDIAN (AR1, AR2, AR3, AR4, AR5)

$TEBD_{SB}$ = MEDIAN (SB_D1, SB_D2, SB_D3, SB_D4)

Survey items associated with social and academic integration formed the dimensions of TEBR ($TEBR_{CA}$, $TEBR_{UY}$, $TEBR_{SB}$, and $TEBR_{AA}$). An aggregated measure for each dimension of TEBR was calculated. Since all items were ordinal measures, the median for each dimension of TEBR was calculated as follows:

$TEBR_{CA}$ = MEDIAN (CA1, CA2, CA3)

$TEBR_{UY}$ = MEDIAN (UY1, UY2, UY3, UY4, UY5)

$TEBR_{SB}$ = MEDIAN (SB_R1, SB_R2, SB_R3, SB_R4, SB_R5, SB_R6, SB_R7)

$TEBR_{AA}$= MEDIAN (AA1, AA2, AA3, AA4, AA5, AA6, AA7)

The three survey items associated with parental education, parental income, and parental occupation formed the dimensions of SES (SES_{PED}, SES_{PIN}, and SES_{POC}). Five categories, ranging from low to high, were defined for each of the three survey items. Since all items were ordinal measures, the median for each dimension of SES was calculated as follows:

SES_{PED} = MEDIAN (D10)

SES_{PIN} = MEDIAN (D11)

SES_{POC} = MEDIAN (D12)

Data Analysis

Since the variables in this study were predominantly ordinal in nature a nonparametric tests was used to measure the three research questions. The Mann-Whitney *U* test was used for assessing RQ1 and RQ2. The Mann-Whitney *U* test is used when evaluating whether the medians on a test variable differ significantly between two groups (Leedy & Ormrod, 2005; Strayhorn, 2006). Specifically, the Mann-Whitney *U* test is recommended when the variable being observed between two groups is ordinal in nature (Leedy & Ormrod). For RQ1, the Mann-Whitney *U* test was used to evaluate if there was a significant difference in the medians of TEBD behaviors between FG and CG students. For addressing RQ2, TEBR was evaluated to determine if there was a significant difference in the medians of TEBR behaviors between FG and CG students. The Mann-Whitney *U* test is considered the non-parametric counterpart to the t-test (Leedy & Ormrod).

For RQ3, an OLR was developed as a multivariate approach to assess the predictive value of TEBD, TEBR, SES, and GPA on persistence in college of first-year students. The OLR is used for analysis of data collected on an ordinal scale (Hannah & Quigley, 1996). According to Hannah and Quigley, the OLR becomes a preferable modeling tool since it does not assume a normal and constant variance. When running the OLR, the dimensions of TEBD ($TEBD_{ES}$, $TEBD_{AR}$, and $TEBD_{SB}$) and TEBR ($TEBR_{CA}$, $TEBR_{UY}$, $TEBR_{SB}$, and $TEBR_{AA}$), SES (SES_{PED}, SES_{PIN}, and SES_{POC}), and GPA were treated as independent variables while persistence in college was the dependent variable. Table 3 provides a summary of the statistical test methods used for evaluating each research question.

Table 3. Research Questions with Statistical Test Methods

	Research Question	Variables	Test Method
RQ1	Is there a significant difference between first-year FG and CG students on their Technology-enabled Bonding (TEBD) behavior?	TEBD (ordinal) Parental Education Status (binary) Groups – 2 (FG/CG)	Mann-Whitney U
RQ2	Is there a significant difference between first-year FG and CG students on their Technology-enabled Bridging (TEBR) behavior?	TEBR (ordinal) Parental Education Status (binary) Groups – 2 (FG/CG)	Mann-Whitney U
RQ3	What are the contributions of TEBD, TEBR, SES, and GPA to first-year students' persistence at a 4-year private college in the Midwestern U.S.?	Independent Variables – TEBD, TEBR , SES, and GPA (ordinal) Dependent Variable – Persistence (binary)	OLR

Resources

Resources needed for this study were fairly minimal. A list of student names, email addresses, home addresses, and parent education status was obtained from the institution's enrollment management system. Envelopes, letters, and postage was used for mailings survey invitations to the participants. A Web-based survey instrument was developed by a third-party consulting service at no cost. Incentives in the form of $10 gift certificates were sent to non-returning students for their participation in completing the

survey. Additionally, all participant's names was entered into a drawing for a single

chance at winning a $50 gift certificate. Finally, the institution's copy of SPSS software

was used to analyze the data.

Summary

Tinto (1993) identified three distinct stages of persistence in college (separation,

transition, and incorporation). Putnam (2000) and Lin (1999) observed that social capital

could assist individuals in advancing them towards goal attainment. In the case of

students, acquiring social capital can potentially help in their successful navigation

through the three stages of persistence in college towards degree attainment. Resnick

(2002) further noted that social capital can be developed through online relationships.

Specifically, this study examined the use of ICTs in building social capital among college

students in the context of the separation and incorporation stages of persistence in

college. Because the separation stage tends to involve interactions between students and

persons in predominantly their bonding networks, this study examined the contributions

of TEBD on persistence in college. Additionally, because the incorporation stage tends to

involve interactions between students and predominantly persons in their bridging

networks, this study examined the contributions of TEBR on persistence in college.

To measure the contributions of TEBD and TEBR on college persistence rates,

this study conducted a Web-based survey of first- to second-year full-time students who

had attended a small, private, 4-year college in the Midwestern U.S. An *a priori* method

was used to specify the suitable sample size of non-persisters. Participants were surveyed

on dimensions of their TEBD and TEBR behaviors. For TEBD, these dimensions

included emotional support, accessibility to resources, and sociability behaviors. For TEBR, these dimensions included involvement in both the social and academic activities of campus life, contact with a broad range of people unlike themselves, and sociability behaviors. In addition to capturing data on TEBD and TEBR behaviors, participants were asked to provide data on their demographic characteristics, such as SES and GPA, in order to study the contributions of these variables on student persistence in college.

To ensure the validity of the survey instrument, an expert panel of higher education professionals and a pilot study from the sample population group was conducted. To ensure the study's reliability, Cronbach's α scores were obtained on each dimension of TEBD ($TEBD_{ES}$, $TEBD_{AR}$, and $TEBD_{SB}$) and TEBR ($TEBR_{CA}$, $TEBR_{UY}$, $TEBR_{SB}$, and $TEBR_{AA}$) in order to determine which items were not measuring the intended construct.

The various items associated with the dimensions of TEBD ($TEBD_{ES}$, $TEBD_{AR}$, and $TEBD_{SB}$) and TEBR ($TEBR_{CA}$, $TEBR_{UY}$, $TEBR_{SB}$, and $TEBR_{AA}$) were collected as ordinal data. A Mann-Whitney U statistical technique was used to investigate any significant difference between FG and CG students on their TEBD and TEBR behaviors. Finally, an OLR was used to investigate the predictability of TEBD, TEBR, SES, and GPA on persistence in college.

Chapter 4

Results

Overview

This chapter contains the procedures used in this study and the results obtained in the analysis. Survey validation procedures are presented, which include a description of the expert panel process and pilot study. Next, the results of the pre-analysis data screening are presented followed by a summary of the demographic data on FG and CG students, as well as Persisters and Non-Persister. Results of the reliability analysis, Mann-Whitney U test, and OLR analysis are presented. The chapter concludes with a summary of the results of the study.

Survey Validation Procedures

Expert Panel

An expert panel was assembled to review the proposed survey. Several rounds of reviews were conducted. The expert panel recommended a usability study of the Web survey to obtain student feedback on the wording of the questions, as well as to help ascertain if the choices for coding the item on parental occupation were clear to students. Student feedback from the usability study was used to further improve upon the survey in Web form. The expert panel reviewed the survey until consensus was obtained on the wording of the survey items. For example, minor revisions, such as text phrasing and

changes to typographical errors were recommended and implemented. The result of conducting an expert panel helped produce the instrument used for both the pilot and the actual study.

The survey instrument, presented in Appendix B, was designed to be delivered in a Web-based format. The delivery method was selected because the Web-based format allowed the survey to be coded in such a way that would minimize data entry errors (Dillman, 2007). In the Web-based format, participants were required to answer all questions. In cases where the participant did not have access to the Internet, a paper version of the survey was mailed to the address the participant supplied.

Pilot Study

A pilot study was conducted to evaluate the procedures of the study as well as examine the pilot data for any anomalies. The pilot study revealed several issues with the survey. One, a duplicate question had been programmed in the Web-based survey. Second, the coded values for item D12 (parental occupation) included the option "never worked." The option "never worked" created a 6-category Likert scale which was inconsistent with the 5-category Likert scales used for all other variables. The concern was brought back to the Expert Panel and they decided to remove the option "never worked" as this was not an occupation. Finally, the values assigned to the negatively worded items were reversed.

Of the 55 students solicited to participate in the pilot study, 19 completed the survey (35% response rate). All 19 cases reported that they had persisted in school. Because the pilot yielded zero non-persisters, it was decided not to run the statistical

analysis due to concerns about response bias. In addition to improving the items noted earlier, the pilot study also provided feedback on strategies to improve response rate. That is, from the pilot study, students who returned to the institution of study did not appear to require an incentive to complete the survey. For the non-returning students, the pilot study reinforced the need to incorporate an incentive.

The pilot study also revealed some survey items that had not been flagged as requiring a response. This error was introduced when a change in the programming was made to reverse the values of the negatively worded items. The error was noted upon visual inspection of the pilot data where one record contained zeros in some of the question items. The programming code was fixed and there were no cases of unanswered items in the actual study.

The pilot also revealed the difficulty of determining which of the non-returning students persisted at another institutions and which failed to persist altogether. Strategies were developed to assist in identifying persisters from non-persisters in the non-returning student group. One such strategy included obtaining the transcript requests report from the Registrar's office. The transcript request report helped identify potential non-persisters from students who may have transferred to another school. For example, students who did not request transcripts to be sent to another school were targeted as potential non-persisters. Students who did request transcripts to be sent to another institution were targeted as potential persisters.

A second strategy was to obtain retention data from an institutional report maintained on non-registered students (S. Besler, personal communication, May 11, 2009). The retention report identified the reason as to why some of the non-returning

students had not registered for fall classes (e.g. plans to transfer, going into military, etc.). The retention and transcript request reports were used to help identify non-returning students in order to estimate the *a priori* target on non-persisters completing the survey.

Data Collection and Analysis

Response Rate

There were a total of 316 potential survey participants. Of these, 238 returned to the University of Dubuque for their second-year of studies, representing 75.3% of the population. Students who returned to the university were sent solicitation emails inviting them to participate in the survey. Follow-up emails were sent on a weekly basis for three weeks. The remaining 78 students who did not return to the University of Dubuque were mailed letters to their last known address inviting them to participate in the study. Follow-up emails were sent to personal email accounts (non-university accounts), as well as phone calls were made (and in some cases text messages were sent) on a weekly basis for three weeks to encourage the former students to participate in the study.

There were several efforts made to determine the enrollment status of the 78 non-returning students. These efforts included obtaining a transcript request report and a registration data report from the institution, as well as calling students' homes to confirm their whereabouts. Based on these efforts it was estimated that 44 (number estimated based on the two reports) to 58 (number estimated based on phone calls) of the 78 non-returning students transferred to another institution, leaving between 20 (based on phone

calls) to 34 (based on the two reports) who most likely failed to persist in college altogether.

The *a priori* target for sampling non-persisting students ranged from 19 (based on 20 total students in the population) to 30 (based on 34 students in the population) students. Initially, the higher *a priori* number was used as the target for obtaining surveys, until it became evident that the lower number was more consistent with the response ratio of the returned surveys. That is, of the 36 surveys completed by students who did not return to the institution, 10 were completed by non-persisters and 26 were completed by persisting students (36 out of 78 potential surveys represented nearly 50% of non-returning students).

In total, 166 surveys were returned. Of these 156 were completed by students who self-reported persisting at the same or another institution. Having estimated 296 total persisters in the sample, 53% of persisting students completed the survey. According to Creswell (2005) a 50% or higher response rate in survey studies is highly desirable. Furthermore, attaining a high response rate helped to ensure the sample of persisting students was representative of the population, and thereby increased the generalizability of the results (Leedy & Ormrod, 2005).

Of the non-persisting students 10 surveys were completed for a 53% response rate when applying the lower *a priori* target (20 students), or 29% when applying the higher *a priori* target (34 students). Exhaustive measures were taken to improve response rate among non-persisting students including gift incentives, follow-up phone calls, text messaging, and several rounds of e-mail solicitations.

Pre-Analysis Data Screening

After collecting the surveys, manual manipulation was performed on 10 items. There were seven items where data had been coded in reverse order (5 to 1) because the questions were negatively phrased. Later, during preliminary factor analysis, it was determined that by flipping the coded values of all seven items to run from 1 to 5 instead of 5 to 1, a stronger load value could be obtained.

The item for enrollment status (E1) was coded as three possible choices (0 = non-persister, 1 = persisted at same institution, 2 = persisted at another institution). Data was collected using this coding method in order to help identify the enrollment status of the 78 non-returning students. After the data was collected and reviewed, cases where E1 was recorded as "2" (persisted at another institution) were then transformed to "1" to denote persisters. All other cases collected where E1 was either "1" or "0" were left untouched.

A new field was calculated for the data set to store the values for the variable FGCG. Data initially collected for the demographic item D10 (parental education status) were used to calculate whether a participant was an FG or CG student. Cases where participants selected one of the first two categories for highest level of education obtained by either parent ("Less than high school" or "Graduated from HS") were assigned the value "0" to denote FG status. Cases where one of the later three categories ("Vocational, trade school after HS or attended some college," "Graduated from college", or "attended higher level than college") were selected were assigned the value "1" to denote CG status. The original values in D10 were preserved as they were needed for identifying SES_{PED} (one of the dimensions of socioeconomic status).

Lastly, the values in D13 (years of experience accessing the Internet prior to college) needed to be manually manipulated. The first choice, "never" was collected as the value "1". However, the subsequent four choices (two through five) were coded from most to least years of experience as the scale rose. Therefore, the values collected on the second through fifth choices had to be reversed so that the scale rose from least amount of experience to the most amount of experience with using a computer prior to entering college.

Pre-data screening analysis was performed after manual manipulation. The pre-data analysis screening was conducted for three reasons: (a) to examine the data for any irregularities; (b) to deal with any issues of response-set bias, and (c) to deal with any cases of outliers. Mahalanobis Distance Analysis was then conducted to examine the data set for cases of outliers. The Explore analysis was run separately using FGCG as a DV, and then again using Persisters/Non-Persisters (E1) as a DV. Subjects with a Mahalanobis Distance greater than $X^2(38)=88$, were eliminated; in both analyses (FGCG and E1), the same three cases were found. CaseIDs 157, 103, and 87 were then eliminated from the study for further analysis. Results of running Mahalanobis Distance Analysis are presented in Figure 2.
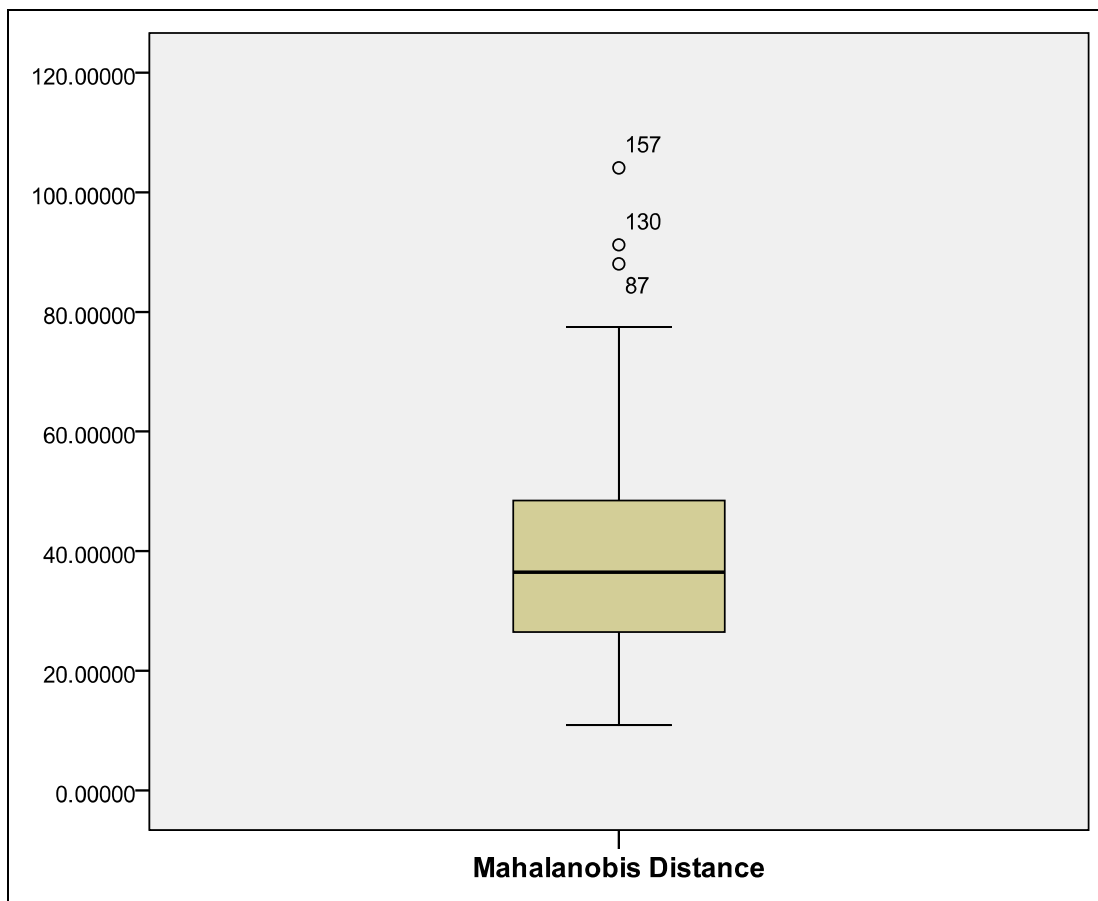
Figure 2. Mahalanobis Distance Analysis for Extreme Cases

A visual examination of the data was conducted and revealed two records of response-set bias. In CaseID 116 all responses in the right-most position of the survey (5s) had been selected. In CaseID 81 the participant had selected the center-most option (3s) for each of the survey items. CaseID 116 was that of a non-persister and CaseID 81 was that of a persisting student. Eliminating both cases for further analysis reduced the total number of non-persister cases to 9 and persister cases to 152. The final number of cases used for analysis was 161.

Descriptive Analysis of Participants

According to Creswell (2005), the sample needs to be an accurate representation of the target population in order to draw conclusions that would be generalized to the population of interest. Demographic data were obtained from the survey population in order to determine the representativeness of the sample. The population of all 316 first-year students at the University of Dubuque consisted of approximately 55% CG and 44% FG students (one was unknown). The respondents in the final data set were 66% CG and 34% FG students. Of the 316 first-year students, an estimated 92% persisted from their first-to-second year of college at either the same or another institution while an estimated 8% failed to persist in school. The respondents in the final data set were comprised of 94% (152) persisters and 6% (9) non-persisters which was consistent with the distribution of the normal population. The nine non-persisters who completed the survey represented about 50% of the non-persisting population. The low number of non-persisters was noted as a limitation of this study. Descriptive analysis frequencies and percentages of the study participants are presented in Tables 4, 5, and 6.

Table 4. Descriptive Analysis of the Study Participants

Item		**Frequency**			**Percentage**		
		FG	*CG*	Total	*FG*	*CG*	Total
Persisters		52	100	152	32.3%	62%	94%
Non-Persisters		3	6	9	2%	4%	6%
	Total	55	106	161	34%	66%	100%

Based on the median values for FG students on SES and high school GPA included: parental occupation = 2 ("manual labor"), parental income = 2 ("$25k - $49,999"), and high school GPA = 3 ("2.5 - 2.99"). The median values for CG students

included: parental occupation = 3 ("white collar"), parental income = 3 ("$50k -

$74,999"), and high school GPA = 4 ("3.0 - 3.49").

Based on the median values for non-persisters on SES and high school GPA

included: parental education status = 3 ("some college"), parental occupation = 3 "white

collar", parental income = 2 ("$25k - $49,999"), and high school GPA = 3 ("2.5 - 2.99").

Median values of persisters on the same key variables included parental education = 3

("some college"), parental occupation = 3 ("white collar"), parental income = ("$50k -

$74,999"), and high school GPA = 4 ("3.0 - 3.49").

Table 5. Descriptive Analysis on Frequency of SES and GPA on DV of Study Participants

SES	Frequency by Dependent Variable			
	FG	CG	Non-Persisters	Persisters
P_Education Status				
< H.S.	9	-	1	8
H.S. Grad	46	-	2	44
Some College	-	37	2	35
College	-	47	3	44
Post College	-	22	1	21
P_Occupation				
Unskilled	26	9	1	34
Manual	8	15	-	23
White-collar	15	30	4	41
Mid-level Pro	5	40	3	42
Executive	1	12	1	12
P_Income				
<$25,000	11	8	2	17
$25k - $49,999	26	23	4	45
$50k - $74,999	9	32	-	41
$75k- $100,000	5	23	2	26
> $100,000	4	20	1	23
H.S. GPA				
Less than 2.0	1	1		2
2.0 – 2.499	6	9	1	14
2.5 – 2.999	15	18	5	28
3.0 – 3.499	18	40	3	55
3.5 or higher	15	38		53

Table 6. Descriptive Analysis on Percentage of SES and GPA on DV of Study Participants

SES	FG	CG	Non-Persisters	Persisters
			Percentage by Dependent Variable	
P_Education Status				
< H.S.	5.59	-	.62	4.97
H.S. Grad	28.57	-	1.24	27.33
Some College	-	22.98	1.24	21.74
College	-	29.19	1.86	27.33
Post College	-	13.66	.62	13.04
P_Occupation				
Unskilled	16.15	5.59	.62	21.12
Manual	4.97	9.32	-	14.29
White-collar	9.32	18.63	2.48	25.47
Mid-level Pro	3.11	24.84	1.86	26.09
Executive	.62	7.45	.62	7.45
P_Income				
<$25,000	6.83	4.97	1.24	10.56
$25k - $49,999	16.15	14.29	2.48	27.95
$50k - $74,999	5.59	19.88	-	25.47
$75k- $100,000	3.11	14.29	1.24	16.15
> $100,000	2.48	12.42	.62	14.29
H.S. GPA				
Less than 2.0	.62	.62	-	1.24
2.0 – 2.499	3.73	5.59	.62	8.70
2.5 – 2.999	9.32	11.18	3.11	17.39
3.0 – 3.499	11.18	28.84	1.86	34.16
3.5 or higher	9.32	23.60	-	32.92

Reliability Analysis

Factor analysis principal component analysis (PCA) was conducted to help identify underlying variables, or factors, to explain the pattern of correlations within a set of observed variables, in order to remove redundant data (Sekaran, 2003). For this study, factor analysis was conducted to determine what, if any, underlying structure existed for measures of the following seven variables: emotional support (ES), access to resources (AR), sociability behaviors bonding (SBd), unlike you (UY), campus activities (CA), sociability behaviors bridging (SBr), and academic activities (AA). Additionally, a

varimax rotation procedure was used. The varimax rotation is the most common rotation procedure used when factors being examined are uncorrelated with each other (Mertler & Vannatta, 2005). The varimax rotation procedure maximizes the variance of the squared loadings of a factor (displayed column-wise) on all the variables (displayed row-wise) in a factor matrix. Using the varimax rotation procedure makes it easier to obtain a pattern of loadings on each factor that are as diverse as possible while easier to interpret.

Eight components emerged upon running the initial PCA. PCA was then conducted a second time and set to retain seven components while again applying a varimax rotation. The purpose for setting the fixed number of factors to seven was to examine if the PCA results would group the seven constructs with their associated variables as defined in this study (three components for TEBD and four for TEBR). Results of running the second PCA did group most variables with their respective construct (e.g., AR1, AR2, AR3, AR4, and AR5 grouped together as component 2). Elimination of five variables (UY4, UY5, AA7, SBr5, and SBr7) was found to increase the model's fit. That is, these five variables grouped with other components instead of their respective constructs. A sixth variable, CA2 showed marginal results. Once the five variables (UY4, UY5, AA7, SBr5, and SBr7) were removed, the remaining variables continued to group with variables from their respective constructs as well as each showed a higher loading. Table 7 provides a summary of the loadings obtained on the variables for each component.

Table 7. Results of Factor Analysis PCA - Component Loading

	Variable	Loading
Component 1: ES	ES3	.773
	ES5	.747
	ES4	.723
	ES1	.705
	ES6	.698
	ES2	.696
	ES7	.650
Component 2: AR	AR3	.883
	AR4	.872
	AR2	.849
	AR1	.845
	AR5	.614
Component 3: SBr	SBr3	.863
	SBr2	.830
	SBr1	.815
	SBr6	.731
	SBr4	.658
Component 4: AA	AA4	.811
	AA5	.739
	AA2	.695
	AA3	.692
	AA1	.676
	AA6	.585
Component 5: UY	UY2	.864
	UY3	.837
	UY1	.733
Component 6: SBd	SBd2	.740
	SBd1	.738
	SBd3	.668
	SBd4	.652
Component 7: CA	CA3	.827
	CA1	.739
	CA2	.605

Reliability analysis using Cronbach's α was conducted on all seven constructs

(ES, AR, SBd, UY, AR, SBr, and AA) to determine consistency across items for each

scale. Seven items, AR5, UY4, UY5, SBr5, SBr7, AA6, and AA7 were removed from the data set as they demonstrated low Cronbach's α scores of their respective constructs and also had either conflicting or very low loadings on the factor analysis results. The construct for CA produced the same Cronbach's α scores with or without the CA2 item included in the analysis. The ambivalent finding on the contribution of CA2 was consistent with the factor analysis. CA2 was kept for further analyses as part of the composite variable for aggregating $TEBD_{CA}$.

In running the reliability analysis, the construct SBr was found to be multi-dimensional. The results showed that the correlation between items SBr1, SBr2, and SBr3 were higher when analyzed separately from SBr4 and SBr6. SBr1, SBr2, and SBr3 produced a Cronbach's α score of .903. SBr4 and SBr6 when loaded together produced a Cronbach's α score of .737. Upon further inspection of survey items SBr1, SBr2, and SBr3, it was determined that these items were intended to measure negative behaviors. SBr4 and SBr6 were items intended to measure supportive social behaviors with employees of the university. The construct SBr was divided into two sub-constructs, SBr_{neg} (SBr1, SBr2, and SBr3) to measure negative social behaviors and SBR_{pos} (SBr4 and SBr6) to measure positive social behaviors. Reliability analysis results for each scale are presented in Table 8.

Table 8. Results of Reliability Analysis on Eight Components

Components		Cronbach's α score
1	ES1, ES2, ES3, ES4, ES5, ES6, and ES7	.860
2	AR1, AR2, AR3, and AR4	.930
3	SBd1, SBd2, SBd3, and SBd4	.732
4	UY1, UY2, and UY3	.850
5	CA1, CA2, and CA3	.741
6	SBr1, SBr2, and SBr3	.903
7	SBr4 and SBr6	.737
8	AA1, AA2, AA3, AA4, and AA5	.817

Mann Whitney U

After determining which variables should be eliminated for further analysis, a Mann Whitney *U* test was used to investigate RQ1 ("Is there a significant difference between first-year FG and CG students on their TEBD behavior?") and RQ2 ("Is there a significant difference between first-year FG and CG students on their TEBR behavior?") Each component was aggregated into a dimension of either TEDB or TEBR.

When analyzing results of the Mann Whitney *U* test a *p* value of .05 was used to answer RQ1 and RQ2. The output from running the Mann Whitney *U* Test generated *z* and two-tailed *p* values. None of the constructs produced a *p* value of less than .05. Therefore, there was insufficient evidence to conclude any significant difference between first-year FG and CG students on their TEBD or TEBR behaviors. The results of running the Mann Whitney *U* Test are presented in Table 9.

Table 9. Mann Whitney *U* Test Statistics of TEBD and TEBR of FG and CG Students

	Mann Whit *U*	**Z**	**p value (2-tailed)**
TEBD$_{ES}$	2627.000	-1.108	.268
TEBD$_{AR}$	2835.000	-.293	.770
TEBD$_{SB}$	2704.000	-.767	.443
TEBR$_{CA}$	2614.000	-1.134	.257
TEBR$_{UY}$	2749.500	-.607	.544
TEBR$_{SBneg}$	2865.500	-.257	.797
TEBR$_{SBpos}$	2775.000	-.557	.577
TEBR$_{AA}$	2737.500	-.658	.511

Variables collected on the dimensions of SES were then tested using Mann Whitney *U* in order to be sure that the results from testing for significant difference on TEBD and TEBR behaviors of FG and CG students were not due to the two groups being homogenous. The three variables associated with SES include parental education (SES$_{PED}$), parental income (SES$_{PIN}$), and parental occupation (SES$_{POC}$).

The results of running the Mann Whitney *U* Test showed significant difference between FG and CG on three dimensions of SES. The high *z* score (-10.734) on SES$_{PED}$ was not surprising since FG and CG students were aggregated on this variable (students who selected "1" or "2" were categorized as FG; students who selected "3", "4", or "5" were categorized as CG). The high *z* scores on the variables SES$_{PIN}$ (-4.280) and SES$_{POC}$ (-5.878) showed FG students came from lower income and lower occupation homes than that of CG students. The finding of FG students having lower SES than CG students is consistent with prior research, such as Bui (2002) and Ishitani (2003). The specific results of running Mann Whitney *U* on the SES characteristics of FG and CG students are presented in Table 10.

Table 10. Mann Whitney U Test Statistics of SES of FG and CG Students

	Mann Whit U	**Z**	**p value (2-tailed)**
SES$_{PED}$	.000	-10.734	.000 *
SES$_{PIN}$	1748.000	-4.280	.000 *
SES$_{POC}$	1314.000	-5.878	.000 *

* $p < .001$

Ordinal Logistic Regression

An OLR model was conducted to determine which independent variables

(TEBD$_{ES}$, TEBD$_{AR}$, TEBD$_{SB}$, TEBR$_{CA}$, TEBR$_{UY}$, TEBR$_{SBneg}$, TEBR$_{SBpos}$, TEBR$_{AA}$,

SES$_{PED}$, SES$_{PIN}$, SES$_{POC}$, and GPA) were predictors of persistence in college (E1). The

logit link function was applied when running the OLR analysis. The case processing

summary output from SPSS showed 9 cases of non-persisters (5.6%) and 152 cases of

persisters (94.4%). Concern is noted that there is a limitation with this study because of

the few number of cases of non-persisters. The small sample has negatively affected the

results.

Regression results obtained indicate an overall model-fit and goodness-of-fit to be

good (-2 Log Likelihood = 69.402; Goodness-of-Fit 40.193; $X^2(12) = 29.209 \; p < .01$).

Results of the overall model fit are presented in Table 11. Results of the goodness-of-fit

results are presented in Table 12.

Table 11. OLR Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig. p
Intercept Only	69.402			
Final	40.193	29.209	12	.004 **

** $p < .05$

Table 12. OLR Overall Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	56.997	148	1.000
Deviance	40.193	148	1.000

Regression results showed the overall model had five predictors that were statistically reliable in distinguishing between persisters and non-persisters. The five predictor variables ($TEBD_{AR}$, $TEBR_{UY}$, SES_{POC}, SES_{PIN}, and GPA) were found significant at $p < .05$, indicating that these variables are related to the dependent variable. Z scores were also calculated and confirmed that variables with z scores >1.96 (or < -1.96) were predictive of persistence in college. Z scores are presented in Table 13.

Two predictors (SES_{PIN} and GPA) had positive log odds, which means as either parental income (SES_{PIN}) or high school GPA increased by one of their respective units, students were more likely to be classified as persisters in college. The three other individual predictors had negative log odds ($TEBD_{AR}$, $TEBR_{UY}$, and SES_{POC}). The negative parameter estimates indicate that as the values of any of these locations of the IVs increased by one of their respective units, students would more likely be classified as non-persisters in college. The two predictor variables with positive parameter estimates (SES_{PIN} and GPA) had much higher odds ratio, 3.25 and 3.30 respectively, than the three

predictor variables with negative parameter estimates ($TEBD_{AR}$, $TEBR_{UY}$, and SES_{POC}) which ranged from .10 to .35. Odds ratios for all variables are presented in Table 13.

Table 13. OLR Model Significance

	Estimate B	Std. Error	Wald	Sig. p	95% Confidence Interval		z	Odds Ratio
					Lower Bound	Upper Bound		
$TEBD_{ES}$	1.125	.839	1.799	.180	-.519	2.770	1.34	3.08
$TEBD_{AR}$	-2.308	.827	7.779	.005 **	-3.930	-.686	-2.79	0.10
$TEBD_{SB}$	.920	.563	2.674	.102	-.183	2.024	1.63	2.51
$TEBR_{CA}$	.589	.637	.856	.355	-.659	1.838	.924	1.80
$TEBR_{UY}$	-1.052	.413	6.482	.011 **	-1.861	-.242	-2.54	0.35
$TEBR_{SBpos}$	-.629	.760	.686	.408	-2.119	.860	-0.82	0.53
$TEBR_{SBneg}$	-14.342	.000	.	.	-14.342	-14.342	-	0.00
$TEBR_{AA}$	.562	.546	1.060	.303	-.508	1.631	1.029	1.75
SES_{PED}	.514	.593	.754	.385	-.647	1.676	0.866	1.67
SES_{POC}	-1.588	.612	6.734	.009 **	-2.788	-.389	-2.59	0.20
SES_{PIN}	1.179	.590	3.995	.046 **	.023	2.335	1.99	3.25
GPA	1.195	.539	4.909	.027 **	.138	2.252	2.217	3.30

** $p < .05$

Summary of Results

The purpose of this chapter was to provide the results of all analyses performed in this study as well as the results of the three research questions. The chapter presented the results of an empirical examination designed to evaluate if significant differences existed between FG and CG students in their TEBD and TEBR behaviors. The results of the investigation designed to measure the contributions of TEBD, TEBR, SES, and GPA on predicting persistence in college was also presented. First, pre-analysis data screening was performed to ensure the accuracy of the collected data. Next, reliability analysis was

conducted on all 38 independent variables to determine how well items in a set were positively correlated to one another. The results demonstrated high Cronbach's α scores for all but seven items (AR5, UY4, UY5, SBr5, SBr7, AA6, and AA7) which were eliminated for further analysis. The distribution of the data collected appeared to be representative of the population of students at the university. There was a slightly higher ratio of CG to FG in the sample than the target population, while the ratio of Persisters to Non-Persisters was consistent between the sample and the target populations.

Two models, Mann Whitney U (non-parametric) and OLR (regression), were used to answer the three research questions presented in the study. Results from running the Mann Whitney U found no significant difference between FG and CG students in their TEBD and TEBR behaviors. Further analysis was conducted on SES to determine if the sample populations were homogeneous. The results of Mann Whitney U showed a significant difference in parental income (SES_{PIN}) and parental occupation (SES_{POC}) between FG and CG students.

Results from the OLR analysis found five variables to be predictive of persistence in college: $TEBD_{AR}$, $TEBR_{UY}$, SES_{POC}, SES_{PIN}, and GPA. Because two predictive variables had positive coefficients, the findings suggested that as parental income (SES_{PIN}) or high school GPA increase by one unit, students were more likely to be classified as persisters in college. Because the three other individual predictors ($TEBD_{AR}$ $TEBR_{UY}$, and SES_{POC}) had negative log odds the findings suggested that as the values of any of these variables increased by one unit, students were more likely to be classified as non-persisters. Again, it is noted that the small sample size (nine responses from non-persisters) has negatively affected the findings in this study.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Conclusions

This chapter begins with a reminder of the goals of this study and the research

questions that were investigated. A review of the analysis is provided along with the

conclusions drawn. Implications for the study and contributions to the body of research

are discussed as well as the study's limitations are outlined. The chapter concludes with

several recommendations for future research and a summary of the investigation.

There were two main goals of this research study. The first main goal was to

develop a model to test differences in the TEBD and TEBR behaviors of FG and CG

college students. The second main goal was to develop an instrument to assess the

contributions of TEBD and TEBR behaviors, as well as SES and GPA, to student

persistence from the first-to-second year in college. The population of this study

consisted of 316 first-year students attending the University of Dubuque, a small, private

4-year college in the Midwestern U.S. The overall response rate obtained for the survey

was 53% (166 cases) with the sampling skewed to slightly more CG students than FG

students. The response rate of CG students and FG students, as well as persisters to non-

persisters were fairly normally distributed and representative of the population.

There were three specific research questions this study addressed. These included:

RQ1   Is there a significant difference between first-year FG and CG students on their TEBD behavior?

RQ2   Is there a significant difference between first-year FG and CG students on their TEBR behavior?

RQ3   What are the contributions of TEBD, TEBR, SES, and GPA to first-year students' persistence at a 4-year private college in the Midwestern U.S.?

A non-parametric test, Mann Whitney U, was used to analyze the first two research questions. Evidence from Mann Whitney U showed there was no significant difference between first-year FG and CG students on their TEBD and TEBR behavior. These findings in one way are consistent with Duggan's (2005) study that found that FG and CG students with email accounts were similar in persistence rates. However, Duggan did not compare persistence rates of FG and CG students on their TEBD and TEBR behaviors. Even though this study found that FG and CG students are similar in their use of technology for developing sociotechnical capital, the findings do not draw any conclusions regarding the persistence in college of FG and CG students based on their TEBD and TEBR behaviors.

Additional analysis was run to determine if the FG and CG students were similar in their SES characteristics. Mann Whitney U again was run to compare FG and CG students on the SES variables of parental income (SES_{PIN}), parental occupation (SES_{POC}), and experience accessing the Internet prior to college (SES_{EAI}). Both SES_{PIN} ($z = -4.280$, $p = .000$) and SES_{POC} ($z = -5.878$, $p = .000$) were found significant at $p = .05$. But, there was no significant difference between FG and CG student on SES_{EAI}. However, when

running Mann Whitney U on the same SES variables for comparing Persisters with Non-persisters (E1), SES_{EAI} was the only dimension of SES that was significant ($z = -2.405$, $p = .016$) between the two groups. Further analysis using OLR showed SES_{EAI} to be a positive predictor of persistence in college. That is, as students compiled more years of experience accessing the Internet prior to entering college, they were more likely to persist in college. It is noted, however, that the use of multiple Mann Whitney U tests can cause an inflation of the overall Type I error rate, particularly when there are unequal sample sizes being compared (Zimmerman, 1998).

Ordinal logistic regression was used to investigate the third research question. Findings showed evidence that certain dimensions of TEBD and TEBR, as well as SES_{PIN}, SES_{POC} and high school GPA were predictors of persistence in college. Specifically, the constructs of SES_{PIN} and GPA showed the highest odds ratio for predicting the likelihood of a student persisting in college. The finding of SES_{PIN} as a predictor of persistence in college is consistent with findings by others, such as Ishitani (2003) who found that as parental income rose so did the likelihood of persisting in school.

This study's finding on high school GPA was also consistent with other studies, such as Astin, (2005), Harackiewicz et al. (2002), and Ishitani (2003), who found that in general, high school GPA was a significant predictor of college persistence. The odds ratio for GPA was strong at 3.03 and produced a significant p score of .027.

This study found SES_{POC} to be a negative predictor of persistence in college which is inconsistent with prior studies, such as Entwisle et al. (2005), Marks (2008), and

Miller and Salkind (2002). The odds ratio for SES_{POC}, although significant, was small

(.20) and had a significant *p* score of .009.

Finally, the finding in this study that $TEBD_{AR}$ and $TEBR_{UY}$ are negative

predictors of persistence in college is inconsistent with the findings of Williams (2006)

and Markus (1994). Williams found $TEBD_{AR}$ and $TEBR_{UY}$ constructs to be positive

predictors for developing social capital, whereas, the findings from this study suggested

that as students increased in agreement with $TEBD_{AR}$ and frequency of $TEBR_{UY}$

behaviors, the likelihood of persisting in college decreased. The findings in this study are

more consistent with Nie (2001) and Niemz et al. (2005) who found as students spent

more time online their academic performance declined. The small sample size (nine) of

non-persisting students is a limitation of this study and therefore the findings cannot be

generalized.

Implications

This investigation has several implications to add to the existing body of

knowledge in the fields of higher education and sociotechnical capital theory. First, a

group comparison model was developed and constructed to explore differences between

two population groups (FG and CG students) on their TEBD and TEBR behaviors. This

model can be used to explore differences in other college populations (e.g., gender,

second-to-third year students, between-semester first-year students, etc.).

Second, this study was designed as a predictive model in order to investigate the

contributions of the constructs of TEBD, TEBR, SES and GPA on college persistence.

The context of this study was focused on first-year college students and how through

technology they could develop social capital, which in turn could improve their chances

at persisting in college. This study did not find significance differences between FG and

CG students on their TEBD and TEBR behaviors. The finding of no significant difference

between FG and CG students in their TEBD and TEBR behaviors is none the less

significant. That is, there has been a great deal of prior research showing differences

between FG and CG students on a variety of factors that have affected their persistence in

college. This study found that at least when it comes to TEBD and TEBR, these two

population groups are similar.

Past research, such as Duggan (1999) demonstrated a digital divide between FG

and CG students. Duggan noted that more CG students had email accounts than FG

students, and students with email accounts persisted at a higher rate than students

without. Since Duggan's study, technology has become more pervasive. Certainly, it

would be rare today to find any college student in the U.S. who did not have access to

email. Similar to Duggan's findings, this study showed there to be no significant

difference between FG and CG students' use of the Internet when it comes to

communicating with persons in their bonding and bridging relationships. The implication

here is that perhaps the pervasiveness of technology has helped FG students who engage

in TEBD and TEBR behaviors persist equally as well as CG students who engage in these

same behaviors. The findings from this study not only support Duggan's work, but also

Strayhorn's (2006) findings that ICTs have the potential to enable students to maintain

contact more easily with the communities of their past thus enabling students to better

integrate into college life. Should this be the case, higher education administrators and

those responsible for retention would be interested in the findings of this study because

these findings show that when at least it comes to using technology, FG and CG students appear to be on a level playing field.

A contribution this study makes to the field of higher education is that when students use the Internet to engage in $TEBD_{AR}$ and $TEBR_{UY}$ behaviors the likelihood of their persistence in college decreases. Even though prior research by Williams (2006) does not support this conclusion, the implications from these findings suggest that as students spend more time online, they are less likely to persist in college, which is consistent with research by Nie (2001) and Niemz et al. (2005). Therefore, college administrators and those with retention oversight should advise students on tempering their Internet use for social purposes.

A contribution this study makes to the understanding of sociotechnical capital is that as students engage in certain kinds of online behaviors with persons in their bonding and bridging relationships they may be less likely to persist in college. This finding, although contrary to sociotechnical capital theory, could imply that spending too much time online socializing could be detrimental to academic life. More research is needed to discern the amount of time students spend engaging in TEBD and TEBR behavior which may help or hinder student persistence in college.

Study Limitations

This investigation had several limitations to report. First, the sample size of non-persisting students was small. Only 10 non-persisting students completed the survey, one of which was eliminated due to response-set bias. It is difficult, even with incentives, to get students who have left the institution to volunteer to participate in a study. This is

evidenced by the 46% response rate of non-returning students who were incentivized by a guaranteed modest gift as well as a chance at winning a second gift; compared to the 54% response rate from returning students who were only incentivized by a single chance at winning a gift. Furthermore, because this study collected data from a single college, any findings generated will be limited to a similar setting and treatment (Creswell, 2005).

Another limitation of this study is that only full-time, first-year students who completed one year (two semesters) of college courses were surveyed. A significant number of students, who fail to persist in college, do so between the fall and spring semesters of their first year of college. It is possible there are differences in the between-semester non-persisters' TEBD and TEBR behaviors and the non-persisters who completed a full year of school. If such differences exist, findings of this study cannot be generalized to the between-semester non-persisting group.

Another limitation of this study was that only ICTs were addressed in the survey. Other technologies, such as cell phones, may have been used as another method for communicating with family, friends, faculty, administrators, and other students (Harley et al., 2007; Ling & Baron, 2007). For example, cell phone contact, particularly texting, may be more prevalent than using Internet technologies when communicating with persons in one's bonding networks (PEW, 2002). Future studies should widen the scope of communication technologies to include the use of cell phones.

A final limitation of this study is the timeframe in which the survey was given in relationship to when the participants were last enrolled in classes. Creswell (2005) noted that the time that passes between the beginning and end of an experiment may threaten the internal validity of a study. The participants in this study were asked to recall

behaviors that took place in the previous academic year; therefore, their memories may not be as clear when recalling past events.

Recommendations and Future Research

This study has several recommendations for future research. The first recommendation is to expand the definitions of TEBD and TEBR to include the use of cellular technology. Many students today use cell phones to stay connected with family and friends by text messaging or voice contact instead of asynchronous methods, such as email (PEW, 2002).

Prior research has shown that some students spend considerable time online engaged in non-academic work that can be detrimental to academic success (Nie, 2001; Niemz et al., 2005). Social networking sites, such as Facebook.com[TM], have become popular among students (Fu et al., 2008; Hinduja & Patchin, 2008) and therefore more investigation is needed to explore significant differences between FG and CG students on the amount of time spent online engaged in social and academic activities that may be predictive of student persistence in college. Similar research by Gatz and Hirt (2000) has shown some significance between persistence in college and email activity.

A third recommendation for this study is to change the methodology used for collecting survey data. It is recommended to use a coded survey and to have participants complete the survey near the end of the spring term. At the start of the fall term institutional data on enrollment status can be gathered and the surveys manually updated by the investigator. For non-returning students, the investigator could contact the participants to find out if they transferred to another institution or are no longer enrolled

in any school. For non-returning students who may be difficult to locate, the investigator could contact a family member or friend who could provide information on enrollment status. For example, if a student entered the military, he or she could complete the survey in the spring, and if not available in the fall, have a family member tell the investigator their enrollment status. This new method would allow for capturing actual college persistence data and address some of the limitations of this study. For example, this new method could increase the probability of attaining a better response rate from non-persisters as well as reduce the time between when students last attended classes and completed the survey.

Finally, it is not known if factors affecting student persistence between academic years are different from factors that affect student persistence between semesters. Therefore, a fourth recommendation is to extend this study by adapting its instrument in order to examine factors that predict student persistence between semesters.

Summary

This dissertation addressed the problem of lower persistence rates among FG college students and whether sociotechnical capital enabling behaviors, as well as SES and high school GPA were predictors of persistence in college. Researchers such as Duggan (2005) demonstrated a need for this study by showing how students who had email accounts persisted in college at a higher rates than those without. Lohfink and Paulsen (2005) pointed out the need for further investigation of factors that affect the persistence of FG and CG students between their first- and second-year in college at four-year institutions.

Literature from four major theoretical disciplines was used to build the theoretical foundation for this study. These disciplines included college persistence, FG college students, social capital, and sociotechnical capital theories. Examples of major studies and their findings were reviewed which included research by Tinto (1993), Putnam (2000), Lin (1999), Bui (2002), Resnick (2002), Williams (2006), Gatz and Hirt (2000), Duggan (2005), and others. Appendix F provides a detailed listing of the various studies discussed in the literature review of this dissertation.

This study used a non-experimental design approach to compare the differences in technology-enabled bonding (TEBD) and technology-enabled bridging (TEBR) behaviors of FG and CG students. The first factor investigated was that of TEBD. Dimensions of TEBD included emotional support (Williams, 2006), accessibility to resources (Putnam, 2000), and sociability behaviors (Glaeser, 2001; Markus, 1994; Nie, 2001). The second factor investigated was that of TEBR. The specific dimensions of TEBR included involvement in the social and academic activities of campus life (Gatz & Hirt, 2000), contact with a broad range of people unlike oneself (Williams), and sociability behaviors (Markus; Nie).

This study also used a predictive design approach aimed at predicting the persistence in college of students based on the contributions of their TEBD and TEBR behaviors as well as socioeconomic status (SES) and high school GPA. Dimensions of SES included parental education, parental income, and parental occupation.

In order to address the research questions, a survey instrument was developed from items adapted from several validated instruments, such as those used by Elkins et al. (2000), Pace (1990), Wellman et al. (2001), Williams (2006), and Markus (1994).

Because the survey items came from different sources, an expert panel of higher education professionals was assembled to examine questions in order to address issues of content validity (Straub, 1989). Additionally, a pilot study was conducted that addressed questions that could not be answered by the expert panel, such as the participants' perception of complexity, ambiguity of questions, protocols for administering, and anticipated response rate (Dillman, 2007; Van Teijlingen et al., 2001).

For investigating the construct of TEBD, the survey was comprised of seven items that addressed ES (emotional support), five items that addressed AR (access to resources), and four items that addressed SBD (sociability behaviors related to bonding relationships). For investigating the construct of TEBR, the survey was comprised of three items for measuring CA (campus activities), five items for measuring UY (unlike you), seven items for measuring SBR (sociability behaviors related to bridging relationships), and seven items for measuring AA (academic activities). The demographic section of the survey included items that addressed the three variables of SES (parental education, parental income, and parental occupations), as well as high school GPA.

A population of 316 students, who completed their first year of study in college at a small, Midwestern U.S. college, was solicited to participate in a Web-based survey. Of these, 166 students completed the survey. Pre-data screening analysis was run to identify outliers and cases of response set bias. A total of 161 cases were used for further analysis. Factor analysis PCA was used in order to improve construct reliability and any underlying variables that did not correlate with a construct were removed. Cronbach's α scores were obtained and constructs with .70 or higher were retained for further analysis.

Findings from running a non-parametric analysis (Mann Whitney *U*) on RQ1 and RQ2 found no significant differences between FG and CG students on their TEBD and TEBR behaviors. Findings from running OLR for the predictive model on RQ3, found two constructs, SES_{PIN} and GPA to be positive predictors of persistence in college. The OLR analysis also found $TEBD_{AR}$, $TEBR_{UY}$, and SES_{POC} to be negative predictors of persistence in college. Specifically, an increase in either dimension of $TEBD_{AR}$ (as access to resources), $TEBR_{UY}$ (communicating with other unlike you), or SES_{POC} (parental occupation increased), found students to be less likely to persist in college. The findings on the negative predictability of $TEBD_{AR}$, $TEBR_{UY}$, and SES_{POC} were inconsistent with what has been reported in prior research (e.g., Williams, 2006 and Marks, 2008). The small sample size of non-persisting students (nine) has negatively affected the findings in this study.

Five limitations were identified, as well as implications to the fields of education and sociotechnical capital. Finally, recommendations for future research were made which included extending this research to 1) include other types of technology communication devices, such as cell phones; 2) examine the contributions of TEBD and TEBR to persistence in college between semesters; and 3) investigate if there are significant differences between FG and CG students on the amount of time spent online engaged in social and academic activities, as well as examine if time spent online is a predictor of student persistence in college.

Appendix A

Study Variables and Measurement Scales

Table 14. Summary of Variables and Scales for Research Questions

RQ1	RQ2	RQ3	Variables	Variable Name	Scales
Obs		IV	**TEBD**		
			Separation	$TEBD_{ES}$	Ordinal
				$TEBD_{AR}$	
				$TEBD_{SB}$	
	Obs	IV	**TEBR**		
			Social Integration	$TEBR_{CA}$	Ordinal
				$TEBR_{UY}$	
				$TEBR_{SB}$	
			Academic Integration	$TEBR_{AA}$	Ordinal
		DV	**Persistence**		
			Enrollment status (Persisters or Non-persisters)	E1	Binary
			Demographics		
			Gender	GENDER	Binary
			Ethnicity	ETHNIC	Nominal
			Age	AGE	Scale
			Residency status	RES	Ordinal
			Semester in school	SEM	Ordinal
			Credit hours taken	CRHOUR	Ordinal
		IV	H.S. GPA	GPA	Ordinal
			College GPA	C_GPA	Ordinal
			Hours of work	WKHOUR	Ordinal
Group	Group	CV	Parent graduated from college (FG/CG)	FGCG (obtained from SES_{PED})	Binary
		IV	**SES**		
			Higher of parents education level	SES_{PED}	Ordinal
			Parents combined income	SES_{PIN}	Ordinal
			Head of household occupation	SES_{POC}	Ordinal
			Experiencing accessing Internet prior to college	SES_{EAI}	Ordinal

Appendix B

Survey Instrument

Sub-Section 1 - Technology-Enabled Bonding (TEBD)

SEPARATION
The following items relate to ways in which you might have used the Internet, such as email, IM, and social networking Web-sites, to communicate with **family members and friends from home**. Using a scale of 1 (Strongly Disagree) to 5 (Strongly Agree) rate your disagreement or agreement with each statement on how you used the Internet when you attended the University of Dubuque last academic year.

---

		(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
ES1	I felt emotionally supported when I used the Internet to communicate with <u>family members</u> about my **college experiences** at the University.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
ES2	I felt emotionally supported when I used the Internet to communicate with <u>friends from home</u> about my **college experiences** at the University.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
ES3	As a result of using the Internet to communicate with <u>family members</u> I felt continuing **support for my decision** to attend the University.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree

		(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
ES4	As a result of using the Internet to communicate with <u>friends from home</u> I felt continuing **support for my decision** to attend the University.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
ES5	Using the internet in college made me **closer** to <u>my family</u>.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
ES6	Using the internet in college made me **closer** to <u>friends from home</u>	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
ES7	I have used the Internet to get help with a **personal problem** from a <u>friend from home</u>.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
AR1	Since in college, I feel comfortable using the Internet to ask <u>family members</u> for **money**.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
AR2	Since in college, I feel comfortable using the Internet to ask <u>friends from home</u> for **money**.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
AR3	Since in college, I feel comfortable using the Internet to ask a family member or friend from home for an **emergency loan** of $500.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree
AR4	Since in college, I feel comfortable using the Internet to ask a family member or friend from home to **co-sign a loan**.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree

AR5	Since in college, I feel comfortable using the Internet to ask a family member or friend from home to help me **get a job** or a better job.	(1) Strongly Disagree	(2) Disagree	(3) Neither Agree nor Disagree	(4) Agree	(5) Strongly Agree

On a scale of 1 (Not at All) to 5 (10 or more times per year) rate each item to describe how you used the Internet to communicate with family members and friends from home when you attended the University of Dubuque last academic year.

SB_D1	Since in college, how often did you use the Internet to send **negative messages** to family members and/or friends from home.	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
SB_D2	Since in college, how often did you use the Internet to discuss **personal problems** with family and/or friends from home.	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
SB_D3	Since in college, how often did you use the Internet to **avoid having face-to-face contact** with family and/or friends from home.	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
SB_D4	Since in college, how often did you use the Internet to **make social arrangements** with family and/or friends from home.	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year

Sub-Section 2 - Technology-Enabled Bridging (TEBR)

SOCIAL INTEGRATION
The following items relate to ways in which you might have used the Internet, such as email, IM, and social networking Web-sites to communicate with **persons you met while in college**. Using a scale of 1 (Not at all) to 5 (10 or more times per year) rate each item to describe how you used the Internet when you attended the University of Dubuque last academic year.

		(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
CA1	How often did you use the Internet to **discuss policies and issues related to campus activities and student government**?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
CA2	How often did you use the Internet to **vote or answer campus surveys?**	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
CA3	How often did you use the Internet to help **organize campus-related activities, clubs, or meetings?**	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
UY1	How often have you used the Internet to communicate with students whose **social interests** are different from yours?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
UY2	How often have you used the Internet to communicate with students whose **family background** is different from yours?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year

		(1)	(2)	(3)	(4)	(5)
UY3	How often have you used the Internet to communicate with students whose **ethnicity** is different from yours?	Not at all	1-3 times per year	4-6 times per year	7-9 times per year	10 or more times per year
UY4	How often have you used the Internet to have **serious discussions** with students whose <u>political views are different from yours</u>?	Not at all	1-3 times per year	4-6 times per year	7-9 times per year	10 or more times per year
UY5	How often have you used the Internet to have **serious discussions** with students whose <u>religious beliefs are different from yours</u>?	Not at all	1-3 times per year	4-6 times per year	7-9 times per year	10 or more times per year
SB$_R$1	How often did you use the Internet to send **negative messages** to a <u>faculty member or your academic advisor?</u>	Not at all	1-3 times per year	4-6 times per year	7-9 times per year	10 or more times per year
SB$_R$2	How often did you use the Internet to send **negative messages** to a <u>an administrator, staff, coach, or admissions counselor?</u>	Not at all	1-3 times per year	4-6 times per year	7-9 times per year	10 or more times per year
SB$_R$3	How often did you use the Internet to send **negative messages** to a <u>other students at the University?</u>	Not at all	1-3 times per year	4-6 times per year	7-9 times per year	10 or more times per year
SB$_R$4	How often did you use the Internet to arrange **non-academic activities (socialize)** with <u>employees of the University</u>?	Not at all	1-3 times per year	4-6 times per year	7-9 times per year	10 or more times per year

SB$_R$5	How often did you use the Internet to arrange **non-academic activities (socialize)** with <u>other students at the University</u>?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
SB$_R$6	How often did you use the Internet to discuss a **personal problem** with <u>employees of the University</u>?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
SB$_R$7	How often did you use the Internet to discuss a **personal problem** with <u>other students at the University</u>?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year

ACADEMIC INTEGRATION
The following items relate to ways in which you might have used the Internet, such as email, IM, and social networking Web-sites to communicate with **persons you met while in college**. Using a scale of 1 (Not at all) to 5 (10 or more times per year) rate each item to describe how you used these when you attended the University of Dubuque last academic year.

AA1	How often did you use the Internet to contact your <u>instructor</u> about **information related to a course** you were taking (grades, make-up work, assignments, etc.)?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
AA2	How often did you use the Internet to **discuss an academic program or course selection** with a <u>faculty</u> member?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year

		(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
AA3	How often did you use the Internet to ask your <u>instructor</u> for **comments or criticisms** about your academic work?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
AA4	How often did you use the Internet to **make an appointment** with a <u>faculty member/advisor/staff/ coach</u>?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
AA5	How often did you use the Internet to work on or **communicate on a class assignment, project, or presentation** with <u>other students</u>?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
AA6	How often did you use the Internet to **access library research databases (e.g., Lexis/Nexis, EBSCO, Credo, UD Journals), eReserve, online newspapers, or magazines**?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year
AA7	How often did you use the Internet to ask for advice or help from the **Academic Success Center**?	(1) Not at all	(2) 1-3 times per year	(3) 4-6 times per year	(4) 7-9 times per year	(5) 10 or more times per year

Sub-Section 3 – College Enrollment

College Enrollment
Check the statement below which best describes your current enrollment status.

E1. ☐   Currently enrolled at the <u>University of Dubuque</u>

E2. ☐   Currently enrolled at <u>another college</u>

E3. ☐   Not currently enrolled at any college

Sub-Section 4 – Demographics

Demographics
Please answer the following statements/questions as accurately as possible.

D1. Select your gender.
__ Male
__ Female

D2. What is your ethnicity?
(check all that apply)
__ Caucasian
__ Black
__ Hispanic
__ Asian Pacific
__ Asian
__ Other: _____

D3. What is your age?
____

D4. What is your residency status?
__ Live on campus
__ Live off campus (not at home)
__ Live off campus (at home)

D5. How many semesters in college have you completed?
__ 1
__ 2
__ 3
__ 4 or more

D6. Last year, on average, how many credit hours did you attempt per semester?

__ No credits attempted
__ 1 - 6
__ 7 - 11
__ 12 – 17
__ 18 or more

D7. What was your cumulative first-year GPA in college on a 4.0 scale?

___ less than 2.0
___ 2.0 – 2.499
___ 2.5 – 2.999
___3.0 – 3.499
___ 3.5 or higher

D8. What was your high school GPA on a 4.0 scale?

___ less than 2.0
___ 2.0 – 2.499
___ 2.5 – 2.999
___3.0 – 3.499
___ 3.5 or higher

D9. Last year, on average, how many hours per week did you work earning a salary, while enrolled in classes?

___ was not employed
___ Employed 1-9 hours per week
___ Employed 10 – 19 hours per week
___ Employed 20 – 39 hours per week
___ Employed 40 or more hours per week

D10. What is the highest level of education of either of your parents?

___ Less than high school
___ Graduated from HS
___ Vocational, trade school after HS, or attended some college
___ Graduated from college
___ Attended higher level than college

D11. What was your parent(s) total gross income last year?

__ Less than $25,000
__ $25,000 – $49,999
__ $50,000 – $74,999
__ $75,000 – $100,000
__ More than $100,000

Head of Household Occupation
Below, which best matches the occupational status of either of your parents' or guardian's occupation?

  (Note: If they are retired select occupation prior to retirement)

D12.	Occupation	___ Unskilled laborer (machine operator, factory worker, construction)
		___ Manual skilled laborer (farmer, carpenter, plumber, electrician)
		___ White-collar skilled laborer (clerical, sales, social worker, technician, musician)
		___ Mid-level professionals (teacher, nurse, clergy, small-to-midsize business owner, pilot)
		___ Executive, owner of large business, high-level professional(lawyer, doctor, professor, CEO)
D13.	Prior to attending college, how long have you used a computer that has been connected to the Internet?	__ Never
		__ Since as long as I can remember
		__ Since elementary school
		__ Since junior high
		__ Since high school
D14.	Prior to attending college, which location did you access the Internet from most?	__ Did not access the Internet prior to college
		__ Home
		__ School
		__ Friend's/Neighbor's home
		__ Other, such as public library

Appendix C

Authorization for Data Collection from the University of Dubuque
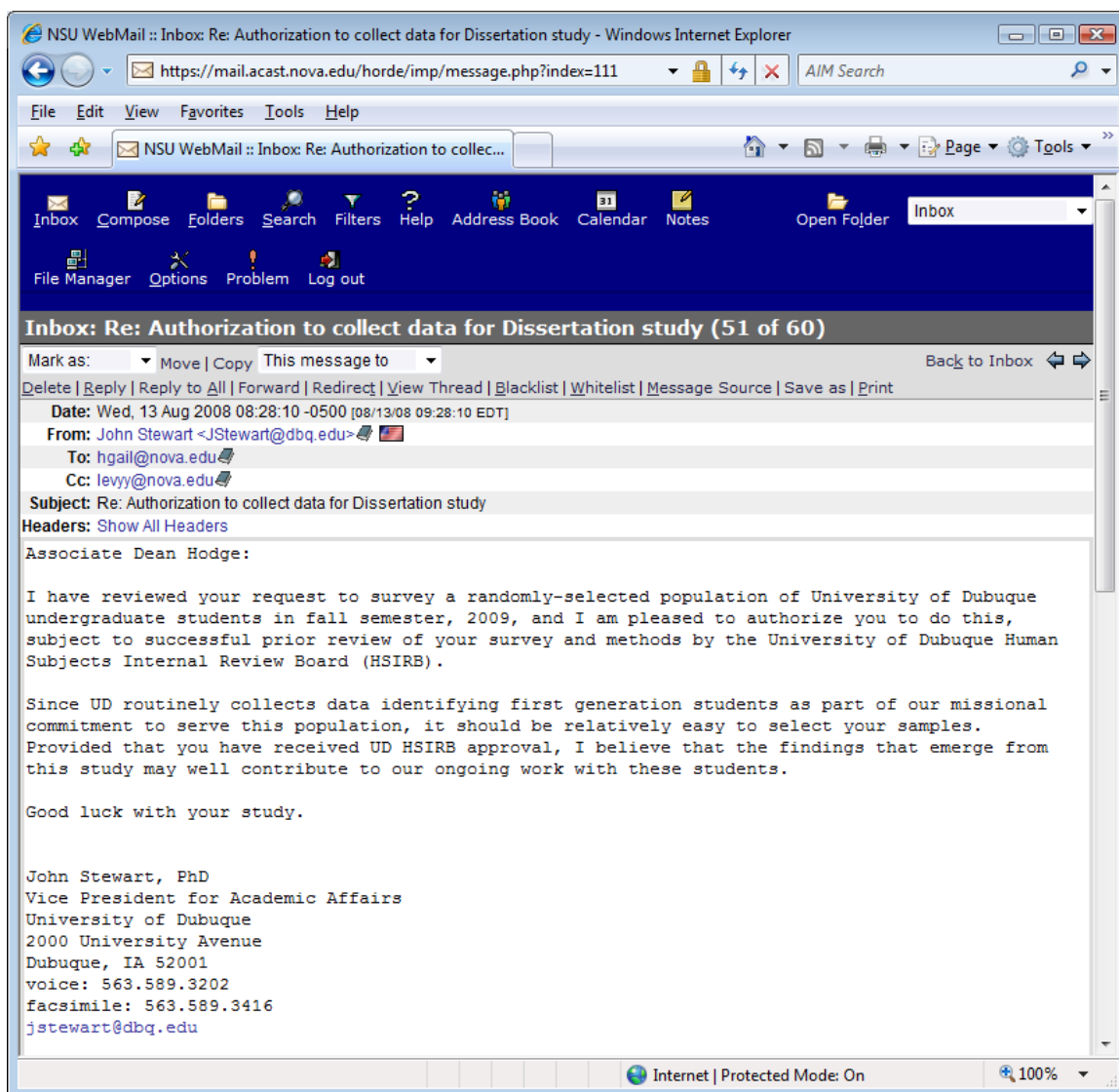
Appendix D

IRB Approval from the University of Dubuque

Request for **Exemption** from IRB Review of
Research Involving Human Subjects Research at UD

This form must be signed by the Chair of the Institutional Review Board (IRB) before the
researcher proceeds with subject recruitment and research.

Principal Investigator (PI): _GAIL HODGE_ (please print)

Mailing Address: _2000 UNIVERSITY AVE RM 318 VAN VLIET_
DUBUQUE, IA 52001

Phone: _(563)589-3349_ E-mail: _ghodge@dbq.edu/hgaile@nova.edu_

Name/Title of Advisor (if PI is a student): _Dr. Yair Levy /Associate Professor_

Advisor Phone: _(954)262-2006_ E-mail: _levyy@nsu.nova.edu_

Proposed Project Title: _A Study of First- and Continuing-Generation College_
Students' Use of Internet Communication Technologies in Building Social Capital
All of the following conditions must be satisfied if the research is to qualify for exemption from
IRB review. Read each condition and check the line or box if your proposed research meets that
requirement. If you cannot check off all of the conditions preceded by a blank ( ), you must
submit the "Application for Expedited or Full IRB Approval" form to the IRB.

✓ The research does **not** focus on **special/vulnerable populations** (e.g., minors, prisoners, HIV-infected persons, addicts, victims of sexual or other forms of assault, pregnant women, fetuses, or those unable to consent for themselves because of language differences, lowered intelligence or mental acuity, etc.).

✓ The project does **not** entail **recording any behavior** which, if disclosed outside the research, might reasonably place subjects at **risk of criminal or civil liability** or **be damaging** to their financial standing, academic standing, employability, or reputation.

✓ The researcher(s) do not participate in any of the activities being observed or manipulate the environment to elicit behavior, except the following: administering questionnaires or interviews; engaging in transparent educational activities (teaching or training); transparently participating in another culture's or organization's activities as a learner of publicly accessible information.

✓ Subjects will not be deceived in any way.

✓ Subjects' anonymity or confidentiality will be protected in the reporting of the research. This condition will be satisfied in the following way(s) (check all that apply):
    ☑ Anonymous surveys will be used.
    ☐ Anonymous interviews or observations will be conducted. Data will be gathered via researcher notes and/or audio recordings, but NOT video recording.
    ☑ Subjects' names and other personal identifiers will be removed from the data in the report. Data will be gathered via surveys, researcher notes, and/or audio recordings, but NOT video recording.

✓ **Informed consent** to participate in the research will be obtained from subjects in the following way(s) (check all that apply):
    ☑ **Implied consent**: Subjects will voluntarily take an anonymous survey or participate in an anonymous interview, and they will be informed in advance that they may, at any time, withdraw from participation or request that their data not be used by the researcher.
    ☐ **Informed consent**: Before participation, subjects will be required to read and sign an informed consent slip indicating that they understand the nature of the research and give permission for their data to be used in the report. **(Please attach proposed informed consent form.)**

On an attached sheet, using non-technical language, provide a **brief (one page or less) typewritten description** of the topic, purpose and research methods to be used in the study, including subject selection and recruitment. Attach **informed consent form** (if any) and whatever form of your **questionnaire or research instrument** is currently available.

Applicant's Assurance: *If a decision is made to change the research design such that one of the above conditions is no longer met, I/we will submit the "Application for Expedited or Full IRB Approval" form to the Institutional Review Board for review.* Signed,

Principle Investigator (PI): _Gail Hodge_   Date: _8-25-08_

Advisor Signature (if applicable): _D. Y._   Date: _9/2/08_

Submit this completed checklist and required accompanying documentation to the IRB Chair:

    John Hatch   /   Fax: (563)589-3243   /   E-mail: JHatch@dbq.edu
    Tel: (563)589-3426   /   Faculty mailbox located in MTAC 345

IRB Decision:

I have examined this form and determined that the proposed research project . . .

____ **Does not** meet the requirements for exemption from review by the Institutional Review Board. The applicant should submit the Application for Expedited or Full IRB Approval.

✓ **Meets** the requirements for exemption from review by the Institutional Review Board.

    ☐ . . . as is.

    ☑ . . . with the following provisos: _In the communications inviting students to take the survey, you should either (1) use registrar data to filter out anyone under the age of 18 from receiving the invitation OR (2) include language in the invitation and the beginning of survey with language to this effect: "To comply with federal regulations, we ask that you not take this survey unless you are 18 or older."_

_10/1/08_
Done
(as seen in attached)

Chair of Institutional Review Board: _John B. Hatch_   Date: _9/23/08_

(Copies of this form are to be kept on file by IRB chair, Office of Academic Affairs, and PI.)

(Last updated 8/13/08)

(* I understand from the registrar that Dick Feller could make a report with age-specific criteria (customized).

The University of Dubuque

September 4, 2009

Dear <<Student Name>>,

As an Associate Dean and faculty member of the University of Dubuque, I am seeking your assistance on an important study that I am conducting on how college students use Internet technologies. The research satisfies part of the requirements of my PhD program. Additionally, I hope that the findings from this research project will help improve technology services for future students. Even though you do not have to complete the questionnaire as a condition of your studies, your participation is of great help. (To comply with federal regulations, I ask that you not take this survey if you are younger than 18.)

The study is comprised of completing an online questionnaire. The questionnaire will only take about 15 to 20 minutes to complete.

To access the questionnaire, you will need a computer with Internet capabilities. The address of the website containing the questionnaire is http://URL.

 The data collected in this study CANNOT be matched to any one student. Rest assured, your identity will not be revealed. If you have questions about the study, please feel free to contact me. My contact information is provided below.

Thank you in advance for your assistance with this important study.

Sincerely,

Gail Hodge
Associate Dean of Academic Affairs, University of Dubuque
Doctoral Student in the Graduate School of Computer and Information Sciences at Nova Southeastern University

(583) 589-3349
2000 University Avenue
Dubuque, Iowa 52001

On the Survey Site:

Thank you for agreeing to assist with the study on *College Students use of Internet Technologies*. The answers you provide in this survey cannot be linked back to you. Your participation is completely anonymous.

Additionally, if at any time you desire not to continue with the survey, you can click on the Cancel button. Selecting the Cancel button will clear out all of your previously entered answers and you will be exited from the study.

Finally, only students who are 18 years of age or older can participate in the study. If you are not yet 18, please select the Cancel button now. If you are 18 or older and wish to proceed, please select the Continue button to begin the survey.

Thanks again for your assistance with this study!

Associate Dean Gail Hodge

Appendix E

IRB Approval Certificate

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

NSU

MEMORANDUM

To: Gail Hodge

From: Ling Wang, Ph.D.
Institutional Review Board

Date: Oct. 28, 2008

Re: *A Study of First- and Continuing-Generation College Students' Use of Internet Communication Technologies in Building Social Capital*

IRB Approval Number: wang10150803

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

Appendix F

Literature Summary Tables

Table 15. Summary of College Persistence Literature

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
ACE, 2002, 2005, 2006	National survey	80,000 households	Descriptive statistics of U.S. Census Bureau and NCES data used prior to 2005. After 2005, Integrated Postsecondary Education Data System (IPEDS) data used	Minority student enrollment is increasing. African American students comprise 14% of college population, while Hispanic students comprise13%. African American students perform better at PWI over HBCU.
Adelman, 1999	Longitudinal study	National cohort of 10th graders from 1980 to1993	Ordinary least squares regression analysis and 5-step logistic regression	Nearly 60% of students attend more than 1 school.
Astin, 1975, 1984, 1999	Theoretical		Student Involvement	Student involvement or engagement, improved degree completion rates
Astin, 2005	Empirical and Survey	56,818 freshman (Fall 1994) from over 262 baccalaureate-granting institutions	Step-wise Linear Regression	Identified determinants of persistence to graduation. Found more than two-thirds variation in institution was attributed to freshman entry characteristics.
Attinasi, 1989	Exploratory study	Eighteen students and former students from same institution (13 persisters)	Open-ended interviewing technique	Social integration is important to persistence in college. The degree to which students interact has varying effects on persistence.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Barefoot, 2004	Commentary		College Persistence	Noted reason some students leave college is due to poor institutional fit, failure to connect to the campus social life, and general dissatisfaction.
Bean, 1980	Casual model adapted from work organizations	1,171 Freshman	Multiple regression and path analysis	Examined the differences in reasons why men and women fail to persistence in college.
Bean & Metzner, 1985	Commentary		College Persistence	Examines persistence in college of nontraditional students. Past academic performance is good predictor of future performance.
Bentler & Speckart, 1979	Empirical and panel study	288 college students	Structural equation model Expectancy Theory	Past behavior is a good predictor of future behavior
Braxton et al., 2007	Commentary		College Persistence	Seven guidelines for improving campus retention
Braxton et al., 1997	Commentary		College Persistence	Notes the number of other studies and dissertations that have referenced Tinto's work.
Bryson et al., 2002	Empirical and survey	1.078 first-year students enrolled in selected admissions program in 1990 and 1991 fall semesters	Correlational analysis. Stepwise regression analysis, and three sets of regression models	High school GPA was significant predictor of Black students' GPA. High school rank and ACT Math and Reading scores were significant predictors for White students.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Cabrera et al., 1992	Longitudinal study	466 first-year, under 24 years, unmarried students attending a large urban commuter institution	Institutional and Goal commitment	Institutional commitment (ß=.308). goal commitment (ß=.185), and financial aid (*r*=.224) had significant direct effects on student's intent to persist.
Cabrera et al., 1990	National Longitudinal High School and Beyond (1980) survey	1,375 college students attending public 4-year institutions in the spring of 1982	Used linear probability models to examine institutional persistence, goal commitment, academic integration, social integration, and ability to pay on persistence in college.	Demonstrated that SES impacted persistence in college. Students in the lowest SES quartile were less likely to persist in school than students in the highest SES quartile. Students satisfied with cost of college were more likely to persist in school.
Cavote & Kopera-Frye, 2006	Empirical and survey	381 students who completed one of 17 FYE courses or one of 13 English composition courses	Kruskal-Wallis	ACT scores and high school GPAs found to be covariates of persistence for both FYE and non-FYE students.
Choy et al., 2000	National Longitudinal Study	1988 8th grade cohort through 1994	Logistic regression	Important predictors of college enrollment included having friends enrolled, parental involvement, and taking algebra in the 8th grade.
Cirino et al., 2002	Empirical	140 participants from 3 cities (Atlanta, Boston, and Toronto) in two countries (U.S. and Canada).	Comparative reading study of 3 different scales for measuring SES: Hollingshead scale, Nakao and Treas scale, and Canadian scale.	Support for simplified approach to measuring SES.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
DesJardins et al., 2002	National Longitudinal survey	14,799 college sophomores enrolled between fall of1982 and end of 1993)	Discrete-time event history modeling to examine how a number of factors affect student persistence in college	For every one-grade increase in GPA, a student's chance of graduating from college more than doubled.
Dixon Rayle et al., 2006	Empirical and survey	527 first-year female undergraduates	Zero-order correlations and hierarchical regression analysis	Mothers' education, family income, and perceptions of high school preparation were positively related to academic persistence of women.
Elkins et al., 2000	Longitudinal panel design	689 full-time freshman completing the CIRP survey	Simple descriptive statistics and path analysis	Dimensions of support and rejection of attitudes and values were found to influence persistence in a statistically significant way.
Entwisle et al., 2005	Longitudinal study using multivariate models	790 Baltimore public school students age 6 until they turned 22	OLS regression analysis was used to estimate the contribution of the social and personal resources children possess when they start school to their educational attainment and level of education.	Positive correlation between years of schooling and the highest level of school attempted responded to family SES.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Escobedo, 2007	Qualitative pilot study	601 students fro Fall 2001, 977 from Fall 2002, and 1,244 from Fall 2003	Percentage	Examined cognitive, social, and institutional factors associated with persistence. Students who had contact with retention specialist persisted at substantially higher rates.
Fischer, 2007	National Longitudinal Survey of Freshman	3,924 first-time students entering colleges and universities in 1999. Equal groups of Black, Hispanic, Asian, and White students were selected for face-to-face interviews	OLS and logistic regression. Examined the predictability of various variables on academic achievement and college satisfaction.	For all groups, leaving college was most closely related to experiences that occur in college. For minority students, involvement in extracurricular reduced likelihood of leaving college by at least 83%. Off-campus ties increased likelihood of minority students leaving college; whereas on campus formal ties are important to minority students' adjustment to college.
Flowers, 2002	Longitudinal study	African American students from 207 postsecondary institutions who completed CSEQ	Regression analysis	Attendance at HBCU significantly enhanced academic and social growth of African American students
Gloria & Ho, 2003	Empirical and survey	160 Asian Americans	Descriptive statistics and correlational analyses College persistence	Significant relationships among comfort in the university environment, social support, and self-beliefs were indicated. Social support strongest predictor of persistence.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Gloria & Rodriguez, 2000	Theoretical		Psychosociocultural issue and College Persistence	Latino students experience transition problems. Latino students maintain close family ties.
Gloria et al., 1999	Institutional survey	98 African Americans students	Two-step hierarchical regression analysis	Institutional climate plays a significant role in the persistence of African American students
Green, 1970	Instrumentation	1,592 California families with at least one child under 5 years of age	Stepwise regression analysis - Socioeconomic Status Index	SES index that can be used to optimize the prediction of family health actions from socioeconomic information.
Harackiewicz et al., 2002	Longitudinal study	604 students enrolled in introductory psychology course	Descriptive and multiple regression analyses College Success	Prior high school performance predicted academic performance but not interest.
Harrop et al., 2007	Empirical and survey	255 psychology students	Spearman's correlation College Persistence	Women persist in college at higher rate then men. Women visit professors more for academic reasons, men for informal reasons.
Haug & Sussman, 1971	Theoretical		Measuring Socioeconomic Status	Compares Hollingshead Two-Factor Index and Duncan Socioeconomic Index. Concluded that Duncan SEI has weaknesses and Hollingshead Index needs to be updated

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Hauser, 1994	Commentary		Measuring Socioeconomic Status	SES may be improved by collecting the occupational status of 1 or both parents. Collect both father's and mother's educational attainment levels.
Hoffman & Lowitzki, 2005	Empirical and survey	863 full-time students completed fall semester	Structural equation modeling College Persistence	High school grades was stronger predictor of success for non-majority students
Horn & Carroll, 1998	National Longitudinal study	1989-90 BPS:90/94. National sample of 2- and 4-year institutions. Undergraduate students enrolled in post-secondary education for the first time during 1989-90 academic year. Follow-ups in 1992 and 1994.	Used two types of statistical procedure: testing differences between means (t tests), and adjustment of means after controlling for covariation among a group of variables. Examined determinants (College GPA and SES) on persistence in college	Low cumulative GPA in first-year of college is a significant factor in early departure.
Ishitani, 2003	Institutional longitudinal study	1,747 students attending a 4-year public university in the Midwestern U.S. over the course of 5 years (9 academic semesters)	Event history modeling was used to examine persistence behaviors of FG students.	High school GPA had a positive effect on persistence in college. Students from families with lower income ($25K or less) had 49% higher risk of leaving college in the first year

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Jacobs, 1996	Commentary		Gender in higher education	Women represent majority of students enrolled in higher education.
Kalmijn, 1994	Empirical and survey	Data set taken from the National Survey of Families and Households, where respondents were age 24 or older	Logistic regression analysis	Maternal occupation has strong affect on education. Both mother's and father's education are equally important.
Kalsner, 1991	Commentary		College Persistence	Less than 15% of students fail to persist due to academic reasons. Other reasons include: uncertainty, transition, adjustment problems, financial difficulties, academic underpreparedness
Kiser & Price, 2007	Empirical and survey	1,014 full-time freshmen enrolled in Fall 2002 at Texas State University with GPA of 2.0 or higher and completed the CIRP Freshman Survey.	Determinants of persistence in college by ethnicity (African-American, White, and Hispanic students)	Cumulative hours earned by the students during the first year of college significantly predicted college persistence at the $p < .01$ level. First-year GPA significantly predicted college persistence at the $p < .05$ level.
Leppel, 2005	Empirical and survey	2594 white male freshmen and 2585 white female freshmen.	Probability estimates on persistence in college and involvement in sports and non-sport activities. Logit analysis and CATMOD procedures of SAS were used.	Students involved in sports and non-sport activities persisted in college more so than students not involved. Involved males persisted more at their initial institution while involved females tended to transfer. Male athletes had lower GPA then students involved in non-sport activities.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Lohfink & Paulsen, 2005	National Longitudinal study	1,167 FG and 3,017 CG students	Logistic regression methods used to examine relationship between first-to-second year persistence rates of FG and CG students on five sets of independent variables.	Found 15 variables to be significant in the first-to-second year persistence rates of FG students. For each $10,000 increase in family income the probability of persisting in school increased by 2%.
London, 1992	Theoretical		College Persistence	Discussed difficulties students face in the transition between two cultures.
Magnuson & Duncan, 2006	Commentary		Socioeconomic Theory	Examines the test score gap between Black and White students reported in various studies
Marks, 2008	Empirical and survey	172,000 15-year olds from 32 different countries	Regression analysis and Socioeconomic Theory	Mother's education had greater or was comparable impact on student academic achievement than father's education level. Impact of mother's occupation status was rare.
Marks et al., 2000	Theoretical		Socioeconomic Theory	Discusses the conceptual basis of socioeconomic position and defines terms, and methods for measuring SES.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
McCarron & Inkelas, 2006	National longitudinal study and survey	24,599 eighth graders in 1988 and ended with 12,144 participants in 2000.	Multiple regression analysis measuring parental involvement, student educational aspiration, and attainment	Parental involvement had an influence on the educational aspirations of college students. Specifically, parental involvement showed larger gains among FG students as compared to CG students.
Miller and Salkind, 2002	Theoretical		Measures of Socioeconomic Status	Occupation is single best predictor of SES
Mueller & Parcel 1981	Theoretical		Measures of Socioeconomic Status	Review of how SES is defined, measured, and analyzed, as well as identified implications for measurement.
Muse, 2003	Empirical and survey	276 Web-based students attending Montgomery College in Maryland	Exploratory factor analysis and discriminant factor analysis	Students with higher GPA, more satisfied with study environment, and older are more successful in Web-based courses.
NCES, 2007	Empirical and survey	109,210	College Persistence	Reports on rates of program completion, transfer, and attrition
NCES, 2008	Survey	Digest of Education Statistics	College Persistence	Women outnumber men in college enrollment
Pascarella & Terenzini, 1980	Longitudinal and survey	773 freshmen at Syracuse University	Factor analysis followed by multivariate analysis of covariance and discriminant analysis	Informal contacts between students and faculty improved college persistence

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Pascarella et al., 2004	National Longitudinal Survey	3,331 students from 18 4-year institutions. Of these, 1,613 participated in second follow-up. Of these, 1,054 participated in third follow-up.	Ordinary least-squares regression analysis	FG students more likely to attend less selective institutions, accrue fewer course credit hours, work more, less likely to live on campus, and have lower levels of extracurricular involvement and interactions with peers. When FG students do engage in such activity they derive greater outcome benefits than their CG peers.
Pascarella et al., 1986	Institutional longitudinal study	1,906 incoming freshmen from a medium-sized, independent residential university	Multiple regression analysis	SES, social integration, goal commitment, and institutional commitment contributed the most to persistence in school
Paulsen & St. John, 2002	Empirical and survey	Students completing the National Postsecondary Study Aid Survey of 1987 (NPSAS87)	Logistical regression was used to examine the persistence of undergraduate students in four income groups	Found varying affects of SES based on a student's race or ethnicity.
Pyke, 1997	Commentary		Gender and College Persistence	Women persist in college at higher rate then men in spite of "chilly" environment. Gender differences in obstacles to persistence in college
Sanchez, 1997	Commentary		Minority and College Persistence	Minorities are too broadly defined in research. Minority population is growing at faster rate than majority.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Terrell, 2005	Longitudinal study and survey	51 students	Myers-Brigg Type Indicator. Descriptive and non-parametric inferential statistics	Hypothesized that psychology type (learning styles) is related to academic achievement
Tinto, 1975, 1993, 2006	Theoretical		College persistence	Stages of persistence include: Separation Transition Incorporation (academic and social integration)
Tierney, 1992	Commentary		College persistence	A multicultural perspective is needed when explaining college persistence.
Tucker, 1999	Commentary		College persistence	Vision and sense of community are better factors for explaining college persistence.
Wells, 2008		1988 NELS data set	Binary logistic regression and logistic regression analysis College Persistence	Social and cultural capitals have a positive effect on persistence in college. Persistence gap is much wider between community college and 4-year students low in social and cultural capital.

Table 15. Summary of College Persistence Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Wohlemuth et al., 2006	Empirical and survey	3,610 entering class of students at a Midwestern university	Regression analysis and logistic regression	Examined contributions of demographic characteristics, environmental variables, and financial aid on persistence in college. Ethnic minorities had lower retention rates; No significant difference between resident and non-resident; High ACT was significant for higher 4-year graduation rates; student-athletes had lower 4-year graduation rate, but equalized after 5- and 6-year; Graduation rates improved with financial aid
Zheng et al., 2002	Empirical and survey	3003 first-time, full-time freshmen attending Iowa State University in the fall of 1999	Factor analysis and hierarchical regression equations to examine factors affecting student persistence in college	High school GPA was found to be the strongest background characteristics for predicting college persistence.

Table 16. Summary of First-Generation Students Literature

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
ACE, 2002	National survey	Data sets taken from NELS (1988), BPS (1989-90), B&B (1992-93)	Percentages College Persistence	More rigorous high school courses improve persistence in college; FG students have lower persistence rates
Bui, 2002	Empirical and survey	207 students; 75 (FG), 68 (CG); 64 (at least one parent with bachelor's degree)	Multivariate analysis	FG students were more likely to come from low SES backgrounds; worry about financing college; pursing college to help family out financially.
Choy et al., 2000	National Longitudinal Study	1988 8th grade cohort through 1994	Logistic regression	Examined risk factors associated with non-persistence. FG students had 2.0 risk factors compared to 1.6 for CG students, and 1.3 for students whose parent had a college degree. Five steps of college-decision making process: (1) Aspire to attain a 4-year degree; (2) Prepare academically; (3) Take admissions test; (4) Apply to 4-year college; and (5) Gain acceptance and enroll in college.
HERI, 2007a	Commentary		First Generation	Decline in FG status. African American fastest decline. Hispanics most likely group to be FG (38.2%) at 4-year colleges. Parental encouragement is identified as important in decision to attend college. FG students identified financial factors as reason for school selection.

Table 16. Summary of First-Generation Students Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
HERI, 2007b	Empirical	272,036 first-year, first-time students from 356 institutions	Parental involvement	FG students reported "too little" parental involvement on six items regarding college-going process. CG students rated parental involvement as "just right."
Inman & Mayes, 1999	Empirical and survey	5,037 applicants to 12 University of Kentucky Community Colleges	Chi-square tests First Generation	FG students tend to come from lower income families, older, and are more likely to be female. After first year, earned about same number of credits and had equal GPAs to their non-FG counterparts.
Ishitani, 2003	Institutional longitudinal study	1,747 students attending a 4-year public university in the Midwestern U.S. over the course of 5 years (9 academic semesters)	Event history modeling was used to examine persistence behaviors of FG students	FG students failed to persist more so than CG students. Survival rate of FG students was 9% lower in the first semester and 22% lower in the sixth semester than that of CG students with two college-educated parents.
Kojaku & Nuñez, 1998	Empirical and surveys	12,000 first-time students who completed the 1996 National Postsecondary Student Aid Study (NPSAS).	Data analysis system (DAS) and linear regression models First Generation	FG enrollment in 2-year schools (51.1%) was much higher than 4-year public institutions (35.4%) and 4-year private institutions (29.7%)

Table 16. Summary of First-Generation Students Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Lee et al., 2004	One-shot 47-item survey of school district	5,000 students from nine campuses in the Los Angeles Community College District	Used ANOVA to examine and compare the experiences and views of community college students across multiple parental education levels	Latino/a's and Mexican American students were more likely to be of FG status than all other ethnic and race groups. FG students tend to come from families that have lower income as well as have lower high school GPAs.
Lohfink & Paulsen, 2005	Used BPS: 96/01 National Longitudinal study	Sampled 1,167 FG and 3,017 CG students	Logistic regression methods used to examine relationship between first-to-second year persistence rates of FG and CG students on five sets of independent variables	Fifteen variables found to be significant in the first-to-second year persistence rates of FG students. FG students have a 76.5% probability of persisting from their first- to second-year of college compared to 82.2% of CG students.
Longwell-Grice & Longwell-Grice, 2008	Case study	Four first-semester, FG, working class, White, males	Phenomenological interview methodology, using a triangulation approach on FG perceptions of faculty support	FG students reported a significant distance from faculty, which included fear and risk.
McCarron & Inkelas, 2006	Longitudinal study NELS:88/2000	Series of surveys collected on over 6,000 variables, starting in 1988 with 24,599 eighth graders, and ending with 12,144 participants in 2000.	Multiple regression analysis measuring parental involvement, student educational aspiration, and attainment	Parental involvement had an influence on the educational aspirations of college students. Specifically, parental involvement had a larger influence among FG students as compared to CG students.

Table 16. Summary of First-Generation Students Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
NCES, 2006	Empirical	12,000 beginning students	Data Analysis System (DAS) and descriptive statistics First Generation	Rigorous high school preparation improves college persistence. Parent's education level was a significant factor for determining student persistence in college.
Nuñez & Cuccaro-Alamin, 1998	1993 Baccalaureate and Beyond (B&B) Longitudinal Study using the BPS:90/94 longitudinal component of the NPSAS:90 survey	Sampled 10,080 college graduates from 2- and 4-year institutions.	Used BPS:90/94 and B&B:93/94 Data Analysis Systems (DAS) to compare the persistence and attainment rates of FG and CG students	Background characteristics indicate FG students are more likely to be female, older, have dependent children, have lower incomes, enrolled in 2-year institution, enrolled part-time, receive some form of financial aid, work full-time, live at home, and less likely to persist to degree attainment than CG students.
Pascarella et al., 2004	NSSL 1992-1995 Longitudinal Survey	Initial sample started with 3,331 students from 18 4-year institutions. Of these, 1,613 participated in second follow-up. Of these, 1,054 participated in third follow-up.	Ordinary least-squares regression analysis	FG students more likely to attend less selective institutions, accrue fewer course credit hours, work more, less likely to live on campus, and have lower levels of extracurricular involvement and interactions with peers. When FG students do engage in such activity they derive greater outcome benefits than their CG peers.

Table 16. Summary of First-Generation Students Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Pike & Kuh, 2005	National study using the College Student Experiences Questionnaire	Sampled comprised of 439 (39%) FG students and 688 (61%) CG freshmen.	Multigroup structural equation models with latent variables to examine background characteristics, college experiences, and learning outcomes of FG and CG students.	FG students were less engaged overall, less likely to integrate diverse college experiences, perceived college as less supportive, report making less progress in their learning and intellectual development. Students living on campus mitigated much of these differences.
Terenzini et al., 1996	Longitudinal study of the National Study of Student Learning (NSSL)	Sample consisted of 3,840 new students entering 2- and 4- year colleges in Fall 1992	Ordinary least-squares multiple regression, logistic regression, and discriminant function analysis where used to examine differences between FG and CG students on their precollege characteristics, experiences, and cognitive development	FG students were more likely to come from low-income families, be Hispanic, to have weaker cognitive skills, to have lower degree aspirations, and to be less involved with peers and teachers in high school. FG students tended to have dependent children, expected to take longer to complete their degree, and received less encouragement from parents to attend college.
Ting, 2003	Empirical and survey	96 first-year Asian students	Step-wise multiple regression analysis	Identified cognitive and non-cognitive variables for academic success of Asian American students. Realistic self-appraisal, leadership experience, and demonstrated community service were significant predictors of GPA and indicators of college persistence.
Tinto, 1993	Theoretical		First Generation and College Persistence	FG students encounter transition difficulties and do not receive same level of support from parents.

Table 16. Summary of First-Generation Students Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Warburton et al., 2001	National longitudinal study using data set from BPS:96/98	National sample from BPS:96/98 of public and private, not-for-profit 4-year institutions over 3 years	Percentage tables generated from the BPS:98 Data Analysis Systems (DAS) examining academic preparedness of FG students and their likelihood to enroll and persist in a 4-year institution.	FG students were less likely than their CG peers to be prepared academically for postsecondary education and less likely to enroll in a 4-year institution. Parents' level of education was associated with rate of students' retention and persistence in college. FG students were less likely to be enrolled in their initial institution 3 years later and to stay on persistence track to bachelor's degree.
Zalaquett, 1999	Empirical	840 students: FG (202), CG (244), and students with one parent who graduated from college (394)	Chi-squared analysis and two-factored analysis of variance First Generation Students	High percentage of FG students came from minority backgrounds. Contrary to other studies, attrition rates and academic performance was similar to non-FG students

Table 17. Summary of Social Capital Literature

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Bentler & Speckart, 1979	Empirical and panel study	228 students	Chi square goodness-of-fit and Structural equation model Expectancy Theory	Intentions influenced by other factors than attitudes and social norms. Past behavior can be a good predictor of future behavior
Bourdieu, 1986	Theoretical		Social Capital	Groups develop and maintain social capital as a collective asset
Briggs, 1997	Commentary		Social Capital	Provided definition of social capital. Distinguishes two purposes of social capital –for getting by and getting ahead
Coleman, 1988	Theoretical and survey		Social Capital	Social capital can be attained and used by individuals as well as groups. Students who are more involved in school and whose parents have more social capital have been shown to persistence in school at higher rates.
Duggan, 2005	Empirical and survey	NCES BPS 1996:98 data set of first-time, first-year students attending 4-year schools	Cross-tabulation Social Capital and College Persistence	Students build social capital through email. Students with email accounts persist in college at higher rates than students without email
Gatz & Hirt, 2000	Exploratory	11 men and 12 women (from pool of 4,000 students).	Social Capital and College Persistence	Social engagement has improved student persistence in college. Study found students used email for social integration but less so for academic integration

Table 17. Summary of Social Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Glaeser, 2001	Commentary		Social Capital	Approached social capital from the individual perspective. Discussed social capital development through community investment
Granovetter, 1973	Theoretical		Social Capital	Strength of weak tie networks
Hampton & Wellman, 2001	Ethnography and survey	109 households	Regression analysis Computer Mediated Communication	Wired residents were more successful in maintaining contact with networks living farther away than non-wired residence. The Internet increased local as well as global contact
Leppel, 2005	Empirical and survey	2594 white male freshmen and 2585 white female freshmen.	Probability estimates on persistence in college and involvement in sports and non-sport activities. Logit analysis and CATMOD procedures of SAS were used.	Student involvement in co-curricular activities shown to improve persistence over non-involved students
Lin, 1999	Theoretical		Social Capital	Provided four elements that help explain why social capital works for both individual and groups: information, influence, social credentials, and reinforcements
McNeal, 1999	Theoretical		Social Capital	Parental involvement can help in developing social capital to aid in their children's academic achievements
Narayan, 1999	Theoretical		Social Capital	Social capital is based upon relationships and exists only when it is shared

Table 17. Summary of Social Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Neri & Ville, 2008	Empirical and survey	173 international students	Social Capital	International students who invested in social capital renewal (made friends with host students) did not perform better academically than those who remained isolated.
Pascarella & Terenzini, 1980	Longitudinal and survey	773 freshmen at Syracuse University	Factor analysis followed by multivariate analysis of covariance and discriminant analysis	Informal contacts between students and faculty improved college persistence
Patulny & Svendsen, 2007	Commentary		Social Capital	Review of literature on bonding and bridging forms of social capital
Portes, 1998	Theoretical		Social Capital	Provides literature review of social capital. Discusses the negative aspects of social capital, particularly bonding.
Putnam, 1993, 2000	Theoretical		Social Capital	Distinguished between bonding and bridging forms of social capital. Online communities may offset the decline in civic engagement and prove to be a valuable new source for building social capital.
Son & Lin, 2008	Empirical and survey	3,003 national households were randomly selected to complete the 2000 Social Capital Benchmark Survey	Confirmatory and exploratory factor analysis Social Capital	Examined instrumental and expressive civic actions. Individual social capital was significant predictor of instrumental and expressive civic action.

Table 17. Summary of Social Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Stanton-Salazar, 1997	Theoretical		Social Capital	Minority students are disadvantaged when it comes to the attainment of social capital. Social antagonisms and divisions in the wider society operate to problematize opportunities and resources for minorities. When institutions are purposeful in supporting minority students, the outcomes are considerable.
Van Der Gaag & Snijders, 2005	Empirical and survey	1,004 Dutch adults	Latent trait analysis	Provided definitions and examples of instrumental and expressive returns. Developed Resource Generator for measuring social capital
Warschauer, 2003	Theoretical		Social Capital	Computers and the Internet can be used to enhance social capital
Wells, 2008	Empirical and survey	1,726 students enrolled in 2- and 4-year colleges	Binary logistic regression	Social and cultural capital have an effect on student persistence in college. 4-year full-time students with high social capital have a significantly higher probability (.97) than full-time students with low social capital (.76). Difference in 2-year full-time students' probability was much wider— high social capital students (.96) to low social capital students (.68).

Table 17. Summary of Social Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Wells, 2008	Empirical and survey	1,726 students enrolled in 2- and 4-year colleges	Binary logistic regression	Social and cultural capitals have an effect on student persistence in college. 4-year full-time students with high social capital have a significantly higher probability (.97) than full-time students with low social capital (.76). Difference in 2-year full-time students' probability was much wider— high social capital students (.96) to low social capital students (.68).
Woolcock, 2001	Commentary		Social Capital	Describes elements of social capital: 1) Norms and networks that facilitate collective action 2) Focus on resource instead of consequences 3) Relational, sociological variable 4) Multidimensional sources: bonding and bridging 5) Viewed in context of the community
Woolcock & Narayan, 2000	Commentary		Social Capital	Defined social capital Identified four views of social capital: 1) Communitarian 2) Networks 3) Institutional 4) Synergy Discussed methods for measuring social capital.

Table 18. Summary of Sociotechnical Capital Literature

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Boles, 1999	Practical inquiry using an institutional survey approach	Three groups of approximately equal numbers of graduate diploma and master degree students	Obtained percentages of students responses to survey items used to measure the effect email had on improving classroom assignments.	Email improved student-student interaction. When the instructor initiated email contact with students, student performance in the classroom and instructor-student interactions improved
Coleman, 1988	Theoretical and Survey		Social Capital	Social capital can be like a double-edged sword—that which is valuable in one situation can be useless, or even harmful in another
Constant et al., 1996	Theoretical and survey	149 employees of Tandem Computer Incorporated	Regression analysis Bridging Social Capital	The culture of the organization supported useful organizational information exchange in weak-tie networks through email
Duggan, 2005	Empirical and survey	NCES BPS 1996:98 data set of first-time, first-year students attending 4-year schools	Cross-tabulation	Found that having an email account is a significant predictor of persistence in college. FG and CG students with email persisted in college at same rate. FG students with no email account had probability of persisting in school that was 11% lower than CG students.

Table 18. Summary of Sociotechnical Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Gatz & Hirt, 2000	Exploratory research using printouts of sent and received email, logs sheets identifying relationship, and 6-item survey	11 men and 12 women (from pool of 4,000 students).	Measured frequency of emails sent and received to various persons and frequency of types of emails sent. Authenticated data collected in printouts and log sheets against survey data.	Students used email for social integration more so than for academic integration.
Gordon et al., 2007	Empirical and survey	312 college students	Exploratory factor analysis	Internet is used for relationships development and support
Hampton & Wellman, 2001	Ethnography and survey	109 households	Regression analysis Computer Mediated Communication and Sociotechnical Capital	Wired residents were more successful in maintaining contact with networks living farther away than non-wired residence. The Internet increased local as well as global contact
Kazmer, 2006	Grounded theory and interviews	30 graduate students	Grounded theory analysis and content analysis Sociotechnical Capital	Identified five concepts that arise from online communities: 1) Reputations, 2) Trust and situational friendships, 3) Identity, 4) Shared experience, and 5) Technical expertise. Sociotechnical can be lost when the online world changes (disengage, dismantled, or forcibly removed from forum.)

Table 18. Summary of Sociotechnical Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Kazmer & Haythornthwaite, 2001	Ethnography and interviews	17 graduate students	Grounded theory analysis and content analysis Sociotechnical Capital	Social worlds consist of people who share activities, space, and technology and who communicate with one another. There are multiple social worlds. Students were able to manage both online and offline worlds including developing synergy between the their worlds
Kelly et al. 2002	Empirical and survey	52 respondents	Survey of computer mediated communication. Reticence scale used to measure email comfort, preference, and motives for using email	Reticent students are more comfortable and prefer to use email when communicating with instructors than non-reticent students. Both groups reported similar experience and frequency of using email.
Kraut et al., 1998	Longitudinal and survey	169 participants over their one or two years of Internet use	Path analysis Sociotechnical Capital	HomeNet Study 1: Greater use of Internet saw decline in family communications; greater use of Internet saw decline in size of local and distant circles; people who used the Internet reported more subsequent loneliness; people who used the Internet reported increases in daily life stress and depression

Table 18. Summary of Sociotechnical Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Kraut et al., 2002	Empirical and survey	203 participants	Mann Whitney U test Sociotechnical Capital	HomeNet Study 2: Those who used the Internet reported increases in size of local, distant, and face-to-face circles of family and friends. Extraverts had better outcome from Internet use than introverts.
Markus, 1994	Exploratory research: Case study utilizing data from interviews, survey, and email archives	29 HCP employees were interviewed. 375 employees were surveyed. Sample emails were obtained from employees that were interviewed	Exploratory factor analysis and interpretive analysis to examine the negative effects of email on social life at work	Employees used email in the workplace to avoid negative social consequences
Nie, 2001	Commentary		Sociotechnical Capital	Examined results from four studies on Internet use. Concluded that persons engaged in Internet activity spend less time engaged in face-to-face relationships
Nie et al., 2003	Empirical and survey	6,000 Internet users	Multivariate analysis Sociotechnical Capital	Time spent online is an asocial activity. Internet use is contextual. Time spent online at home takes from social involvement with family and friends. Time spent online at work, takes from social involvement with co-workers
PEW, 2002	Survey	2,054 college students from 27 different U.S. colleges	Descriptive statistics	Students reported using email to contact professor regarding grades and to avoid classroom interaction

Table 18. Summary of Sociotechnical Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Putnam, 2000	Theoretical		Social Capital	Posited that online communities may offset the decline in civic engagement and prove to be a valuable new source for building social capital. The Net is the network to end all networks
Resnick, 2002	Theoretical	Commentary	Sociotechnical capital	The use of ICTs can create sociotechnical capital. Suggested five different types of social relationships that can create sociotechnical capital: enhanced group self-awareness, brief interactions, maintaining ties while investing less time, support for large group, and introducer systems that link disparate people on common interests.
Strayhorn, 2006	Institutions study using CSEQ survey	Sampled 712 students enrolled at a large mid-Atlantic state research institution	Mann Whitney U test and multiple regression analysis	Found significant educational gains in learning outcomes from student's use of technology.
Warschauer, 2003	Theoretical		Social Capital	Computers and the Internet can be used to enhance social capital

Table 18. Summary of Sociotechnical Capital Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Wellman et al., 2001	Empirical and survey	Data set from the National Geographic Survey 2000 of 39,211 North American adults.	Factor analysis was used to measure online behaviors that effected social capital development.	Examined the Internet and its contribution to the development of social capital. Greater use of Internet may lead to wider network of weak ties. Online activity increased likelihood of involvement in offline political and organizational activities. Email most common social activity at mean rate of 270 days per year. Chats were 25 days per year, multi-user games were 11 days per year. Internet users use the telephone (40%) as most frequent method for contact with close friends and relatives, followed by email (32%).
Williams, 2006	Theoretical	Instrument validation	Sociotechnical and social capital	Validated ISCS instrument for measuring bridging and bonding forms of social capital from online and offline activities

Table 19. Summary of Internet Communication Technology Literature

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Boneva et al., 2001	Empirical and survey	32 women and 28 men from HomeNet project (Kraut et al., 1998)	Quantitative part of study used multivariate analysis of covariance ICT	There are gender differences between how men and women use email. Compared to men, women find emailing to friends and family more gratifying. Women are more likely to keep kinship through email, men are more likely to use email to maintain contact with those that live far away
Chen et al., 2008	Exploratory and survey	94 students	MANCOVA and discriminant analysis	Showed a significant relationship between flow and communication outcomes when email was used, and none when IM was used. The effectiveness and quality of communication was better through email than IM
CTIA & Harris Interactive, 2008	Empirical and survey	2,089 teenagers who have cell phones	ICTs	One in 3 teens use phone to browse the Internet; 79% of teens carry cell phone; over half text message (67-74%); and text message is used almost as often as they use the phone for talking.
Debrand & Johnson, 2008	Empirical and survey	458 graduate students enrolled in a college business course	ANOVA and Chi square ICTs	In general, women perceive email more useful than men when communicating with others at a geographic distance. College males and females perceive and use email and IM similarly

Table 19. Summary of Internet Communication Technology Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Du & Wagner, 2006	Empirical	126 weblogs	Rank aggregation and chi-square ICTs and Sociotechnical Capital	Weblog success is associated with type of blogging tool used. Weblog success is associated with its ability to provide value to bloggers and readers at the content, technology, and social levels. Blogging may improve if technology fosters participation and community interactivity
Faulhaber, 2002	Commentary		Instant Messaging ICTs	Provides definition of IM
Fu et al., 2008	Empirical	Examined Sina and Xiaonei, two popular Chinese social networking sites	Structural analysis on degree distribution, average shortest path length, as well as degree–degree correlation ICTs	Describes blogs and gain in popularity
Gooding & Morris, 2008	Commentary		ICTs	Examines Web 2.0 technologies, and provides descriptions of blogs, podcasts, social networks, chat rooms, and wikis.

Table 19. Summary of Internet Communication Technology Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Gordon et al., 2007	Empirical and survey	312 college students	Exploratory factor analysis	College students use the Internet more than any other age group. Five types of uses for the Internet: Meeting people, Information Seeking, Distraction, Coping, and Email. The specific type of Internet use relates to depression, social anxiety, and family cohesion. Internet use is an important aspect of college students' lives.
Fu et al., 2008	Topological analysis of online social network	Chinese networks containing 200,292 nodes and 901,607 edges	Topological analysis of social networking Web sites	Social networking sites develop structured online communities. More popular users develop friendships
Herring et al., 2005	Quantitative content analysis	203 randomly selected blogs	Content analysis and structural analysis of blogs	Blogs are used as intimate forms of self-expression and less so for external-oriented interactive events
Hinduja & Patchin, 2008	Comprehensive content analysis of a representative sample of MySpace profile pages	1,475 randomly drawn adolescent profiles	Descriptive statistics on social networking sites	Forty % of adolescents set profiles to private. Open profiles revealed private and identifiable information. Number of active members was less than reported number of users.

Table 19. Summary of Internet Communication Technology Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Kirkwood & Price, 2005	Theoretical, empirical and survey	Over 80,000 respondents	ICTs	Infiltration of personal computers into the college campus spurred Internet use. Provided definition of asynchronous and synchronous modes of communication, as well as how students are using ICTs for academic purposes
Lightfoot, 2006	Empirical and survey	596 undergraduate students	Used SPSS, analyzed using basic frequency analysis and chi-square goodness-of-fit statistics. ICTs	Students put more thought into email to professors and peer groups than to face-to-face interactions; and equal thought when communicating with individual peers. Discussed email advantages and disadvantages
Lin, 1999	Theoretical		Social Capital and Sociotechnical Capital	The Internet is an affordable medium for providing opportunities for relationship building
Mayer & Puller, 2008	Empirical and survey	1,930 Texas A&M students using Facebook^{TM}	Summary statistics ICTs	Social networks exhibit modest segmentation across dimensions of ability, parental education, and political orientation. However, social networks were highly segmented by race. Students are selective with whom they interact online with
Nie, 2001	Commentary		Sociotechnical Capital	Asynchronous nature of email provided flexibility between sender and receiver

Table 19. Summary of Internet Communication Technology Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
NITLE, 2008	Commentary		ICTs	Maintains statistics on number of Weblogs. There are over 2.8 million current active weblogs
PEW, 2002	PEW Internet Project survey	2054 surveys were completed by students attending one of 27 different 2-year and 4-year colleges and universities	ICTs	Students used email to communicate with professors regarding course content, inquiring about grades, and reporting absences.
PEW, 2005	The Parents & Teens 2004 Survey by PEW Internet and American Life Project (focus interviews)	Study consisted of sample of 1,100 teens 12 to 17 years-old and their parents living in continental U.S. telephone households	Sample balancing (Deming Algorithm) to investigate online communications of teens ICTs	IM has become most common form of communicating online between teens and their friends.
Subrahmanyam et al., 2004	Exploratory	52 names were extracted from a 30 minute online chat room conversation	Conversational analysis to investigate chat room use ICTs	Adolescents used online chat room to air concerns about sexuality and exchange identity information with peers.
To et al., 2008	Empirical investigation of factors influencing workers within organizations to adopt IM usage	313 employees of Taiwan companies who have adopted IM were surveyed	Structural equation model (SEM) to investigate IM use ICTs	Peer influence has greatest affect on IM adoption.

Table 19. Summary of Internet Communication Technology Literature (continued)

Study	Methodology	Sample	Instrument or Construct	Main findings or contribution
Wang, 2007	Empirical and Survey	624 college students	Descriptive analysis ICTs	86% of college students are online users, compared with 59% of the general population. Found that in integrated classrooms, the Internet increased interactions between student-student, student-instructor, student-material, and student-expert. Provided description of Chat rooms

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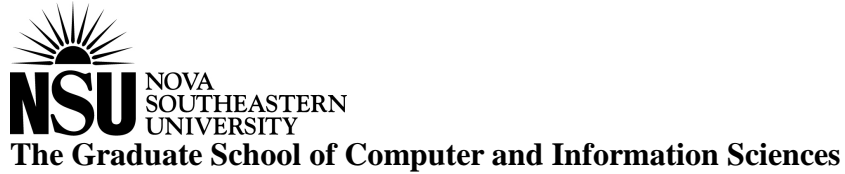
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