

A Study of the Academic Success and Retention of Postsecondary Students Peer-Tutored
in Mathematics

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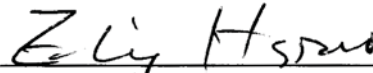
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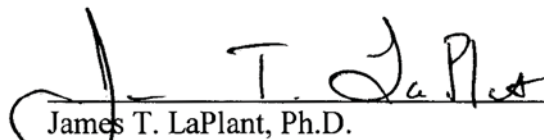
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ABSTRACT

The underlying problem that formed the basis for the current study is the fact that many U.S. postsecondary students are not doing well. It is important that postsecondary institutions identify the issues that are causing this underperformance and design policies and procedures that will assist students in improving their academic performance. In fact, it is so important that both the University System of Georgia and the Technical System of Georgia have initiated a joint effort in order to lay the groundwork for improved student performance, having recognized that “Georgia’s future depends on improving college completion” (University System of Georgia, 2011, p. 3).

The purpose of the case study was to gain a better understanding of the effectiveness of peer-tutoring in improving the academic success and retention of students enrolled in mathematics courses who chose to utilize this resource. Research questions in the current study sought to determine if there was a difference in performance of students who participated in peer-tutored sessions when compared to those who did not using measures such as mathematics course grades, cumulative GPAs and retention rates, and also investigate peer-tutored students’ overall program experiences and their recommendations for improving the tutoring program.

The sample included 5,352 peer-tutored and non peer-tutored students who took mathematics courses over a period of eight semesters. Some invalid data were removed after data examination. As a result, 4,639 records were kept for data analysis. Out of 4,639 students, 339 of them responded to the SSC Evaluation Form for providing more information about their overall program experiences and recommendations for program improvement.

The results showed peer-tutoring had a positive impact on students' cumulative GPAs and overall retention rates. Most students who responded to the SSC Evaluation Form also supported the results by indicating they expected their grade to increase as a result of attending the peer-tutored sessions and perceived their knowledge did increase after attending the sessions. Most students also indicated they had positive experiences with their tutors and gave great ratings on patience, knowledge and overall tutoring quality of their tutors. They felt comfortable seeking help at the Student Success Center and were willing to visit the center again for additional tutoring. These results demonstrated the positive outcome of the Student Success Center. Although students did value the helpfulness of peer-tutored sessions to their academic success and considered their tutors spent either more than enough or enough time with them, some students still recommended the center to employ more tutors and provide more time in the peer-tutored sessions, so the impact of peer-tutored sessions can be maximized.

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DEDICATION

It goes without saying that this dissertation would not have been completed without the support of my family. I would like to thank my parents for always believing in me, and especially my loving and supportive wife, Brenda, as well as my two wonderful children, Lindsey and Lauren. I will always be thankful for your allowing me the opportunity to pursue my dream.

Chapter I

INTRODUCTION

Problem Statement

Academic Success and retention have been identified as critical issues in many colleges and universities (Allen, Robbins, Casillas, & Oh, 2008). In Complete College Georgia, Georgia's Higher Education Completion Plan 2012, the importance of academic success and retention has been addressed by stating, "Georgia's future depends on improving college completion" (University System of Georgia, 2011, p. 3). This plan was a collaborative effort between the state of Georgia's two main educational systems, the University System of Georgia (USG) and the Technical College System of Georgia (TCSG). The two systems focused on three areas identified as opportunities:

1) Create new forms of collaboration and accountability among organizations responsible for or reliant on higher education,

2) Continue to work with the Georgia Department of Education to increase the number of college-ready students graduating from high school, and,

3) Reevaluate and envision anew the performance of completion-related aspects of higher education.

A section of the plan pointed out that workers with some level of postsecondary education would be needed to fill more than half of the jobs that would be available in Georgia at the beginning of the next decade. The plan was designed to establish a

competitive workforce that would have the essential skills acquired through quality higher education.

In order to address this potential shortfall, Governor Nathan Deal announced the implementation of the Complete College Georgia Initiative in August 2011. This initiative consisted of policies and procedures that were designed to positively impact current and future higher education and employment needs affecting the state of Georgia.

Retention has continued to be a problem at postsecondary institutions as indicated by decreased graduation rates over the past several years (Talbert, 2012). While this is not a new problem, it has become more of a concern due to the projected demand for college graduates needed to fill jobs in the near future. According to Complete College Georgia, Georgia's Higher Education Completion Plan 2012, only 57% of students who sought a four-year degree completed their course of study within six years, while only 11% of students who sought a two-year degree in the University System of Georgia completed their course of study within three years (University System of Georgia, 2011).

Allen et al. (2008) have indicated low graduation rates continue to stress the need for a solution to improve retention efforts. Statistics revealed, "On average, 58% of undergraduate students in the United States completed college within a six-year period" (Turner & Thompson, 2014, p. 94). According to Complete College Georgia, Georgia's Higher Education Completion Plan 2012, 59% of first-year students at the USG two-year colleges required some type of remediation and 48% of the first-year students who enrolled at the USG state colleges required some type of remediation (University System of Georgia, 2011). Based on these findings the USG determined "current methods of

remedial education must be changed in order to meet college completion goals”
(University System of Georgia, 2011, p. 17).

Remedial program design and implementation has been and will continue to be an integral part of institutional efforts in retention of students, so that “Georgia established a Transforming Remediation Work Group as part of its commitment to Complete College America” (University System of Georgia, 2011, p. 17). A main focus of this work group concentrated on restructuring the traditional remediation efforts of institutions, and both the USG and the TCSG have begun to implement some of these recommendations.

One of the traditional means utilized by postsecondary institutions to improve student performance in mathematics courses involved enrolling designated students in learning support courses. Even though these courses were taught at institutions of higher education, students who enrolled in these courses did not receive college credit. This increased the amount of time it could take for these students to graduate. “The more time it takes to graduate the less likely a student is to complete a certificate or degree” (University System of Georgia, 2011, p. 18). Improving the outcomes of remedial students should be an important part of the overall solution. A strategy that would allow students who require remediation to succeed would not only shorten the time to graduation, but should also help improve student attrition rates. This problem must be solved in order for higher education to continue to provide society with individuals who are prepared to assume leadership roles in the future.

Ariovich and Walker (2014) investigated how community colleges reformed their developmental mathematics programs by introducing concepts such as modularization. Using this concept, students must master each module in the program before they can

advance to the next part of the developmental sequence. This allowed a student to utilize self-pacing techniques in order to better understand the materials. Ngo and Melguizo (2016) focused on placement tests and their impact on mathematics remediation outcomes. They found there was concern about the appropriateness of placement tests and cut off scores as to their effectiveness in correctly identifying students that might need mathematics remediation coursework. Ngo and Melguizo also pointed out there were very few studies on how placement policies affect developmental mathematics student outcomes.

Student attrition affects not only individual students, but postsecondary institutions as well. Postsecondary institutions lose future revenue when a student fails to enroll for a subsequent semester. It is the individual student, however, who experiences the largest impact of his or her decision. Zhan (2014) examined the impact of both student loans and credit card debt on college graduation. Zhan found there was evidence that loans in excess of \$10,000 reduced the probability of college graduation. Avery and Turner (2012) stated, "Borrowing to finance educational expenditures has been increasing more than quadrupling in real dollars since the early 1990s" (p. 165). Finally, Kesterman (2006) discussed the number of borrowers in default, which, as far back as 2003 exceeded five million. In order to develop a successful strategy to combat student attrition, institutions need to identify types of students who might be deemed as at-risk as early as possible. Some of the student types that have already been identified include ethnic minorities, students from poor families, and first-generation college students (Knaggs, Sondergeld, & Schardt, 2015). Peer-tutoring has been utilized as a method of assisting these types of students.

Utley and Mortweet (1997) have defined peer-tutoring as “a class of practices and strategies that employ peers as one-on-one teachers to provide individualized instruction, practice, repetition, and clarification of concepts” (p. 9). Peer-tutoring programs have also been identified as being an integral part of a university’s academic support structure (Munley, Garvey, & McConnell, 2010). Many of the students who require remedial or learning support coursework have deficiencies in the area of mathematics. Some advantages peer-tutoring could afford these students include availability of peer tutors at times that are convenient for students, familiarity with a peer tutor and a level of trust with the peer-tutoring process. Another advantage of peer-tutoring is that it can be utilized in multi-student settings (Menesses & Gresham, 2009), while having tutors tailor peer-tutored sessions to match the academic capabilities of students has been identified as an effective method as well (Sytsma, 2014).

Peer-tutoring has often been proven successful when viewed in traditional settings (Menesses & Gresham, 2009). Many tutoring centers utilize both peer-tutoring and tutoring conducted by professional staff in order to serve their students, with importance placed on determining how each student responds to the methods utilized by the tutors. Rheinheimer (2000) found higher academic success directly correlated to the number of hours for which a student received instruction from a tutor. Those whose levels of tutoring exceeded five hours had higher performance rates than those students who received less than five hours of tutoring instruction.

With the advent of online education, tutoring has also entered the virtual world, allowing tutors and tutees to interact via the web rather than in a personal setting. Cochran, Campbell, Baker, and Leeds (2014) identified the growth of online enrollment

as a major factor concerning institutional views regarding retention efforts. Many students believe online courses offer an opportunity to earn an “easy A” but this is usually not the case because they are not academically prepared for success in online courses. In order to succeed in the world of online education, students must be motivated, well versed in time management skills and understand the challenge of independent study. Evans and Moore (2013) evaluated the results of tutoring efforts via the Opal tutoring system. Students utilizing this approach did not work with the same tutor during subsequent sessions, as they would in a traditional setting. Evans and Moore concluded tutees were indeed very successful in mastering the subject matter when utilizing the Opal tutoring system. When comparing human tutors to computerized methods, Van Lehn (2011) determined there was very little difference in the success of human tutors when compared to computerized methods. Peer-tutoring has also improved with the advent of online technology. VanLehn (2011) reported online peer-tutoring programs were just as successful as human tutors when applied to certain areas of study. Evans and Moore (2013, p.144) stated,

based on social network analysis methods and a student assessment of learning gains surveys, the introduction of this method [Online Peer-Assisted Learning] has had a positive effect on student-student interaction and student learning in our course and may have broad implications for peer-tutoring in courses that involve digital problem solving as a key component.

In addition, there is evidence in the literature regarding the relationship between peer-tutoring and academic success in higher education. Munley et al. (2010) conducted a study regarding the effectiveness of peer-tutoring on student achievement at the

university level. They found a positive relationship existed between peer-tutoring and student achievement if students participated in tutoring sessions on a defined schedule each week. Menesses and Gresham (2009) described peer-tutoring as “an efficient method for providing individualized instruction to many students simultaneously” (p. 266). In their study, they found students placed in a control group that received instruction from teachers and were not tutored were not as successful academically as students who received peer-tutoring in conjunction with teacher instruction. Evans and Moore (2013) reported high academic gains for students who utilized peer-tutoring with the aid of online technology, while Rheinheimer (2000) found students who received longer levels of tutoring were more successful academically than students who received lower levels.

Some problems have been reported with peer-tutoring. Leung (2015) reviewed previous studies on the relationship between peer-tutoring and academic success and found many contained theoretical and methodological flaws. Another potential problem involved students not devoting enough time in tutoring sessions. Munley et al. (2010) found students must interact with tutors for at least one hour per week during a typical semester in order to earn higher grades. Previous studies were also limited in regards to peer-tutoring and its impact on mathematics achievement.

Purpose of the Study

The problem that underlies the study is the lack of academic success and low retention rates, especially in the area of mathematics. According to O’Keefe (2013), student attrition has not only cost universities and college’s potential revenue; it has also resulted in substantial losses related to higher education investment. These costs are

translated to society as a whole, with areas such as student loan default rates and underemployment being impacted by attrition rates. As a means to address these issues, a collaborative effort between the state of Georgia's two main educational systems, the USG and the TCSG was undertaken and the result of those efforts were identified in Complete College Georgia, Georgia's Higher Education Completion Plan 2012.

The purpose of the current study was to gain a better understanding of how effective peer-tutoring was in improving the academic success and retention rates of students who chose to utilize this resource. In the current study, academic success referred to students' mathematics course grades and cumulative Grade Point Averages (GPAs), retention rates referred to 1) the proportion of students who attended peer-tutored sessions and subsequently enrolled in another mathematics course, and 2) the proportion of students who attended peer-tutored sessions and subsequently enrolled in another course. Student responses to the Student Success Center (SSC) Evaluation Form were also collected to understand students' their overall program experiences and their recommendations for improving the tutoring program.

Research Questions

The following research questions were used to guide the current study:

1. To what degree, if any, was there a significant difference in the mathematics course grades of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

2. To what degree, if any, was there a significant difference in the cumulative GPAs of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

3. To what degree, if any, was there a significant difference in the retention rates of postsecondary students enrolled in mathematics courses who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

4. To what degree, if any, was there a significant difference in the overall retention rates of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

5. How did students who have participated in peer-tutored sessions perceive their overall program experiences?

6. What recommendations, if any, did students have for improving the tutoring program?

Theoretical Framework

Tinto's (1975) model of student retention and his longitudinal theory of student departure were the basis for the study's theoretical framework. The central idea of the student retention model is integration, which is considered to be a strong indicator of how likely a student will persist in his or her academic pursuits. In another article, Tinto (1988) discussed stages of student departure. He described the process of student departure as longitudinal in nature, consisting of well-defined stages that students navigate during their postsecondary career. The current study focused on the second and third stages of student departure, which are transition and integration. Tinto (1988) defined the transition stage as "a period of passage between the old and the new, between associations of the past and hoped for associations with communities of the present" (p. 444). It is at this stage that peer-tutoring can play an important role in a student's transition from high school to postsecondary education, specifically as it relates to the

formation of proper study habits and the acquisition of time management skills.

Integration occurs when a student is absorbed into the culture or community of the postsecondary institution.

Tinto's (1975) longitudinal theory of student departure is based on the belief that academic and social integration are achieved through student association with institutional norms and culture and that the levels that are achieved through the integration process have a direct impact on a student's decision to continue his or her studies or to depart from the campus. This is another area where peer-tutoring can be successful. The benefits of peer-tutoring in academic integration are easy to define, but it also can play a pivotal role in social integration.

Tinto (2009) identified four attributes of student success as expectations, support, feedback and involvement. He also believed students could meet expectations that are placed upon them. Tinto's (1993) theoretical framework was derived from a student persistence model. He found students need both cognitive and non-cognitive experiences in order to establish a solid foundation when first arriving on campus. Tinto (1990) stated, "the practical route to successful retention lies in those programs that ensure, from the outset of student contact with the institution, that entering students are integrated into the social and academic communities of the college" (p.44).

Tinto's (2009) view of student integration is an important step for students in learning how to navigate the world of postsecondary education. Students who can integrate quickly into the culture of an institution, both academically and socially, have a much better opportunity of success during their academic career. As mentioned earlier,

peer-tutoring can play an important role in helping students to integrate into the community of the postsecondary institution.

From an academic standpoint, both the student and the institution need to be committed to the process in order for the tutoring effort to be successful. Prior qualifications and attributes have played a role in how prepared the student is for entry into postsecondary education. Peer-tutoring efforts can help keep the student on track academically in order to enhance the opportunity for success, leading to retention of the student. Peer-tutoring can also influence the student's integration into the social aspects of college life. The tutor provides information on this integration process in an effort to somewhat smooth the transition phase of the tutee.

Methodology

I was interested in gaining a better understanding of how effectively peer-tutoring for students enrolled in mathematics courses would improve the academic success and retention rates of students who chose to utilize this resource. The sample was drawn from a postsecondary institution in central Georgia and included 5,352 peer-tutored and non peer-tutored students who took mathematics courses (Calculus I, College Algebra, Precalculus, and Quantitative Skills & Reasoning) over a period of eight semesters (fall 2013, spring 2014, summer 2014, fall 2014, spring 2015, summer 2015, fall 2015, and spring 2016). Some invalid data were removed after data examination. As a result, 4,639 records were kept for data analysis. Out of 4,639 students, 339 of them responded to the SSC Evaluation Form for providing more information about their overall program experiences and recommendations for program improvement.

A case study design was used in the current study. A case study is “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context” (Yin, 2009, p. 18). It can be based on “any mix of quantitative and qualitative evidence” (Yin, 1994, p. 14). The data collected for the current study were mainly quantitative supplemented with limited qualitative data from multiple sources including course mathematics grades, cumulative GPAs and retention rates for answering research questions 1-4, and student responses to the SSC Evaluation Form for answering research questions 5 and 6.

Significance of the Study

The need for the current study was founded in the desire of postsecondary institutions to develop effective tutoring programs in order to assist students in improving their academic success. One benefit of the study is the possibility of ensuring the effectiveness of the tutoring program on students’ academic success at the current institution. A second benefit is the possibility of identifying problems in current practices that can be altered in an attempt to make programs more effective. The results of the study would help address a gap that exists in current literature regarding the effects of peer-tutoring on the academic success of students enrolled in mathematics courses.

With retention at University System of Georgia institutions receiving renewed scrutiny, the findings of the current study would provide information to, and identify opportunities for academic success centers to design effective and efficient tutoring programs that would help retain students. This can be an important part of the overall effort to meet the goal of producing a prescribed number of college graduates by the year 2020.

Assumption and Limitations

I collected the data including mathematics course grades, cumulative GPAs, and retention rates through an institutional database to understand students' academic success and retention and assumed the data collected were accurate. I also collected student responses to the SSC Evaluation Form to understand students' overall program experiences and their recommendations for program improvement and assumed their responses were honest, truthful, and without bias.

Possible limitations for the current study were related to the quality of peer tutors, the academic preparedness of the individual students, the experience of individual mathematics instructors, grading systems and the similarity of the course content. In addition, because the current study was a case study and only included students in one postsecondary institution in central Georgia, the results may not be generalized to a large population and should be interpreted with caution.

Definition of Key Terms

The following terms were applicable to the current study:

Academic success: In the current study, the academic success referred to students' mathematics course grades and cumulative GPAs.

Peer-tutoring: The process by which a student helps one or more students learn a skill or concept (Thomas, 1993, p. 266).

Remediation: "Students admitted to college, but unprepared in mathematics, reading or writing, receive remediation, also known as learning support. These courses, although delivered at a college, do not count in degree and certificate program hours, but

serve as an important pathway for students who would otherwise not be given the opportunity to complete college” (University System of Georgia, 2011, p. 17).

Retention: “Retention” was defined by Hagerdorn (2006) as “the measure of the proportion of students who remain enrolled at the same institution from year to year” (p. 14). In the current study, the retention rates referred to 1) the proportion of students who attended peer-tutored sessions and subsequently enrolled in another mathematics course, and 2) the proportion of students who attended peer-tutored sessions and subsequently enrolled in another course.

Summary

The case study, framed around Tinto’s (1993) model of student retention and his longitudinal stages of student departure, was designed to gain a better understanding of how effective peer-tutoring for students enrolled in mathematics courses was in improving the academic success and retention rates of students who chose to utilize this resource. Data were collected from multiple sources including mathematics course grades, cumulative GPAs, retention rates of students and student responses to the SSC Evaluation Form to examine their overall program experiences and recommendations for improving the tutoring program.

A review of literature was examined in Chapter 2. I explored the cost of student attrition to institutions along with challenges in regards to at-risk students. The overall theme of the review focused on the concept of peer-tutoring and the role it has played in relation to academic success and retention of postsecondary students.

The methodology for the study was discussed in Chapter 3, which included research design, site information, sampling, instrumentation, validity and reliability, data

collection procedures and data analysis. Chapter 4 included findings, and Chapter 5 centered on discussions and conclusions, including discussion of the findings, recommendations for practice, recommendations for further research and conclusions.

Chapter II

LITERATURE REVIEW

The purpose of the current study was to gain a better understanding of the effectiveness of peer-tutoring for students in mathematics courses in improving the academic success and retention of students who chose to utilize this resource. A review of the literature provided a solid foundation of support for the study as well as providing guidance for the data to be collected in the study. The organization of the review was presented in the next section.

Organization of the Review

The literature review was organized by topics that guided the reader through the main aspects of the review. The topics of the review were as follows:

1) Tutoring, Retention, and Academic Success: I focused on the importance of student retention and its importance to institutions of higher education. Factors were presented that influenced student retention along with theories that provided a basis for those decisions. GPAs of students were reviewed in order to determine their impact on retention rates.

2) Tutoring and Academic Success Centers: I reviewed the impact of academic success centers on student retention.

3) Theories Underlying Tutoring: Theories that have affected tutoring practices and designs were explored.

4) The Roles of Peer-tutoring: I espoused the impact of peer tutors on students, not only in an academic sense, but also in relation to social and interpersonal skills and even future career choices. Role Theory, Behaviorist Theory, Socio-Linguistic Theory and Gestalt Theory were reviewed and their contributions in tutoring were discussed.

5) Leadership and Tutoring: I examined researchers such as Gardner, Sergiovanni, Kouzes and Posner, and their contributions to the field of leadership. Some of those contributions were linked to tutoring and how the concepts that worked in business could be adapted to assist in creating successful peer-tutoring programs.

6) Tutoring Models and Programs: I focused on traditional models and programs such as surrogate teaching, proctoring and co-tutoring. Programs that were based on certain variables were also investigated.

7) Online and Technology Based Tutoring: Online and technology based tutoring methods were identified. These ranged from standalone computer assisted peer-tutoring programs to online activities that were used in conjunction with human interaction.

8) Retention: Theories that related to retention efforts, specifically theories espoused by Piaget and Tinto, were investigated in the current study.

9) Academic Success: I focused on the impact of peer-tutoring on student academic achievement.

10) Summary

Tutoring, Retention, and Academic Success

One important aspect of improving academic success of students was related to retention. While student retention has always been a concern in institutions of higher education, it has recently become part of a renewed focus within the USG in relation to

retention and graduation rates (University System of Georgia., 2011). According to O’Keefe (2013), student attrition has not only cost universities and colleges potential revenue, it has also resulted in substantial losses related to higher education investment. These costs are also translated to society as a whole, with areas such as student loan default rates and underemployment being impacted by attrition rates. Projections that many of the jobs in the near future will require workers that have some degree of higher education are troubling when viewed against the reality of today. It is more important than ever to identify programs and techniques that can be utilized by both tutors and instructors, with a goal of improving academic success and retention of students.

Lizzio and Wilson (2013) identified first-year students having trouble with early college assessment as being at-risk of non-continuation. Other groups of at-risk students included some first-year students from the millennial generation who, according to Turner and Thompson (2014), had a 58% completion rate after attending college up to six years. Heisserer and Parette (2002) identified student groups such as ethnic minorities and students with disabilities as helping comprise at-risk student groups. Low-income students (Knaggs et al., 2015) and students of color (Johnson, Wasserman, Yildirim & Yonai, 2014) have also been labeled as an at-risk population.

In developing a comprehensive and successful peer-tutoring program, institutions must understand the challenges faced by at-risk students. O’Keefe (2013) identified a “sense of belonging” as being crucial to the retention efforts of at-risk students. Johnson et al. (2014) defined how the campus environment played an important role in the overall experience of certain students. They further identified how racial and ethnic diversity on campus benefited other student groups. Other factors to consider would include

academic barriers in k-12 education, underrepresented students and lack of parental understanding of how to enroll in college (Knaggs et al., 2015). All of these factors should be considered when designing a peer-tutoring program for higher education students.

Munley et al. (2010) described how tutoring sessions have traditionally included students and faculty or professional staff in a face-to-face setting. They also discussed how peer-tutoring has changed the approach to overall tutoring efforts at many institutions, having been recognized as an integral part of the institutional structure. Menesses and Gresham (2009) identified peer-tutoring as an effective means of reaching multiple students at the same time, while Evans and Moore (2013) cited the positive impact peer-tutoring had in the classroom setting.

The success of peer-tutoring has been attributed to several methods. Munley et al. (2010) described an effective method regarding peer-tutoring as consisting of experienced undergraduate students who work with a limited number of students who need assistance in certain areas of their coursework. Robinson, Schofield and Steers-Wentzell (2005) conducted a study on peer and cross-age tutoring in mathematics courses and determined this approach showed promise in regards to the academic success of different student groups having differing levels of initial achievement. Evans and Moore (2013) discovered peer-tutoring was successful when assisted by technology, while Rheinheimer (2000) noted while peer-tutoring conducted among same sex tutoring pairs did not necessarily have better results than non-gendered pairs; the amount of tutoring received by the students was more impactful.

Tutoring and Academic Success Centers

Academic success centers have evolved over the years from primarily a tutoring center to an all-encompassing academic support mechanism. In regards to tutoring, Cooper (2010) found students who visited an academic success center tended to experience a positive impact on their academic success, having noted students who received tutoring at an academic success center were more likely to have a higher academic standing than students who did not attend the center. He also cited the ability of an academic support center to provide tutoring to multiple students at the same time. Bray, Braxton and Sullivan (1999) found an academic success center could provide an excellent opportunity for students to experience positive social integration as they were exposed to a microcosm of the college or university's social system. An academic success center also could provide the opportunity for a student to identify and bond with a member of the campus who then can contribute to his or her academic success. O'Keefe (2013) referred to this as the bond that forms between a student and someone at the university who can give the proper guidance.

Another advantage offered by an academic success center involved drop-in tutoring (Cooper, 2010). Many centers are set up to allow the opportunity for a student to drop-in at his or her convenience. This would provide the opportunity for more frequent contact with tutors, more time to devote to subject matter and the opportunity for immediate feedback. Kim (2015) demonstrated how academic support centers have been successful in assisting students who otherwise might not receive help due to limited resources. In this regard, academic support centers have been recognized as a resource saving option for an institution.

Whether tutoring occurred in an academic success center or another setting, Powell (1997, p. 6) identified the following ten factors as leading to the success of a well-designed peer-tutoring program:

- 1) Top management supports the program.
- 2) Mentoring is one component of, and integrated into, a broader youth development effort.
- 3) Participation is voluntary.
- 4) Program duration may be relatively short (up to a year).
- 5) There are specific goals in which the mentoring relationship is focused.
- 6) Mentors and protégés are selected carefully.
- 7) Mentor and protégé roles are delineated.
- 8) Orientation and training is provided for both mentors and protégés.
- 9) Programs have “structured flexibility” to allow mentors to use their own style.
- 10) Programs are carefully monitored.

According to Kim (2015), student-centered learning has become a focus at many institutions. Student-centered learning involves students becoming more responsible for their education, including in a tutor-tutee relationship. This would seem to meet many of the requirements of Powell’s (1997) design. This also could translate to tutoring session outside of an academic success center. Kim (2015) stated tutors assist students in many different organizations on campus, such as a residence hall or consulting office. The importance lies in the success of the tutoring effort rather than in the location.

Theories Underlying Tutoring

Powell (1997) reviewed four theories related to tutoring, which included Role Theory, Behaviorist Theory, Socio-Linguistic Theory and Gestalt Theory. He also described Role Theory as identifying expectations that accompany certain roles in the social structure. These expectations are composed of certain rights and requirements and when tutors and tutees assume these roles these expectations are viewed in a different light. The tutor becomes responsible for the success of the tutee (although not solely responsible) and is judged on how successful he or she is. A successful peer-tutoring program exhibits improvements in tutor attitudes, cooperation with those who supervise them and their assumption of more responsibility in their own educational progress.

Goodlad and Hirst (1989) identified the following benefits that Role Theory provides for participants in peer-tutoring programs:

- 1) Tutors develop their sense of personal adequacy: this also supported O'Keefe's (2013) "sense of belonging" as it relates to retention.

- 2) Tutors, in the adult role and with the status of teacher, experience being part of a productive society: this also related to Tinto's model of student persistence which emphasized the importance of a student's academic and social integration into an institution as it related to student retention.

Behaviorist Theory is associated with the work of B. F. Skinner (1948) and focuses on rewarding subjects for correct answers to questions. Peer-tutoring programs designed on this concept are highly structured and normally both the tutor and tutee are successful at the end of the program (Powell, 1997).

Socio-Linguistic Theory focuses on speech patterns developed in early adolescence as being a solid determinant of how well a student's perceptions and abilities translate to effective academic success. According to Powell (1997), the theory segregates disadvantaged children from middle class children in the way each group develops a capacity for learning. Given this fact, it should come as no surprise that tutoring is identified as being the most appropriate technique for assisting disadvantaged students in achieving academic success.

Powell (1997) identified Gestalt Theory as another of the underlying tutoring theories that asserts learning happens when objects are located within an intellectual setting or a learner can associate an idea to a "bigger picture." Tutors are identified as the primary beneficiaries of the tutor-tutee relationship because they rely on their own personal learning experiences in order to effectively communicate the material to the tutee, often with considerable difficulty. This results in the tutor becoming more aware of the structure of learning and providing an opportunity to approach problems from a new and different perspective.

Goodlad and Hirst (1989) identified the following that relate to the specific benefits Gestalt Theory provides for participants in peer-tutoring programs:

- 1) Tutors find a meaningful use of the subject matter of their studies.
- 2) Tutors reinforce their knowledge of fundamentals.
- 3) Tutors develop insight into the teaching/learning process and can cooperate better with their own teachers (Role Theory and Gestalt Theory): This might also be tied to Piaget's theory in which he emphasized "students' active participation in the teaching-learning process" (De Lisi, 2002, p. 5).

4) Tutees may respond better to their peers than to their teachers (Role Theory and Gestalt Theory).

5) Tutees can receive companionship from tutors: This also supported O’Keefe’s (2013) “sense of belonging” as it relates to retention.

The Roles of Peer-Tutoring

Kim (2015) identified the following roles of peer-tutoring:

1) Supplementing the main course functions, especially in large classes or in complex content or skill areas.

2) Increasing students’ opportunities to succeed and persist at the institution.

3) Improving students’ communication or writing skills. Communication competencies gained during college and graduate school are transferrable knowledge and skills that have a lifelong impact on success.

4) Improving reading and mathematics skills through remedial courses.

5) Improving public presentation skills (Public presentations are required in most classes).

6) Helping to improve leadership skills. Good communicators are likely to take on leadership positions at their institutions and in their careers.

7) Improving participants’ interpersonal skills. While they are usually improved through communication skills and interaction with peers and faculty, they can also be developed through the peer-tutoring process.

8) Improving career-related skills. Public communication skill or confidence in communication is closely related to job performance, especially in the service-oriented

economy. Success is more likely when one has good oral and written communication skills.

What is important to note about this is the fact that Kim (2105) stated these roles vary depending on how and where the sessions are conducted. They also covered a broad spectrum, to include academic skills, social and interpersonal skills and future careers. Most students who seek tutoring assistance are usually concerned with limited subject matter and would most likely not seek assistance in all of the areas mentioned above.

Leadership and Tutoring

According to Sergiovanni (2007), current practices in education are based upon existing theory. In fact, they are so ingrained in the culture that they are often adhered to without question. However, in order to establish effective peer-tutoring programs institutions must be willing to think “outside the box” and seek to discover methods that will assist in reaching the new generation of students that are seeking an education. In order to accomplish this, it will require effective leadership from faculty and administrators.

Gardner (1990) has identified several tasks of leadership that can be effective in developing and implementing successful peer-tutoring programs. The first task, envisioning goals, will affect not only the design of the program but the implementation and execution as well. The second task, motivating, involved freeing existing motives in order to allow the pursuit of goals common to a community. The tutoring community would consist of the tutor and tutee along with the faculty and/or administration responsible for designing the program. Motivation would have the greatest impact on the

tutor-tutee relationship, as the tutor must find ways to encourage the tutee to achieve the established goals.

Both Gardner (1990) and Kouzes and Posner (2012) addressed the importance of trust in a leader/subordinate relationship. Gardner (1990) stated some level of trust must exist in order for a society to function at any level, while Kouzes and Posner (2012) labeled trust as the “central issue in human relationships” (p. 219). It would seem on the surface that trust would be more important in the tutor-tutee relationship but some level of trust must exist between all members of the tutoring community in order for the program to be effective. Kouzes and Posner further stated when people trust each other it becomes easier to establish common goals, which is essential in the development of effective tutoring practices.

Kouzes and Posner (2012) explored how leaders sought to develop a relationship between themselves and those they lead. This was an essential step in the ability of a tutor to effectively engage a tutee in the course subject that is being taught. Kouzes and Posner have identified “the Five Practices of Exemplary Leadership” (p. 15). These practices have been identified as having made significant impacts on the success of organizations. By following these five practices, the tutoring community would give the program that has been designed and implemented every opportunity to succeed.

The first practice involves Modeling the Way. Kouzes and Posner (2012) determined leaders who practice what they preach are the most successful. If followers see a leader “walking the walk” and not just “talking the talk,” they will be more inclined to follow them, therefore a tutee observes a tutor who is actively engaged in sharing his or her knowledge will most likely be motivated to complete the session successfully.

Kouzes and Posner pointed out everyone should have a clear understanding of what the desired outcomes are before launching a new initiative. This would be especially important in establishing a peer-tutoring program. In order to have students desire to participate in the program, they must be encouraged to do so by sharing with them how the vision of the institution will benefit them as well. This is what Kouzes and Posner refer to as Inspiring a Shared Vision.

Kouzes and Posner (2012) commented on how leaders can be more successful when they challenge the “status quo.” For educators and students, this would involve experimenting with new techniques and approaches, such as peer-tutoring versus traditional tutoring or virtual tutoring versus face-to-face tutoring. It also involves taking risks. Kouzes and Posner have determined a good way of handling potential setbacks “is by constantly generating small wins and learning from experience” (p. 20). This is especially true as it relates to students who often get discouraged when they struggle to master content. By allowing for small wins and celebrating them as they occur, tutors can be more effective in keeping a tutee engaged in the process.

The fourth practice was identified as Enable Others to Act. Kouzes and Posner (2012) discovered leaders use trust and relationship building as ways to encourage collaboration. They further stated by encouraging self-determination and mastery of the subject matter, people are more likely to strive to be the “best they can be.” Students who take this to heart could become more competent in their studies and perhaps even exceed their own expectations.

The final practice was entitled Encourage the Heart. The biggest part of this practice involved recognition. Kouzes and Posner (2012) identified this as being the

antidote for frustration and disenchantment. Tutoring can be a long and arduous process, claiming many victims along the way. Tutors who can successfully encourage the heart will lay the groundwork for their tutees to become successful students and become a contributing member to the tutoring community.

Sergiovanni (2007) identified Stages of Leadership that relate to Kouzes and Posner's (2012) leadership practices. The first stage, Leadership by Bartering, involved a leader agreeing to provide a follower with something the follower desired in exchange for something the leader wanted. The second stage, Leadership by Building, involved the leader creating an atmosphere that would give a follower the opportunity to fulfill needs such as achievement, responsibility and esteem. The third stage, Leadership by Binding, occurred when the leader and follower agreed to a set of shared values that would help them strive in the completion of a common cause. The fourth stage, Leadership by Bonding, involved the leader and follow accepting a set of shared ideas that eventually prepared them to become self-managing.

This is a great example of the evolution of a tutor-tutee relationship. In Sergiovanni's (2007) first stage, the tutor and tutee worked in establishing a relationship through give and take. The tutee wanted to be able to master the course material and the tutor wanted to assist the tutee in that endeavor. Each must be willing to help meet each other's needs in order for the relationship to be successful. In the second stage, the tutor worked in creating a climate in which the tutees interpersonal needs were met, helping build trust and confidence in the relationship. The tutor convinced the tutee that by following the program protocol, he or she would be successful in mastering the course content. The third stage would have involved the tutor and tutee committing to a set of

shared values that would help each one maximize the opportunity for the tutee to be successful. The fourth stage would have laid the groundwork for the tutor to guide the tutee in becoming independent, which would eventually allow the tutee to manage the course material without the assistance of the tutor.

Kouzes and Posner (2012) also discussed the importance of developing cooperative goals and roles. In their view, common goals are extremely helpful in providing for collective achievement. In a tutor-tutee relationship, these common goals would be the foundation for working together to assist the tutee in being successful in learning the course material. Another integral part of this process would involve tutors utilizing two of Kouzes and Posner's steps that effective leaders use to strengthen others. Those steps are: 1) Enhance self-determination and 2) Develop competence and confidence.

In a traditional leadership role in business, average leaders have had to understand and accept an important concept in order to become exemplary leaders. Kouzes and Posner (2012) described this as "a paradox of power" in which leaders who share their power with others enjoy an increase in power themselves. They pointed out "as you examine what people say about powerless and powerful times, there is one clear and consistent message: feeling powerful-literally feeling 'able'- comes from a deep sense of being in control of your own life" (p. 246). While this might be a little extreme when describing a tutor-tutee relationship, students who feel they are not in control of certain aspects of their academic life have struggled in those areas of academic life. By empowering a tutee to gain control of that part of his or her academic life, a tutor can enable a tutee to gain that deep sense that Kouzes and Posner referred to.

Another of Kouzes and Posner's (2012) principles fit nicely into this discussion. They described personal accountability as being essential in motivating people to be cooperative in reaching common goals. This is also important in a tutor-tutee relationship because both the tutor and tutee must become personally accountable to each other in order for the common goal to be achieved. This is made possible by a tutor having developed a tutee's competence and confidence. By having the confidence that a tutee can understand a mathematics problem and work it to a successful conclusion, his or her competence in mathematics would have increased. Kouzes and Posner found people who experienced this type of success referred to being "in the flow." They had determined their skill set would allow them to perform at a high level despite the challenging nature of the undertaking.

Tutoring Models and Programs

There are some variations of traditional and peer-tutoring that have been used in higher education settings. Powell (1997) identified four basic types that have been used in these settings.

1) Surrogate teaching is the method where advanced students teach undergraduate students, such as a graduate assistant teaching entry-level courses. This allows both teacher and student to share in the overall educational experience.

2) Proctoring occurs when a one-to-one relationship exists between a tutor and tutee with a goal of fully understanding the subject matter at hand. It has been utilized in many colleges and universities across the United States. Students tend to learn at their own pace, with occasional lectures included in the format.

3) Co-tutoring occurs when students who are struggling with the same subject matter come together in order to assist each other. Many institutions of higher education have adopted this format in order to offer students the opportunity to learn from each other. Co-tutoring has also been successfully implemented in high school settings.

4) Teacher less groups are a non-traditional approach to tutoring where groups led by students meet without the guidance of a teacher. The purpose is to encourage students to facilitate their own learning in order to be able to independently complete their work.

Powell (1997, p. 13) echoed the sentiments of others when she identified four general positive outcomes of peer-tutoring programs. Those outcomes are:

1) Tutoring can improve student performance and skills, and provoke student interest in participating fully in the educational process.

2) Tutoring benefits can improve the learning of both the tutor and tutee.

3) Tutoring can relieve the strain on teachers of trying to teach large, often mixed-ability classes.

4) Tutoring is relatively inexpensive and greatly enriches education.

There is evidence in the literature that tutoring has been successful in improving the academic success of students (Munley et al., 2010). This however, is not always the case. Maggio, White, Molstad and Kher (2005) studied 397 entering freshmen at six universities with a goal of determining which characteristics impacted student GPAs and retention. Maggio et al. concluded certain characteristics had both a positive and negative impact on college GPA while other characteristics had a direct negative effect on the GPA.

Other studies have looked at peer-tutoring programs based on certain variables with mixed results. Rheinheimer (2000) studied gender matching as one of the tutoring variables he researched. The current study concluded the gender of a tutor had neither a positive nor a negative effect on tutoring practices. Cooper (2010) researched the effect of drop-in tutoring and its impact on a tutee's GPA. He concluded students who received drop-in tutoring assistance during multiple sessions achieved higher GPAs and increased rates of retention when compared to student who either did not seek tutoring sessions or visited the center on an infrequent basis.

Berghmans, Michiels, Salmon, Dochy and Struyven (2014) compared student participation in a directly tutored learning environment with a facilitatively tutored learning environment in order to discern which approach yielded the best results. They defined a directly tutored learning environment as one in which the learning process is mostly controlled by the tutor, whereas a Facilitatively tutored learning environment involves more tutor and tutee interaction with a goal of encouraging a "high-quality and active learning process among students" (Berghmans et al., 2014, p. 439).

When discussing their findings, Berghmans et al. discovered students who participated in directly tutored sessions increased their knowledge in the area of procedures but did not gain a better understanding related to clinical knowledge. Facilitatively tutored students, on the other hand, experienced an increase in their level of knowledge while also displaying more varied opinions on the subject matter. Regardless of the type of approach utilized, Berghmans et al. pointed out student input was crucial in developing a well-rounded peer-tutoring program that would sufficiently meet the objectives of both students and instructors.

Online and Technology Based Tutoring

The literature which addressed online and technology based tutoring is less robust than the literature which addressed traditional and peer-tutoring efforts. Evans and Moore (2013) found research into computer-assisted peer-tutoring is far less comprehensive than research involving classroom tutoring. Van Lehn (2011) compared human tutoring and computer tutoring in a study designed to determine which method was more successful. The results indicated computer based tutoring was just as effective as human tutoring in certain subject areas, specifically STEM topics. Kilburn et al. (2014) found computer assisted tutoring had a positive impact on the retention of students taking predominately online courses.

As part of the effort to improve the performance of computer based tutoring, many software programs have been introduced as an aide in this approach. Evans and Moore (2013) developed a web-based product called OPAL (Online Peer-Assisted Learning). OPAL was designed “for use in problem-based undergraduate courses” (p. 144). Preliminary results showed OPAL was effective in enhancing student learning related to web-based tutoring activities.

According to Hung, Smith and Smith (2015), the many advantages to computer technology has encouraged institutions to take another look at the possibility of using the technology in the educational environment. As with any online educational format, learners must be self-disciplined in order to receive the most benefit from the system. The authors conducted a study using REsearchMentor, which is a cognitive tutoring system designed with a problem-based scenario format. Students were placed into focus groups for the study and given differing scenarios in which to utilize REsearchMentor as

a tutoring assistant. The data indicated a system such as REsearchMentor displayed the possibility to tap into students' metacognitive processes. While the authors were encouraged by the results obtained from the study, they did caution further research was needed in order to determine the effect of the interaction between the user and a computer assisted tutoring system such as REsearchMentor.

Retention

The importance of institutional efforts in retention is defined in Complete College Georgia, Georgia's Higher Education Completion Plan 2012 (University System of Georgia, 2011). Statistics were presented from various sources such as the National Center for Higher Education Management, the Bureau of Labor Statistics and Complete College America that painted a rather bleak picture of the future outlook for the state of Georgia. Some items of note were the fact that the current generation of higher education students will be less educated than their predecessors. The United States now ranks behind 14 other developed nations in regard to adults who have received a college degree and by 2020 it is anticipated that over 60 % of the jobs in the state of Georgia will require some form of college education. Institutions must develop educationally based programs that will assist all students in becoming successful college graduates.

According to De Lisi (2002), in order for students to be successful, they must be actively engaged in the learning process. He referenced Piaget's (1932) theory as being positively linked to educational techniques that encourage such participation. Piaget (1932) initially studied children's relationships with others. He noted characteristics that were interwoven into the fabric of social relationships that had both positive and negative effects on those relationships. He noted how children's ideas based on cooperative

relationships were developmentally superior to those based on constraint. As Piaget (1985) later focused on how children developed knowledge, he determined that it was “a relationship between the child’s current cognitive system and the particular object, task, or problem at hand” (p. 7). These ideas established a baseline for future research related to the imbalance of this relationship.

This imbalance, or lack thereof, played a critical role in how children learn, (Piaget, 1976). Piaget further studied cognition and affect, or feelings, and how they affected peer learning, and noted how children tend to view concepts related to peer learning based on prior experiences and the impact that association had on their academic success.

While this was an important concept in understanding how children learn and problems that can cause an imbalance in the relationship, other factors that influence retention have been researched as well. Johnson et al. (2014) studied how stress and campus climate perceptions affected certain student group retention rates. Johnson et al. found students of color were impacted by a different set of factors than white students were when it came to persistence decisions.

Allen et al. (2008) studied the effects of different characteristics on student decisions regarding transfer and retention. They focused on direct and indirect effects of several factors to determine their influence on third year retention decisions. Allen et al. theorized academic self-discipline would play an important role in third year retention but the study indicated otherwise. They also discovered social connectedness had a positive influence on student retention decisions.

Some factors that affect a student's future retention decisions are formed before they become a post-secondary student (Maggio et al., 2005). Much like Piaget (1976) theorized that a child's ability to learn is influenced early in life, these factors have played a role in molding a student's academic ability. Knaggs et al. (2015) identified underrepresented student groups in higher education settings and focused their research on how the primary and secondary educational systems did not adequately prepare these student groups for transition into higher education. They also identified other barriers that affected a student's academic success in college.

Knaggs et al. (2015, p. 9) identified some of the factors as being:

- 1) Low educational aspirations.
- 2) Social isolation that comes with poverty.
- 3) Racism and classism.
- 4) Family barriers.
- 5) Financial barriers.

Some of these factors are similar to those identified by O'Keefe (2013) as contributing to a student's need for developing a sense of belonging at his or her college or university in order to improve their opportunities at being retained.

Bray et al. (1999) "elaborated on Tinto's theory of student departure by focusing on the concept of social integration" (p. 645). They found college students utilize coping mechanisms when dealing with stress and that this has a definite impact on student retention decisions.

Munley et al. (2010), O'Keefe (2013), Kilburn et al. (2014), and Cochran et al. (2014) all expressed the fact that understanding the information regarding retention is

critical for those desiring to design and implement an effective tutoring strategy. It should be obvious by now that there can be no “one size fits all” peer-tutoring program. Every student is different, and his or her approach to learning is unique. The factors and barriers that previously impacted their lives have shaped the lens through which they view the world, and they have played an important role in how academically prepared these students are as they enter the world of higher education. Once tutors understand how to use this information, an effective program can be established for those students wishing to improve their academic success and enhance their retention possibilities.

Academic Success

According to Leung (2014), peer-tutoring has been beneficial in regards to academic achievement. Leung conducted a meta-analysis in order to determine if peer-tutoring had a positive effect on academic success. The results indicated that peer-tutoring benefited students in a positive manner. Munley et al. (2010) indicated while peer-tutoring was found to have a positive impact on student achievement, evidence suggested students must engage in tutoring sessions for approximately an hour per week over the course of an entire semester in order to positively impact the course letter grade.

This view reinforced De Lisi’s (2002) statement that students must be actively engaged in the education process. De Lisi described how students would often develop new learning techniques, which are based on previous learning techniques and experiences. Munley et al. (2010) found peer-tutoring could become an important part of the student “buy in” as long as it is designed properly. De Lisi (2002) emphasized the important role teachers play in ensuring that the participants receive a program that is designed to facilitate ease of use by the participants.

Menesses and Gresham (2009) designed a study to measure the levels of academic achievement among students who received reciprocal and nonreciprocal tutoring. Their results indicated students who received the tutoring, when compared to a control group composed of students who did not receive tutoring, showed marked improvement in the academic results. Rheinheimer and McKenzie's (2011) research looked at a cohort of first-time, full-time, degree-seeking students with undeclared majors at a medium-sized university in Pennsylvania. Both tutored and non-tutored students in this cohort were tracked for four years in order to ascertain retention information and academic success. Rheinheimer and McKenzie (2011) discovered students who were tutored withdrew at a lower rate than anticipated, also were retained, and eventually received a degree at a higher than expected level. Based on the overall results of the study, Rheinheimer and McKenzie (2011) concluded tutoring enhanced academic success and retention.

Lizzio and Wilson (2013) also conducted a study that compared academic success rates of students who were placed in an intervention group and students placed in a non-intervention group. Their findings indicated each student in the intervention group who submitted a subsequent assessment item (as required) experienced a positive impact on short-term academic success. These students also experienced a positive impact on their overall academic success when compared to students in the non-intervention group.

Munley et al. (2010) and Robinson et al. (2005) discovered peer-tutoring, in most cases, had a positive impact on both academic success and retention of postsecondary students. While it was not always successful, the learning experience for both the tutor and tutee was enhanced by the interaction each received during the tutoring sessions. It

would be beneficial for colleges and universities to constantly review the composition of their peer-tutoring programs in order to ensure that the programs are designed to meet the individual needs of an ever-changing student population.

Summary

The literature review covered several topics. “Tutoring, Retention and Academic Success” focused on the importance of student retention and its importance to institutions of higher education. Factors were presented that influence student retention along with theories that provided a basis for those decisions. This section also discussed different types of student groups that have been identified as at-risk in regards to retention programs. “Tutoring and Academic Success Centers” reviewed the impact academic success centers have on student retention. “Theories Underlying Tutoring” explored theories that have affected tutoring practices and designs. “The roles of peer-tutoring” espoused the impact peer tutors can have on students, not only in an academic sense, but also in relation to social and interpersonal skills and even future career choices. Role Theory, Behaviorist Theory, Socio-Linguistic Theory and Gestalt Theory were reviewed and their contributions in tutoring were discussed. “Leadership and Tutoring” examined authors and researchers such as Gardner, Sergiovanni, and Kouzes and Posner and their contributions to the field of leadership. Some of those contributions were linked to tutoring and how the concepts that worked in business could be adapted to assist in creating successful peer-tutoring programs.

“Tutoring Models and Programs” focused on traditional models and programs such as surrogate teaching, proctoring and co-tutoring. Programs that were based on certain variables were also investigated. “Online and Technology Based Tutoring”

identified online and technology based tutoring. These ranged from stand-alone computer assisted peer-tutoring programs to online activities that were used in conjunction with human interaction. “Retention” further explored theories that relate to retention efforts, specifically theories espoused by Piaget and Tinto, while the “Academic Success” section focused on the impact of peer-tutoring on student academic achievement.

Early research regarding tutoring referenced work by Piaget (1932) and Tinto (1975). Piaget (1932) studied the relationship between a child’s cognitive system and problem elements in order to determine if they were in balance with one another. He felt as though an imbalance played a critical role in how children learn. Tinto (1975) developed his theory of student departure, which has been enhanced many times since its inception. These early works established the foundation for development of other theories and, eventually, peer-tutoring programs and concepts. In reviewing the literature, various studies were identified that drew upon Tinto’s theory and measured the effectiveness of different types of approach to tutoring.

Chapter III

METHODOLOGY

Research design, site information and sampling, and instrumentation, validity and reliability, data collection procedures, and data analysis were discussed in Chapter 3. I was interested in gaining a better understanding of whether peer-tutoring was effective in improving the academic success and retention of students who chose to utilize this resource. Postsecondary graduation rates have been a major concern to leaders in higher education over the past several years (University System of Georgia., 2011). In order to improve graduation rates, many institutions have chosen to focus on academic success and retention as a way to increase those rates (Rheinheimer & McKenzie, 2011). The need for the current study was founded in the desire of postsecondary institutions to develop effective tutoring programs in order to assist students in improving their academic success and retention, particularly as it related to mathematics.

The following research questions were used to guide the current study:

1. To what degree, if any, was there a significant difference in the mathematics course grades of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?
2. To what degree, if any, was there a significant difference in the cumulative GPAs of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

3. To what degree, if any, was there a significant difference in the retention rates of postsecondary students enrolled in mathematics courses who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

4. To what degree, if any, was there a significant difference in the overall retention rates of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

5. How did students who have participated in peer-tutored sessions perceive their overall program experiences?

6. What recommendations, if any, did students have for improving the tutoring program?

Research Design

The current study utilized a case study design. Yin (2009) described a case study as “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context” (p. 18). It can be based on “any mix of quantitative and qualitative evidence” (Yin, 1994, p. 14). According to Merriam (2009), a case study approach is particularly useful in fields such as education. An examination of a field’s programs and problems can perhaps lead to improving practices in those areas. This approach was chosen for the study due to its usefulness in studying policy and programs in education.

Merriam (2009) also pointed out generalization is a concern with a case study because it focuses on a single unit or instance. Even though this is a potential threat, there can be much to learn from a case study approach. Another challenging feature of a case study design is that it presents certain limitations in its usage, such as producing a

product that is too lengthy or too detailed. Further limitations include issues of reliability and validity. Based on this information, the results of a case study should be interpreted with caution. Challenges with validity, reliability and generalizability may affect the results.

Site Information and Sampling

The sample was drawn from a postsecondary institution in central Georgia. Reasons for selecting this institution included factors such as student types, programs of study, and the procedures utilized in the institution's Student Success Center. Students who participated in peer-tutored sessions and were enrolled in mathematics courses were identified for the study. Data were collected from 5,352 peer-tutored and non peer-tutored students who took mathematics courses over a period of eight semesters (fall 2013, spring 2014, summer 2014, fall 2014, spring 2015, summer 2015, fall 2015, and spring 2016), including Calculus I, College Algebra, Precalculus, and Quantitative Skills & Reasoning. After examining the collected data, student records for summer 2015 and spring 2016 have been removed because there were no students who attended the peer-tutored sessions during these two semesters. In addition, data for the following courses sessions have been removed because there were not enough samples for comparisons: 1) fall 2013 Calculus I, 2) spring 2014 Calculus I and Precalculus, 3) summer 2014 Calculus I, Precalculus, and Quantitative Skills & Reasoning, 4) fall 2014 Calculus I, 5) spring 2015 Calculus I and Precalculus, and 6) fall 2015 Calculus I. As a result, 4,639 records were kept for data analysis. Out of 4,639 students, 339 of them responded to the SSC Evaluation Form for providing more information about their overall program experiences and recommendations for program improvement.

The Student Success Center at this institution opened in January 2009. The center's mission is to support students at any level and of any ability in their course work and in the development of personal skills that will help them achieve their academic and life goals. The center offers tutoring at no charge to students who are seeking academic assistance.

The student population at the institution is comprised of a subset of first-generation college students and students who need some level of remedial support upon entering as freshmen. Institutional leadership views the Student Success Center as a mechanism for preparing at-risk students for entry into college level coursework as well as striving to have a positive impact on academic success and retention rates. With the current focus on system-wide graduation and retention rates, it is imperative that institutional leadership remain informed as to the effectiveness of the peer-tutoring program so as to allow for program evaluation and improvement as needed. It is also important that faculty understand how the Student Success Center impacts instruction as it relates to supporting classroom instructions in relation to subject matter. Feedback from the Student Success Center could assist faculty in tailoring the instructional approach in the classroom in order to have a more positive impact on student academic success.

The Student Success Center offers a variety of resources to assist students, including workshops, writing resources, mathematics resources and science resources. The center also offers supplemental instruction, which is an academic program that targets historically difficult courses to provide assistance with regularly scheduled, out of class study sessions. Another program offered by the center is the "Always Alert"

program, which seeks to provide support to students who have demonstrated characteristics that hinder academic success and scholastic success. Some of the online resources offered by the Student Success Center include a research paper calculator and a course load calculator.

In reviewing some historical data, I determined that during the fall 2010 semester there were 15,835 log-ins, of which 2,377 were unique, or unduplicated, visitors. There were 996 multiple-visit students (5 or more visits), and the center conducted 1,691 mathematics tutored sessions. During the fall 2011 semester there were 17,508 log-ins, resulting in an additional 2,912 students visiting the center when compared to the fall 2010 semester. Additionally, there were 2,210 unique (unduplicated) visitors as well as 2,063 total mathematics-tutoring sessions. During the fall 2012 semester there were 18,763 log-ins, which was a 1,255 increase over fall 2011. Additionally, there were 1,986 mathematics-tutoring sessions. Finally, during the fall 2013 semester there were 18,018 log-ins, which was a 745 decrease over the fall 2012 semester. The Student Success Center conducted 2,447 mathematics-tutoring sessions, which was an increase of 464 students when compared to the fall 2012 semester.

The reason for the study is related to the renewed focus from the University System Board of Regents in relation to academic success and retention; I was interested in determining to what extent peer-tutoring had an impact on the academic success and retention rates of postsecondary students who were enrolled in certain mathematics courses. It is believed the current study would also help contribute to the literature regarding peer-tutoring.

As part of the need for the study, I looked at current practices within the Student Success Center. The center's goal for a typical tutoring session is between 30 and 35 minutes, with the actual time being closer to 40 minutes. The center currently has 14 mathematics tutors who can provide tutoring resources for mathematics at some level. This also happens to be the average number of mathematics tutors per semester, but the center has employed as many as 22.

Tutors for the Student Success Center are recruited primarily through faculty referral. Each spring, faculty is asked to identify talented students who will be returning the next year and who meet the quantitative criteria (3.0 GPA, enrolled for at least 6 hours) and who demonstrate the needed soft skills (dependable, willing to listen to feedback, good communication skills). As far as matching tutors with students is concerned, being a walk-in center does not necessarily allow for matching. The tutors have business cards with their tutoring hours on them, so if they work with a student and have good results, the tutor gives the student a card and encourages the student to come back and see them. If the results are not encouraging, the tutor will recommend a different tutor who works similar hours. In certain cases, the director of the center might try to match a particular student with a particular tutor (i.e. students with accommodations for anxiety, being on the autism spectrum, etc.) but this only occurs in rare cases.

Most tutoring sessions at the Student Success Center are individual sessions, but group sessions are conducted from time to time, if the circumstances dictate. For example, if four or five students from the same mathematics class come in at the same time, the tutor will group them together and they will all work on problems

simultaneously. Group sessions are discouraged for students who might be in the same course but have different instructors, because each faculty member's syllabus is different, and they are probably working on different things.

To summarize, the reason for the study was related to the renewed focus from the University System in relation to academic success and retention. I looked at current practices with the Student Success center, including the goals for a typical tutoring session and the center's program structure. I determined the structure consists primarily of a directly tutored learning environment, which is defined as one in which the learning process is mostly controlled by the tutor (Berghmans et al., 2014). I was also interested in determining if the Student Success Center incorporated any practices that might be described as facilitatively in nature. A facilitatively tutored learning environment involves more tutor and tutee interaction with a goal of encouraging a "high-quality and active learning process among students" (Berghmans et al., 2014, p. 439).

Instrumentation

Mathematics course grades, cumulative GPAs and retention rates over eight semesters were collected from an institutional database in order to answer RQs1-4 regarding students' academic success and retention. Unless stated otherwise, all determinations of significance were completed at the .05 level.

Another instrument, the SSC Evaluation Form (see Appendices A-C), was used to collect supplemental data regarding students' overall program experiences as well as recommendations on improving the tutoring program. The instrument was designed by

staff at the Student Success Center. Permission to use the form was granted by the Director of the center, and the current form has been in use since 2015.

The SSC Evaluation Form consisted of nine items. Questions 1-8 were used to identify student perceptions related to the current tutoring at the Student Success Center; Question 9 was used to identify student recommendations for improving the tutoring program. Students were able to provide additional information to questions 5, 8 and 9 because they were allowed to provide explanations for the responses made to questions 5 and 8 and question 9 is an open-ended question.

The data collected for the current study are mainly quantitative supplemented with limited qualitative data. The qualitative data collected using the SSC Evaluation Form were coded and used to support the findings from quantitative data. My experiences related to qualitative research were limited to the coursework. I learned the importance of defining the goals for the study, being able to identify and define the paradigms that influence qualitative research, the importance of research questions and selecting the correct approach to conducting the research. I also learned the importance of validity, including identifying threats and researcher bias, and coding the data, and inter-coder reliability at the beginning of coding process.

Inter-coder reliability is a measure used to examine the agreement between two people on the assignment of categories of a categorical value. To ensure inter-coder reliability, two coders (including I) evaluated 61 responses to the SSC Evaluation Form, identifying the responses as being either a recommendation or a comment. These broad categories were later refined as part of the coding process.

Cohen's kappa is a measure of inter-coder agreement for categorical scales when there are two coders. This test was appropriate for measuring inter-coder reliability as it met the following five assumptions:

- The response made by both coders was measured on a nominal scale.
- Both coders assessed the same observations.
- Each response variable had the same number of categories and consisted of a 2 x 2 crosstabulation.
- The two coders were independent.
- The same two coders were used to judge all observations.

The number of responses were listed under the "count" heading and identified as a weighted variable. The analysis was run in SPSS and the results showed there was substantial agreement between the two coders' judgements, $k = .673$ (95% CI), $p < .0005$.

Validity and Reliability

Validity was addressed in the instrumentation and procedures processing. By drawing both qualitative and quantitative data from the same population, it helped enhance data comparison and establish external validity. Credibility was also established by triangulation of data from multiple sources. In addition, two coders (including I) evaluated 61 responses to the SSC Evaluation Form, identifying the responses as being either a recommendation or a comment to ensure inter-coder reliability.

Data Collection Procedures

Upon receiving an approval from the Valdosta State University's Institutional Review Board (see Appendix D), I began the data collection process. To answer the research questions, data including students' mathematics course grades, cumulative

GPA's and retention rates were collected from an institutional database, which consisted of eight semesters of computerized data. Students' mathematics course grades and cumulative GPA's were considered interval data and their retention rates were defined as ratio data. Student responses to the SSC Evaluation Form were also collected to understand their overall program experiences and recommendation for program improvement.

Data Analysis

Data were collected from multiple sources with multiple measurements in order to increase the credibility of this case study and help understand the impact of the peer-tutoring on student academic success and retention, and their overall program experiences. The data collected were mainly quantitative supplemented with limited qualitative data. Quantitative data was analyzed by utilizing both descriptive and inferential statistics, where independent-samples *t*-tests were conducted for research questions 1 and 2 regarding students' academic success and chi-squared tests were conducted for research questions 3 and 4 regarding students' retention rates. Independent-samples *t*-tests were used to compare the means of a normally distributed dependent variable (course mathematics grades-RQ1; cumulative GPA's-RQ2) between students who attended peer-tutored sessions and students who did not. Chi-squared test was used to determine if there was a statistical difference in the retention rates of students enrolled in subsequent mathematics courses who attended peer-tutored sessions and the retention rates of those who did not attend peer-tutored sessions (RQ3). Chi-squared test was also performed determine if there was a statistical difference in the overall retention

rates of students enrolled in subsequent courses who attended peer-tutored sessions and the overall retention rates of those who did not (RQ4).

Student responses to the SSC Evaluation Form were also collected to understand students' overall program experiences and recommendations for program improvement. Descriptive data were provided and students' responses were analyzed and coded to answer research questions 5 and 6. The descriptive coding process was utilized in order to describe what was in the data. Data was coded by recording codes and remarks in the margins of a hard copy of the participant responses, after considering such questions as what is trying to be conveyed and what do I see going on here? Subsequent coding activities centered on looking for key words in context and by combining data that was coded the same way into distinct sections of a spreadsheet. At the conclusion of subsequent reviews of the responses, three categories emerged from the coding process, along with associated concepts:

- Program Structure
- Program effectiveness
- Recommendations

Program structure consisted of the following associated concepts:

- More tutors
- Group tutoring
- Organization of subject material

Program effectiveness consisted of the following associated concepts:

- More time in sessions
- Assignment of individual practice problems

- Tutor competence
- Tutor training
- Tutor effectiveness
- Tutor interaction
- More time with tutors

Recommendations consisted of the following associated concepts:

- No changes to the program
- Increased face-to-face interaction
- Amount of assistance by tutors
- No response
- Coffee pot

Further analysis revealed these categories were part of three eventual themes that emerged from continued refinement of the coding process; employing more tutors (program structure), providing more time in sessions (program effectiveness) and no changes needed (recommendations).

Patton (2002) stated, “Triangulation strengthens a study by combining methods” (p. 247). He further remarked “it is in data analysis that the strategy of triangulation really pays off, not only in providing diverse ways of looking at the same phenomenon but in adding to credibility by strengthening confidence in whatever conclusions are drawn” (p. 556). Triangulation of the data included a review of methods, sources and instruments that were utilized in the data analysis process. Data collected for the current study were from multiple sources with multiple instruments. Those data were analyzed for a comparison between peer-tutored and non peer-tutored students to validate the

effect of peer-tutoring on students' academic success and retention. Students' specific responses to the SSC Evaluation Form were used to support the results and provide detailed explanations to ensure data credibility.

Summary

I utilized a case study that attempted to determine the actual effect peer-tutoring had on student academic success and retention and understand students' overall program experiences and recommendations for program improvement. Data were obtained through an institutional database and with the SSC Evaluation Form. Quantitative data were analyzed using SPSS in order to perform descriptive statistics, independent-samples *t*-tests and chi-squared tests. Qualitative data was analyzed by using the descriptive coding process in order to describe what was in the data. After several iterations of coding, three categories emerged along with associated concepts for each category. Further analysis revealed that these categories were part of three eventual themes that emerged from continued refinement of the coding process; employing more tutors (program structure), providing more time in sessions (program effectiveness) and no changes needed (recommendations). These themes were addressed as part of research question 6.

With the literature review as the foundation, the study revealed additional data upon further analysis. Chapter 4 included the findings. Chapter 5 contained discussions and conclusions drawn from the findings. A further understanding of how effective peer-tutoring is in relation to the academic success and retention of postsecondary students might result in the recommendations for implementation that might be drawn from the study.

Chapter IV

FINDINGS

Academic success and retention have been identified as critical issues in many colleges and universities (Allen et al., 2008). The purpose of this case study was to gain a better understanding of the effectiveness of peer-tutoring at a postsecondary institution in central Georgia in improving the academic success and retention of students who chose to utilize this resource. This was accomplished with the use of historical and current data obtained from an institutional database as well as student responses to the SSC Evaluation Form. The following served as the research questions:

1. To what degree, if any, was there a significant difference in the mathematics course grades of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?
2. To what degree, if any, was there a significant difference in the cumulative GPAs of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?
3. To what degree, if any, was there a significant difference in the retention rates of postsecondary students enrolled in mathematics courses who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?
4. To what degree, if any, was there a significant difference in the overall retention rates of postsecondary students who attended peer-tutored sessions compared to

students who did not attend peer-tutored sessions?

5. How did students who have participated in peer-tutored sessions perceive their overall program experiences?

6. What recommendations, if any, did students have for improving the tutoring program?

Participant Background Information

The sample was drawn from a postsecondary institution in the central Georgia area. Data were collected from 5,352 students who took mathematics courses over a period of eight semesters (fall 2013, spring 2014, summer 2014, fall 2014, spring 2015, summer 2015, fall 2015, and spring 2016), including Calculus I, College Algebra, Precalculus, and Quantitative Skills & Reasoning. After examining the collected data, student records for summer 2015 and spring 2016 have been removed because there were no students who attended the peer-tutored sessions during these two semesters. In addition, data for the following courses sessions have been removed because there were not enough samples for comparisons: 1) fall 2013 Calculus I, 2) spring 2014 Calculus I and Precalculus, 3) summer 2014 Calculus I, Precalculus, and Quantitative Skills & Reasoning, 4) fall 2014 Calculus I, 5) spring 2015 Calculus I and Precalculus, and 6) fall 2015 Calculus I. As a result, 4,639 student records were kept for data analysis (see Table 1). In total, 1,135 out of 4,639 students attended peer-tutored sessions. Mathematics course grades, cumulative GPAs and retention rates in mathematics courses and overall retention rates of 1135 students who attended and 3504 students who did not attend peer-tutored sessions were collected to answer research questions 1-4.

Out of 4,639 students, 339 of them responded to the SSC Evaluation Form for providing more information about their overall program experiences and recommendations for program improvement.

Table 1

Comparison of Peer-Tutored and non Peer-Tutored Students by Course

Semester	Mathematics Course Title	Peer-Tutored	
		No	Yes
2013 fall	College Algebra	565	244
	Precalculus	102	21
	Quantitative Skills & Reason	154	16
	Subtotal	821	281
2014 spr	College Algebra	350	168
	Quantitative Skills & Reason	129	28
	Subtotal	479	196
2014 smr	College Algebra	33	10
	Subtotal	33	10
2014 fall	College Algebra	494	202
	Precalculus	60	13
	Quantitative Skills & Reason	255	58
	Subtotal	809	273
2015 spr	College Algebra	389	129
	Quantitative Skills & Reason	183	59
	Subtotal	572	188
2015 fall	College Algebra	515	122
	Precalculus	88	9
	Quantitative Skills & Reason	187	56
	Subtotal	790	187
	Total	3504	1135

Research Question One

RQ1. *To what degree, if any, was there a significant difference in the mathematics course grades of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?*

Analysis of the data related to this question would help explain if peer-tutored sessions have any impact on students' mathematics course grades.

Independent-samples *t*-tests were conducted to compare the mathematics course grades between two groups of students. The results were broken down by semester and course (see Table 2). The results regarding the impact of peer-tutored sessions on students' mathematics course grades were mixed.

Significant differences were shown between these two groups in the 2013 fall College Algebra ($t(545) = -4.75, p = .000$), 2014 fall College Algebra ($t(439) = -2.35, p = .019$), and 2015 fall Quantitative Skills and Reasoning courses ($t(106) = 4.65, p = .000$). In the 2013 fall College Algebra course, students who did not attend peer-tutored sessions ($M = 1.82, SD = 1.50$) performed significantly better than students who attended peer-tutored sessions ($M = 1.33, SD = 1.25$). A similar situation happened to the 2014 fall College Algebra course. Again, in that course, students who did not attend peer-tutored sessions ($M = 1.60, SD = 1.50$) performed significantly better than students who attended peer-tutored sessions ($M = 1.34, SD = 1.26$). However, there was an opposite result in the 2015 fall Quantitative Skills and Reasoning course. Students who attended peer-tutored sessions ($M = 2.79, SD = 1.23$) performed significantly better than students who did not attend peer-tutored sessions ($M = 1.87, SD = 1.47$). According to the descriptive data shown on Table 2, in seven out of fourteen courses, students who attended the peer-tutored sessions scored higher than students who did not attend the peer-tutored sessions, but there were opposite results in the other seven courses. Therefore, it was difficult to claim attending peer-tutored sessions had a strong impact on students' mathematics

course grades in the current study. It did bring positive outcomes to half of the courses, but not all.

Table 2

Comparison of Mathematics Course Grade of Peer-Tutored and non Peer-Tutored Students

Semester	Math Course	Peer-Tutored				<i>t</i>	<i>df</i>	<i>p</i>	<i>ES</i>
		Yes		No					
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
2013 fall	CA	1.33	1.25	1.82	1.50	-4.75*	545	.000	0.35
	P	1.29	1.45	1.75	1.52	-1.30	121	.197	0.31
	QSR	2.56	1.10	2.27	1.35	0.85	168	.398	0.24
2014 spr	CA	1.41	1.18	1.34	1.35	0.63	373	.527	0.06
	QSR	1.32	1.22	1.43	1.30	-0.42	155	.676	0.09
2014 smr	CA	1.40	1.51	2.09	1.33	-1.40	41	.170	0.48
2014 fall	CA	1.34	1.26	1.60	1.50	-2.35*	439	.019	0.19
	P	2.38	1.12	2.05	1.41	0.80	71	.425	0.26
	QSR	1.33	1.33	1.67	1.41	-1.67	311	.096	0.25
2015 spr	CA	1.59	1.34	1.53	1.50	0.43	243	.671	0.04
	QSR	2.08	1.14	1.95	1.33	0.70	240	.486	0.10
2015 fall	CA	1.52	1.22	1.74	1.49	-1.68	214	.095	0.16
	P	1.67	0.87	2.13	1.72	-1.34	16	.200	0.34
	QSR	2.79	1.23	1.87	1.47	4.65*	106	.000	0.68

Note. * $p < .05$; *ES* = Effect Size (Cohen's *d*); CA = College Algebra; P = Precalculus; QSR = Quantitative Skills & Reason

Research Question Two

RQ2. *To what degree, if any, was there a significant difference in the cumulative GPAs of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?*

Analysis of the data related to this question would help explain if peer-tutored sessions have any impact on students' cumulative GPAs. Independent-samples *t*-tests were conducted to compare the cumulative GPAs between two

groups of students. The results were broken down by semester and course (see Table 3).

The results regarding the impact of peer-tutored sessions on students' cumulative GPAs were more positive as compared to the results for students' mathematics course grades. Significant differences were shown between these two groups in the 2013 fall Quantitative Skills and Reasoning ($t(25) = 3.11, p = .005$), 2015 spring College Algebra ($t(273) = 2.58, p = .010$) and 2015 fall Quantitative Skills and Reasoning ($t(113) = 4.02, p = .000$). In the 2013 fall Quantitative Skills and Reasoning course, students who attended peer-tutored sessions ($M = 2.87, SD = 0.60$) performed significantly better than students who did not attend peer-tutored sessions ($M = 2.34, SD = 1.03$). A similar situation happened to the 2015 spring College Algebra course. Again, in that course, students who attended peer-tutored sessions ($M = 2.34, SD = 0.85$) performed significantly better than students who did not attend peer-tutored sessions ($M = 2.10, SD = 1.07$). Another positive result showed in the 2015 fall Quantitative Skills and Reasoning course. Students who attended peer-tutored sessions ($M = 2.73, SD = 0.92$) performed significantly better than students who did not attend peer-tutored sessions ($M = 2.12, SD = 1.16$). Based on the descriptive data shown on Table 3, in eight out of fourteen courses, students attending peer-tutored sessions scored higher than students who did not attend the peer-tutored sessions. The result indicated attending peer-tutored sessions had a stronger impact on students' cumulative GPAs than students' mathematics course grades in the current study.

Table 3

Comparison of Cumulative GPAs of Peer-Tutored and non Peer-Tutored Students

Semester	Math Course	Peer-Tutored				<i>t</i>	<i>df</i>	<i>p</i>	<i>ES</i>
		Yes		No					
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
2013 fall	CA	2.24	0.92	2.36	1.13	-1.56	559	.119	0.12
	P	2.84	0.85	2.59	1.19	0.92	121	.363	0.24
	QSR	2.87	0.60	2.34	1.03	3.11*	25	.005	0.63
2014 spr	CA	2.10	0.85	2.03	1.05	0.70	398	.482	0.07
	QSR	2.08	0.94	2.03	0.97	0.25	155	.807	0.05
2014 smr	CA	2.18	1.15	2.26	1.06	-0.20	41	.841	0.07
2014 fall	CA	2.19	0.95	2.21	1.14	-0.30	443	.762	0.02
	P	2.79	0.96	2.67	1.10	0.38	71	.708	0.12
	QSR	1.93	0.89	2.07	1.11	-0.90	311	.369	0.14
2015 spr	CA	2.34	0.85	2.10	1.07	2.58*	273	.010	0.25
	QSR	2.35	0.69	2.15	0.98	1.66	139	0.98	0.24
2015 fall	CA	2.23	0.88	2.27	1.11	-0.49	221	.627	0.04
	P	2.31	0.78	2.57	1.38	-0.86	14	.403	0.23
	QSR	2.73	0.92	2.12	1.16	4.02*	113	.000	0.58

Note. * $p < .05$; *ES* = Effect Size (Cohen's *d*); CA = College Algebra; P = Precalculus; QSR Quantitative Skills & Reason

Research Question Three

RQ3. *To what degree, if any, was there a significant difference in the retention rates of postsecondary students enrolled in mathematics courses who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?*

Data related to retention rates in subsequent mathematics courses and tutoring session attendance were collected and analyzed in order to answer the third research question. Chi-squared tests were utilized in order to determine if there was a statistical difference in the retention rates of students enrolled in subsequent mathematics courses who attended peer-tutored sessions and the retention rates of students who enrolled in subsequent mathematics courses and did not attend peer-

tutored sessions (see Table 4).

The results regarding the impact of peer-tutored sessions on retention rates for students who were enrolled in subsequent mathematics compared to the retention rates of students who were enrolled in subsequent mathematics courses and did not attend peer-tutored sessions were mixed. Significant differences were found between these two groups in the 2013 fall semester College Algebra course $\chi^2(1, N = 809) = 14.22, p = .000$, 2014 fall semester Quantitative Skills and Reasoning course $\chi^2(1, N = 313) = 6.17, p = .013$ and 2015 fall Quantitative Skills and Reasoning course $\chi^2(1, N = 243) = 3.87, p = .049$. In the 2013 fall College Algebra course, the proportion of students who attended peer-tutored sessions (26.6%) and subsequently enrolled in another mathematics course were retained at a significantly lower rate than students who did not attend peer-tutored sessions (40.5%). A similar situation happened to the 2014 fall Quantitative Skills and Reasoning course. Again, the proportion of students who attended peer-tutored sessions (13.8%) and subsequently enrolled in another mathematics course were retained at a significantly lower rate than students who did not attend peer-tutored sessions (29.8%). A different situation occurred in the 2015 fall Quantitative Skills and Reasoning course. In this instance, the proportion of students who attended peer-tutored sessions (41.1%) and subsequently enrolled in another mathematics course were retained at a significantly higher rate than students who did not attend peer-tutored sessions (27.3%). According to the descriptive data shown in Table 4, in eight out of fourteen courses, the proportion of students who attended the peer-tutored

sessions and subsequently enrolled in another mathematics course was higher than students who enrolled in a subsequent mathematics course but did not attend the peer-tutored sessions. There were opposite results in six other courses. Therefore, it was difficult to claim attending peer-tutored sessions had a strong impact on students' retention rates in subsequent mathematics courses in the current study. It did bring positive outcomes to more than half of the courses, but not all.

Table 4

Comparison of Retention Rates in Mathematics Courses of Peer-Tutored and non Peer-Tutored Students

Semester	Math Course	Peer-Tutored		df	N	X ²	p
		Yes	No				
2013 fall	CA	26.6%	40.5%	1	809	14.22*	.000
	P	47.6%	44.1%	1	123	0.09	.769
	QSR	56.3%	37.0%	1	170	2.26	.133
2014 Spr	CA	34.5%	28.3%	1	518	2.09	.148
	QSR	35.7%	27.1%	1	157	0.83	.363
2014 smr	CA	30.0%	45.5%	1	43	0.75	.385
2014 fall	CA	32.7%	35.8%	1	696	0.63	.428
	P	46.2%	53.3%	1	73	0.22	.639
	QSR	13.8%	29.8%	1	313	6.17*	.013
2015 spr	CA	34.1%	25.4%	1	518	3.63	.057
	QSR	23.7%	20.2%	1	242	0.33	.565
2015 fall	CA	28.7%	32.4%	1	637	0.64	.425
	P	55.6%	42.0%	1	97	0.61	.436
	QSR	41.1%	27.3%	1	243	3.87*	.049

Note. * $p < .05$; CA = College Algebra; P = Precalculus; QSR = Quantitative Skills & Reason

Research Question Four

RQ4. *To what degree, if any, was there a significant difference in the overall retention rates of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?*

Data related to overall retention rates and tutored session attendance were collected and analyzed in order to answer the fourth research question. Chi-Squared tests were utilized in order to determine if there was a statistical difference in the overall retention rates of students who attended peer-tutored sessions and the overall retention rates of those who did not attend peer-tutored sessions (see Table 5).

The results regarding the impact of peer-tutored sessions on students' overall retention rates in subsequent courses were more positive as compared to the results for students' retention rates in subsequent mathematics courses. Significant differences were found between these two groups in the 2015 spring semester College Algebra course $\chi^2(1, N = 518) = 5.28, p = .022$ and the 2015 spring semester Quantitative Skills and Reasoning course $\chi^2(1, N = 242) = 4.01, p = .045$. In the 2015 spring semester College Algebra course, the proportion of students who attended peer-tutored sessions (72.9%) and subsequently enrolled in another course were retained at a significantly higher rate than students who did not attend peer-tutored sessions and enrolled in another course (61.7%). A similar situation happened to the 2015 spring Quantitative Skills and Reasoning course. Again, the proportion of students who attended peer-tutored sessions (81.4%) and subsequently enrolled in another course were retained at a significantly higher rate than students who did not attend peer-tutored sessions and enrolled in another course (67.8%). Based on the descriptive data shown on Table 5, in eleven out of fourteen courses, the proportion of students who attended the peer-tutored sessions and subsequently enrolled in another course

was higher than students who enrolled in a subsequent course but did not attend the peer-tutored sessions. Therefore, the result indicated attending peer-tutored sessions had a stronger impact on students' overall retention rates than students' retention rates of mathematics courses in the current study.

Table 5

Comparison of Overall Retention Rates of Peer-Tutored and non Peer-Tutored Students

Semester	Math Course	Peer-Tutored		Df	N	X ²	p
		Yes	No				
2013 fall	CA	79.1%	79.5%	1	809	0.01	.905
	P	90.5%	84.3%	1	123	0.53	.467
	QSR	93.8%	84.4%	1	170	1.01	.316
2014 spr	CA	69.0%	62.0%	1	518	2.46	.117
	QSR	75.0%	56.6%	1	157	3.25	.072
2014 smr	CA	70.0%	69.7%	1	43	0.00	.985
2014 fall	CA	76.2%	74.9%	1	696	0.14	.710
	P	84.6%	85.0%	1	73	0.00	.972
	QSR	72.4%	75.3%	1	313	0.21	.649
2015 spr	CA	72.9%	61.7%	1	518	5.28*	.022
	QSR	81.4%	67.8%	1	242	4.01*	.045
2015 fall	CA	83.6%	77.5%	1	637	2.21	.137
	P	100.0%	80.7%	1	97	2.11	.147
	QSR	85.7%	74.3%	1	243	3.15	.076

Note. * $p < .05$; CA = College Algebra; P = Precalculus; QSR = Quantitative Skills & Reason

Research Question Five

RQ5. How did students who have participated in peer-tutored sessions perceive their overall program experiences?

The purpose of this question is to investigate how students who have participated in peer-tutored sessions perceive their overall program experiences.

Data from the SSC Evaluation Form were analyzed to answer this question. In total,

339 students who participated in peer-tutored sessions in mathematics courses completed the form.

Experiences with Tutors

Students were asked to grade the patience of his or her tutor based on a scale, with A being the highest grade and F being the lowest (see Table 6). Of the 339 survey participants, 327 students gave the tutor an A (96.46%) and eight students gave the tutor a B (2.36%). There were no grades lower than a B assigned to tutors; however, four students (1.18%) failed to provide any responses to this item.

Students were also asked to assign a grade related to the tutor's knowledge of the subject matter; again with A being the highest grade and F being the lowest (see Table 6). According to the data shown, 295 students gave the tutor an A (87.02%) while 31 students assigned a B (9.14%). Five students (1.47%) assigned a C and one student (< 1%) gave the tutor a D. Seven students (2.06%) failed to provide any responses to this item.

In addition, students were asked to indicate tutor's available hours to work (see Table 6). According to the collected responses, 312 students (92.04%) assigned the tutor a grade of A while 12 students (3.54%) assigned a grade of B. Five students (1.47%) assigned a grade of C and one student (< 1%) assigned a grade of D. Nine of the 339 respondents (2.65%) failed to provide a response to the item.

Students were also asked to indicate the amount of time a tutor spent with them during a session (see Table 7). The choices were *more than enough*, *enough* and *not enough*. In total, 143 of the 339 students (42.18%) indicated tutors spent *more than enough* time with them while 167 students (49.26%) indicated tutors spent

enough time with them. Thirteen students (3.83%) said tutors did not spend enough time with them and six students (1.77%) provided no response to the item.

Students were asked to rate the overall tutoring quality on a scale; with A being the highest grade and F being the lowest (see Table 6). In total, 306 students (90.27%) assigned a grade of A while 20 (5.90%) assigned a grade of B. Five students (1.47%) and one student (< 1%) assigned grades of C and D respectively, and seven students (2.06%) failed to provide a response to the item.

According to the data collected, students had positive experiences with their tutors because most students assigned a grade of A when asked to rate patience, knowledge and overall tutoring quality of their tutors. Most students also considered their tutors spent either *more than enough* or *enough* time with them.

Table 6

Student Ratings of Their Experiences with Tutors

Item	Grade					
	A	B	C	D	F	No Response
Patience	327	8	0	0	0	4
Knowledge	295	31	5	1	0	7
Available Hours	312	12	5	1	0	9
Overall Tutoring Quality	306	20	5	1	0	7

Table 7

Student Ratings of Time Spent with Their Tutors

Item	Categories	Responses
Amount of Time Spent	More Than Enough	143
	Enough	167
	Not Enough	13
	No Response	6

Experiences with the Student Success Center

Students were asked how often he or she visited the Student Success Center for tutoring sessions (see Table 8). The choices presented as answers were *only when needed, once a week* and *2+ times* per week. In total, 201 students (59.29%) indicated they visited the Student Success Center only when needed, 39 (11.50%) visited once a week and 87 (25.66%) attended 2+ times per week. Twelve students (3.54%) provided no response to this item.

In response to the comfortable level at seeking help at the Student Success Center (see Table 9), 329 students (97.05%) indicated they were comfortable with seeking help at the Student Success Center while only two students (< 1%) indicated they were not comfortable in seeking assistance. Eight students (2.36%) did not provide a response to this item. In addition, 328 students (96.76%) indicated they would visit the Student Success Center again for additional tutoring while 11 students (3.24%) provided no response to this item (see Table 9). In sum, most students felt comfortable seeking help at the Student Success Center and were willing to visit the center again for additional tutoring. However, 59.29% of students indicated they visited the center only when needed. It may need to encourage students to visit the center more often to utilize the resources provided.

Table 8

Student Ratings of Frequency of Visits to the Student Success Center

Item	Categories	Responses
How Often Student Came to SSC	Only When Needed	201
	Once a Week	39
	2+ Times Per Week	87
	No Response	12

Table 9

Student Ratings of Experiences with the Student Success Center

Item	Yes	No	No Response
Comfortable Seeking Help at SSC?	329	2	8
Would You Visit Again?	328	0	11

Expectations and Perceptions of Academic Success

In relation to student's expectations of a grade increase as a result of the peer-tutored sessions (see Table 10), 325 students (95.87%) expected their grade to increase as a result of attending the peer-tutoring sessions and seven students (2.06%) indicated they did not expect their grade to increase. An additional seven (2.06%) provided no response to the item.

Students were asked to indicate if their knowledge of the subject area increased due to peer-tutoring (see Table 10). This was a yes/no question with a request for explanation for any negative responses. There were six negative responses (1.77%) and 23 students (6.78%) who did not provide a response to this item. Some of the explanations provided for the negative responses included "the tutor did not know the material," "I still did not understand the material" and "the tutor did not go in depth with equations." In total, 310 students (91.45%) indicated they believed their knowledge increased as a result of the tutoring sessions. To conclude, most students expected their grade to increase as a result of attending the peer-tutoring sessions and perceived their knowledge did increase after attending the sessions.

Table 10

Student Ratings of Expectations and Perceptions of Academic Success

Item	Yes	No	No Response
Expect Grades to Increase?	325	7	7
Did Knowledge Increase?	310	6	23

Research Question Six

RQ6. *What recommendations, if any, did students have for improving the peer-tutoring program?*

In total, 61 out of 339 students who completed the SSC Evaluation Form offered specific recommendations for improving the tutoring program (See Table 11). Three main themes were generated from the responses including 1) employing more tutors (program structure), 2) providing more time in sessions (program effectiveness) and 3) no changes needed (recommendations). Of these sixty-one, eighteen responses were related to the theme of employing more tutors. For example, Participant 441's response was "more mathematics tutors." Participant 887 also agreed with this viewpoint. Participant 697 was quoted, as requesting "more mathematics tutors on Wednesdays between 12 pm and 2" while participant 686 would like to see "more tutors in the morning." Participant 13 stated "more tutors" were needed and Participants 64, 124, 146, 315, 339, 394, 508, 509, 688, 698, 704, 793 and 841 also identified the need for more tutors.

One of the approaches the Student Success Center has taken is to utilize as many individual tutoring sessions as possible. One drawback to this approach is that it sometimes limits the amount of time a tutor can spend with an individual student. Thus, from the student responses, a clear theme was generated regarding the time in

the sessions. Twelve students suggested “more time in sessions” and considered that was important to them. For example, Participant 137 stated “more time in sessions” was important and Participants 15, 29, 40, 60, 63, 74, 299, 365, and 656 agreed with this premise. Participants 508 and 509 were also quoted as needing “more time in sessions” as well as needing “more tutors.”

The third theme that emerged during the study was the recommendation that no changes were needed to the program. Thirteen student responses were recorded related to this theme. Participant 295 was quoted as saying “as of now, nothing” when responding to the inquiry. Participant 140 stated, “Everything is good” while participants 95 and 272 said, “everything was great. Participant 123 noted, “Everything was satisfactory” while participant 66 remarked, “great just the way it is.” Participant 512 agreed with this assessment. Participant 18 stated the sessions were a “good experience” and participant 127 deemed the sessions as “helpful.” Participant 515 was quoted as saying, “I wouldn’t make any changes, you guys are awesome” while Participant 142 commented, “it really helped.” Finally, Participant 139 stated “it’s perfect” and Participant 297 recommended in regards to the peer-tutoring program that the Student Success Center “keep it going.”

Other responses emerged from the data analysis regarding the Student Success Center peer-tutoring program. Seven responses related to an evaluation of the tutors themselves. Participant 171 stated, “Tutor 1 was amazing” while participant 352 said, “Tutor 2 was great.” Participant 358 was quoted as saying “Tutor 3 was great!” and Participant 667 stated “his hand writing was hard to read, but overall was helpful.” Participant 119 said “Tutor 4 was a great help, [I] will be

back to see him,” and participant 289 concurred with Participant 119 by stating, “Tutor 4 was awesome.” Participant 427 was quoted as saying, “Tutor 5 was a great tutor! He was extremely helpful.” This was consistent with students’ ratings on the overall tutoring quality of their tutors.

Other responses from the survey addressed different aspects of tutoring. Participant 835 said tutors should “be more consistent” while Participant 809 asked if there should be “a tutor test for the subject.” Participant 357 followed up on the previous comment by stating, “If someone doesn’t know the subject, have them ask someone who does instead of leaving me hanging.” Two respondents commented on the need for group tutoring sessions. Participant 434 stated “gather more people in the same subject to make tutoring faster” and Participant 155 said “if there were any other students in the same class that are getting tutoring as well a set group study session to go over the lecture.” Participant 46 stated, “give person a problem to do by themselves, then help as needed” while Participant 311 asked “is there a way to make mathematics organized?” Participant 38 stated, “More practice problems, more patience, session cut short.”

These responses, while not necessarily positive in nature, identified respondents’ concern about improving certain aspects of the tutoring program. For instance, group tutoring could be useful for students enrolled in the same course(s), as long as they are all exposed to the same subject matter. Other comments identified the need for better-trained tutors and longer sessions. Overall, the comments reflected participant expectations for both tutors and the program itself.

Table 11

Recommendations for Improving the Tutoring Program by Category

Category	Responses	%
More Tutors	18	29.5
More Time In Sessions	12	19.7
No Changes Needed	13	21.3
Overall Quality of Tutors	7	11.5
Consolidate Students Seeking Help in the Same Subject	2	< 1
Improve Performance of Tutors	3	< 1
Have Tutors Only Assist When Needed	1	< 1
Student Confidence Level in Tutors	1	< 1
Tutor Knowledge of Subject	1	< 1
Other Responses	3	< 1
Total	61	100

Data Integration

The results of research questions 1 and 3 were mixed, making it hard to claim attending peer-tutored sessions had a strong impact on students' mathematics course grades (RQ1) and students' retention rates in subsequent mathematics courses (RQ3) in the current study. However, the results for research questions 2 and 4 were more positive in nature. For research question 2, the result showed attending peer-tutored sessions had positive impact on students' cumulative GPAs. In more than half of the courses, students who attended the peer-tutored sessions had higher cumulative GPAs as compared to students who did not attend the peer-tutored sessions. Significant results also existed to prove the positive impact of peer-tutoring on students' cumulative GPAs. For research question 4, in eleven out of fourteen courses, the proportion of students who attended the peer-tutored sessions and subsequently enrolled in another course was higher than students who enrolled in a subsequent course but did not attend the peer-tutored sessions. Significant results also existed to prove offering peer-tutored sessions help retain students to take a subsequent course.

The data collected using the Student Success Center Evaluation Form for research questions 5 and 6 also showed most students expected their grade to increase as a result of attending the peer-tutoring sessions and perceived their knowledge did increase after attending the sessions. They also had positive experiences with their tutors and gave great ratings on patience, knowledge and overall tutoring quality of their tutors. Most students felt comfortable seeking help at the Student Success Center and were willing to visit the center again for additional tutoring. Although most students considered their tutors spent either more than enough or enough time with them, some students still suggested the center to employ more tutors and provide more time in the peer-tutored sessions. Because students did value the helpfulness of peer-tutored sessions to their academic success, it may need to encourage them to visit the center more often to utilize the resources provided so the impact of peer-tutored sessions can be maximized.

Chapter V

DISCUSSIONS, RECOMMENDATIONS, AND CONCLUSIONS

The purpose of the current study was to investigate the impact of peer-tutoring on academic success and retention of students who chose to utilize this resource. In the current study, academic success referred to students' mathematics course grades and cumulative GPAs, retention rates referred to 1) the proportion of students who attended peer-tutored sessions and subsequently enrolled in another mathematics course, and 2) the proportion of students who attended peer-tutored sessions and subsequently enrolled in another course. Student responses to the SSC Evaluation Form were also collected to understand students' overall program experiences and their recommendations for improving the tutoring program. This chapter included discussions of the findings, recommendations for practice and future research, and conclusions.

Discussions of the Findings

RQ1. *To what degree, if any, was there a significant difference in the mathematics course grades of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?*

The results regarding the impact of peer-tutored sessions on students' mathematics course grades were mixed. It did bring positive outcomes to half of the courses, but not all. In the 2013 fall College Algebra course, students who did not attend peer-tutored sessions ($M = 1.82$, $SD = 1.50$) performed significantly better than students who attended peer-tutored sessions ($M = 1.33$,

$SD = 1.25$). In the 2014 fall College Algebra course, students who did not attend peer-tutored sessions ($M = 1.60$, $SD = 1.50$) performed significantly better than students who attended peer-tutored sessions ($M = 1.34$, $SD = 1.26$). There was an opposite result in the 2015 fall Quantitative Skills and Reasoning course. Students who attended peer-tutored sessions ($M = 2.79$, $SD = 1.23$) performed significantly better than students who did not attend peer-tutored sessions ($M = 1.87$, $SD = 1.47$). In seven out of fourteen courses, students attending peer-tutored sessions scored higher than students who did not attend peer-tutored sessions, but there were opposite results in the other seven courses. Therefore, it was difficult to claim attending peer-tutored sessions had a strong impact on students' mathematics course grades in the current study.

The findings might have been impacted by factors such as the lack of control for the instructors who taught the individual courses as well as the possibility of students receiving additional help outside of peer-tutoring. Other possible reasons were addressed in the literature. For example, Cooper (2010) researched the effect of drop-in tutoring and its impact on a tutee's GPA. He concluded students who received drop-in tutoring assistance during multiple sessions achieved higher GPAs when compared to students who visited the center on an infrequent basis. Drop-in tutoring assistance refers to students who visit a tutoring center without an appointment, seeking assistance from tutors who are available at the time they visit. If many of the students in the current study only attended tutoring sessions once or twice, it could explain the results. Berghmans et al. (2014) compared student participation in a directly tutored

learning environment with a facilitatively tutored learning environment in order to discern which approach yielded the best results. They defined a directly tutored learning environment as one in which the learning process is mostly controlled by the tutor, whereas a facilitatively tutored learning environment involves more tutor and tutee interaction with a goal of encouraging a “high-quality and active learning process among students” (Berghmans et al., 2014, p. 439). When discussing their findings, Berghmans et al. (2014) discovered students, who participated in directly tutored sessions increased their knowledge in the area of procedures but did not gain a better understanding related to clinical knowledge. Facilitatively tutored students, on the other hand, experienced an increase in their level of knowledge while also displaying more varied opinions on the subject matter. The program at the Student Success Center in the current study resembles a directly tutored session rather than a facilitatively tutored session, which possibly contributed to the fact that in some courses peer-tutored students had lower scores than non peer-tutored students.

RQ2. To what degree, if any, was there a significant difference in the cumulative GPAs of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

The results regarding the impact of peer-tutored sessions on students’ cumulative GPAs were more positive as compared to the results for students’ mathematics course grades. Significant differences were shown between these two groups in three of the courses related to this research question. In the 2013 fall Quantitative Skills and Reasoning course, students who attended peer-tutored

sessions ($M = 2.87$, $SD = 0.60$) performed significantly better than students who did not attend peer-tutored sessions ($M = 2.34$, $SD = 1.03$). In the 2015 spring College Algebra course, students who attended peer tutored sessions ($M = 2.34$, $SD = 0.85$) performed significantly better than students who did not attend peer-tutored sessions ($M = 2.10$, $SD = 1.07$). Another positive result showed in the 2015 fall Quantitative Skills and Reasoning course. Students who attended peer-tutored sessions ($M = 2.73$, $SD = 0.92$) performed significantly better than students who did not attend peer-tutored sessions ($M = 2.12$, $SD = 1.16$). In eight out of fourteen courses, students attending peer-tutored sessions scored higher than students who did not attend the peer-tutored sessions.

Possible explanations for these results are discussed in the literature. Evans and Moore (2013) cited the positive impact peer-tutoring has had in the classroom setting while Cooper (2010) found students who visited an academic success center tended to have a positive impact on their academic success, having noted students who received tutoring at an academic success center were more likely to have a higher academic standing than students who did not attend the center.

RQ3. To what degree, if any, was there a significant difference in the retention rates of postsecondary students enrolled in mathematics courses who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

The results regarding the impact of peer-tutored sessions on retention rates for students who were enrolled in subsequent mathematics compared to the retention rates of students who were enrolled in subsequent mathematics courses

and did not attend peer-tutored sessions were mixed. In the 2013 fall College Algebra course, the proportion of students who attended peer-tutored sessions (26.6%) and subsequently enrolled in another mathematics course were retained at a significantly lower rate than students who did not attend peer-tutored sessions (40.5%). In the 2014 fall Quantitative Skills and Reasoning course, the proportion of students who attended peer-tutored sessions (13.8%) and subsequently enrolled in another mathematics course were retained at a significantly lower rate than students who did not attend peer-tutored sessions (29.8%). A different situation occurred in the 2015 fall Quantitative Skills and Reasoning course. In this instance, the proportion of students who attended peer-tutored sessions (41.1%) and subsequently enrolled in another mathematics course were retained at a significantly higher rate than students who did not attend peer-tutored sessions (27.3%). In eight out of fourteen courses, the proportion of students who attended the peer-tutored sessions and subsequently enrolled in another mathematics course was higher than students who enrolled in a subsequent mathematics course but did not attend the peer-tutored sessions. There were opposite results in six other courses. Therefore, it was difficult to assert attending peer-tutored sessions had a strong impact on student retention rates in subsequent mathematics courses.

The findings related to this question may have been impacted by factors that were also discussed in the literature. For example, according to De Lisi (2002) in order for students to be successful, they must be actively engaged in the learning process. He referenced Piaget's (1932) theory as being positively linked to educational techniques that encourage such participation. Based on the fact that there were mixed results with the data for this portion of the study, it could

indicate differing levels of engagement by students related to the peer-tutoring process.

Another factor that could have contributed to the findings is related to what Knaggs et al. (2015) referred to as underrepresented student groups in higher education settings and secondary educational systems that did not adequately prepare these student groups for transition into higher education.

Knaggs et al. (2105, p. 9) identified some of the factors as being:

- 1) Low educational aspirations
- 2) Social isolation that comes with poverty
- 3) Racism and classism
- 4) Family barriers
- 5) Financial barriers

Some, or all, of these factors could have contributed to the mixed results the data displayed for this part of the study.

A third contributing factor might have been a student's lack of a sense of belonging at the institution. Some of the factors listed above are similar to those identified by O'Keefe (2013) as contributing to a student's need for developing a sense of belonging at his or her college or university in order to improve their opportunities at being retained. Having firsthand knowledge that many of the students that participate in peer-tutoring session at this particular institution of higher learning are first-year, first-generation college students, this factor quite possibly played an important role in the lack of success of the peer-tutored

students who did not perform quite as well as those students who did not participate in peer-tutored sessions.

RQ4. To what degree, if any, was there a significant difference in the overall retention rates of postsecondary students who attended peer-tutored sessions compared to students who did not attend peer-tutored sessions?

The results for this question were more positive as compared to the results for students' retention rates in subsequent mathematics courses. Significant differences were found in two of the courses related to this research question. In the 2015 spring Semester College Algebra course, the proportion of students who attended peer-tutored sessions (72.9%) and subsequently enrolled in another course were retained at a significantly higher rate than students who did not attend peer-tutored sessions and enrolled in another course (61.7%). In the 2015 spring Quantitative Skills and Reasoning course, the proportion of students who attended peer-tutored sessions (81.4%) and subsequently enrolled in another course were retained at a significantly higher rate than students who did not attend peer-tutored sessions and enrolled in another course (67.8%). In eleven out of fourteen courses, the proportion of students who attended the peer-tutored sessions and subsequently enrolled in another course was higher than students who enrolled in a subsequent course but did not attend the peer-tutored sessions. Therefore, the result indicated attending peer-tutored sessions had a stronger impact on students' overall retention rates than students' retention rates of mathematics courses in the current study.

These results were corroborated by the literature. Rheinheimer and McKenzie (2011) discovered students who were tutored withdrew at a lower rate than anticipated and also were retained and eventually received a degree at a higher than expected level, meaning students graduated at a higher percentage than would have been expected if they had not received tutoring. Thus, they concluded tutoring enhanced retention. Munley et al. (2010) and Robinson et al. (2005) also discovered peer-tutoring, in most cases, has a positive impact on both academic success and retention of postsecondary students.

RQ5. How did students who have participated in peer-tutored sessions perceive their overall program experiences?

The data collected using the SSC Evaluation Form for research question 5 showed most students had positive experiences with their tutors and gave great ratings on patience, knowledge and overall tutoring quality of their tutors. Most students felt comfortable seeking help at the Student Success Center and were willing to visit the center again for additional tutoring. In addition, most students expected their grade to increase as a result of attending the peer-tutored sessions and perceived their knowledge did increase after attending the sessions.

In the literature, O'Keefe (2013) identified a "sense of belonging" as being crucial to the retention efforts of at-risk students, while Bray et al. (1999) found an academic success center could provide an excellent opportunity for students to experience positive social integration as they are exposed to a microcosm of the college or university's social system. These views would seem to relate to students responding that they felt comfortable seeking help at the

Student Success Center and were likely to visit again. Many students who visit the center are first-generation college students. Being away from home for the first time presents several challenges, many of which are separate from academic expectations. By stating they felt comfortable seeking help at the center and would likely visit again, students were perhaps indicating they have identified or bonded with tutors and other center personnel as part of the acclimation process to academic life.

Cooper (2010) found students who visited an academic success center tended to have a positive impact on their academic success, having noticed students who received tutoring at an academic success center were more likely to have a higher academic standing than students who did not attend the center. This tends to support the view of students who responded that they expected their knowledge and/or grades to increase.

RQ6. What recommendations, if any, did students have for improving the peer-tutoring program?

There were three main themes related to this question, those being 1) employing more tutors (program structure), 2) providing more time in sessions (program effectiveness) and 3) no changes needed (recommendations). More tutors and longer sessions could provide students with more of an opportunity to achieve a higher level of academic success that, in turn, could also lead to higher retention rates. In addition to employing more tutors, there may also be a need to examine the qualifications of peer-tutors. Utilizing qualified and competent tutors is beneficial not only to the success of the peer-tutoring program; it is also beneficial to the

structure of the program as well. For example, well-trained and competent tutors might enable a Student Success Center to utilize more of a facilitative approach to tutoring, allowing for more tutor and tutee interaction (Berghmans et al., 2014).

The results of their study indicated facilitatively tutored students tend to experience an increase in their level of knowledge while also displaying more varied opinions on subject matter. This type of approach could be beneficial in improving student academic success and retention.

Recommendations for Practice

Qualifications of the Peer Tutors

The first recommendation for practice involves the qualifications of the tutors. Before evaluating the qualifications of a tutor, it might be helpful for Success Center personnel to consider what Kim (2015) identified as the roles of peer tutoring:

- Supplementing the main course functions, especially in the large classes or in complex content or skill areas.
- Increasing students' opportunities to succeed and persist at the institution.
- Improving students' communication or writing skills. Communication competencies gained during college and graduate school are transferable knowledge and skills that have a lifelong impact on success.
- Improving reading and mathematics skills through remedial courses.
- Improving public presentation skills (public presentations are required in most classes).
- Helping to improve leadership skills. Good communicators are likely to take on leadership positions at their institutions and in their careers.

- Improving participants' interpersonal skills and interaction with peers and faculty, they can also be developed through the peer-tutoring process (p. 5).

There were several comments on the SSC Evaluation Form related to the qualifications of tutors. Based on some of the comments, students expected the tutors who worked with them to be competent and well trained. Other comments from students indicated there was an issue with trust, in relation to tutor qualifications. Powell (1997) described Role Theory as identifying expectations that accompany certain roles in the social structure. Powell (1997) also stated a successful peer-tutoring program exhibits improvements in tutor attitudes, cooperation with those who supervise them and their assumption of more responsibility in their own educational progress. This type of "buy-in" from tutors is important in establishing a well-rounded peer-tutoring program. Both Gardner (1990) and Kouzes and Posner (2012) addressed the importance of trust in a leader/subordinate relationship. There must be some level of trust between tutors and tutees in order to allow for positive outcomes.

In regards to the quality of tutors, Castek et al. (2015) found while learners appreciated the tutor's knowledge of the subject matter, they identified the most important quality a tutor could have as patience. Castek et al. further identified other qualities that effective tutors possess. Those qualities include:

- Observant – Successful tutors balanced what the learners thought they needed and wanted with what the tutors knew the learners needed based on their experience with previous learners.
- Respectful – Effective tutors allowed the learners to maintain control over the computer and offered help in ways that were not intimidating to the learner.

- Responsive – Tutors developed ways to work with learners who “don’t know what they don’t know.”
- Persistent – Tutors developed ways to work with learners who were disinterested in learning digital literacy skills because they felt a greater need to find employment.
- Creative – Tutors developed novel approaches to building relevance for learners and teaching concepts (pp. 2-3).

Munley et al. (2010) described an effective method regarding peer-tutoring as consisting of experienced undergraduate students who work with a limited number of students who need assistance in certain areas of their coursework. It might be advisable for personnel in the Student Success Center to review their program for training tutors (or develop one if it does not currently exist) to ensure that it gives a potential tutor the best opportunity at being effective in communicating with students. Gardner (1990) has identified two tasks of leadership that could possibly be effective in developing and implementing successful peer-tutoring programs, namely envisioning goals and motivating.

It might also be advisable for personnel in the Student Success Center to review their program for training tutors (or develop one if it does not currently exist) to ensure that it gives a potential tutor the best opportunity at being effective in communicating with students.

Tutors should be informed of the goals of the Student Success Center, but perhaps more importantly, should be able to ascertain the goals of each student they tutor. By doing so, a tutor would be better able to tailor individual sessions to become

more effective. This might also lessen student concerns about having longer sessions, if each session was more productive. Tutors should also attempt to identify how students are motivated early in the process. This might also allow for more productive sessions between the tutor and tutee.

Finally, the staff of the Student Success Center should evaluate each of the student comments from the SSC Evaluation form with the goal of improving the peer-tutoring program. Having well-trained tutors will be an important part of the process.

Incorporating Technology into the Peer-Tutoring Process

A second recommendation would be to explore more ways to either enhance or introduce technology as part of the tutoring process. There is evidence in the literature as to the use of technology as part of an overall peer-tutoring program. As part of the effort to improve the performance of computer based tutoring, many software programs have been introduced as an aide in this approach. Evans and Moore (2013) developed a web-based product called OPAL (Online Peer-Assisted Learning). OPAL was designed “for use in problem-based undergraduate courses” (p. 144). Preliminary results showed that OPAL was effective in enhancing student learning related to web-based tutoring activities. According to Hung et al. (2015), the many advantages to computer technology have encouraged institutions to take another look at the possibility of using the technology in the educational environment. The use of technology in a student success center can play an important role in bringing innovative instruction to those students who need it most. Employing tutors who are trained to implement different types of

technology as part of the overall process will be paramount in implementing this step in the tutoring plan.

More Facilitatively Peer-Tutoring

A third recommendation would be to analyze the existing program in relation to the directive versus facilitatively tutoring process. Berghmans et al. (2014) compared student participation in a directly tutored learning environment with a facilitatively tutored learning environment in order to discern which approach yielded the best results. They defined a directly tutored learning environment as one in which the learning process is mostly controlled by the tutor, whereas a facilitatively tutored learning environment involves more tutor and tutee interaction with a goal of encouraging a “high-quality and active learning process among students” (Berghmans et al., 2014, p. 439).

When discussing their findings, Berghmans et al. (2014) discovered students who participated in directly tutored sessions increased their knowledge in the area of procedures but did not gain a better understanding related to clinical knowledge. Behaviorist Theory is associated with the work of B.F. Skinner (1948) and focuses on rewarding subjects for correct answers to questions. The directive approach to tutoring lends itself to this concept as interaction is mostly driven by the tutor.

Facilitatively tutored students, on the other hand, experienced an increase in their level of knowledge while also displaying more varied opinions on the subject matter. Student Success Center personnel could take this information into account when reviewing their program, and in relation to the hiring of more tutors and employing longer sessions. Because facilitatively tutoring focuses on a healthy interaction between

tutors and tutees, training tutors to understand how to encourage student interaction in the tutoring sessions could provide an enhanced opportunity for students to improve their academic success and retention levels.

Recommendations for Further Research

Additional research is needed in order to better understand how effective peer-tutoring is in relation to academic success and retention. Rather than comparing the results of peer-tutored and non peer-tutored students, further research should look at a cohort of peer-tutored students over a period of several semesters in order to determine if peer-tutoring is having a continuous impact on their academic pursuits. Further research could include controls on the individual instructors and define the type of peer-tutoring program the student is participating in (directive or facilitatively).

Another area of research might include the qualifications of peer-tutors. The data analysis in the current study focused on student results based on their academic performance. The qualifications of the tutors might be examined as part of another study in order to identify if tutors need certain types of training before they begin their work with individual students. This might also be helpful in the overall design of a peer-tutoring program.

A third area of research would involve the structure of the current Student Success Center program. For educators and students, this would involve experimenting with new techniques and approaches, such a peer-tutoring versus traditional tutoring or virtual tutoring versus face-to-face tutoring. A thorough review of the program could lead to the discovery of other ways to enhance the offerings. This would perhaps

improve the opportunity for students to increase the opportunity for improvement in their academic success and ultimate retention.

Finally, further research may include peer-tutored students at other postsecondary institutions that have similar peer-tutoring programs. In addition, more qualitative data should be collected in order to more comprehensively support (or refute) the findings of the quantitative data, perhaps including interviews or other types of data collection. Additional information gained from such resources might aid in determining just how effective peer-tutoring is in improving students' academic success and retention.

Conclusions

The primary implication of the study's findings is the impact of peer-tutoring on students' academic success and retention, primarily in regards to mathematics courses. The data in the current study indicated the cumulative GPAs of students who were peer-tutored were impacted in a positive way. This also held true in relation to students' overall retention rates. Most students who responded to the SSC Evaluation Form also confirmed by indicating they expected their grade to increase as a result of attending the peer-tutored sessions and perceived their knowledge did increase after attending the sessions.

Most students also indicated they had positive experiences with their tutors and gave great ratings on patience, knowledge and overall tutoring quality of their tutors. They felt comfortable seeking help at the Student Success Center and were willing to visit the center again for additional tutoring. Although students did value the helpfulness of peer-tutored sessions to their academic success and considered their tutors spent either more than enough or enough time with them, some students still recommended the center

to employ more tutors and provide more time in the peer-tutored sessions, so the impact of peer-tutored sessions can be maximized.

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APPENDIX A:

Instructions for Completing the SSC Evaluation Form

Instructions for Completing the SSC Evaluation Form

The [REDACTED] State College Student Success Center Evaluation Form is a questionnaire that is designed as a student inquiry form in order to collect information regarding a student's perception of his or her tutoring session(s). The form consists of 8 questions along with an opportunity to offer recommendations for improving the peer-tutoring program. Instructions for completing the form are given below.

- Please answer each question as completely as possible.
- For questions with more than one answer, please select all appropriate responses.
- Please make every effort to include comments when asked for them. The answers to this survey will assist the Student Center Personnel in improving our program.

This evaluation is to be completed voluntarily by a student and is available to all students tutored in the center. Once complete, the student will fold this sheet and place it anonymously in the evaluation box located in the Student Success Center.

APPENDIX B:
The SSC Evaluation Form

State College
Student Success Center Evaluation Form

This evaluation is to be completed voluntarily by a student and is available to all students tutored in the center. Once complete, the student will fold this sheet and place it anonymously in the evaluation box located in the Student Success Center.

Name (optional): _____

Date: _____

Tutor's Name (required): _____

For which subject/skill did you seek tutoring?

- | | | |
|----------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Math | <input type="checkbox"/> Spanish | <input type="checkbox"/> COMPASS |
| <input type="checkbox"/> English | <input type="checkbox"/> Science | <input type="checkbox"/> TEAS |
| <input type="checkbox"/> History | <input type="checkbox"/> Study Skills | <input type="checkbox"/> Other _____
<i>(specify)</i> |

2. Please grade your tutor's...

(Circle one grade per row)

Patience:	A	B	C	D	F
Knowledge of the Subject:	A	B	C	D	F
Available Hours to Work:	A	B	C	D	F
Overall Tutoring Quality:	A	B	C	D	F

3. The amount of time the tutor spent with you was...

- More than enough Enough Not enough

4. How often do you visit the Student Success Center for tutoring?

- Only when needed Once a week 2+ times per week

5. Did your knowledge of the subject area increase due to tutoring?

- Yes No

If No, please explain:

6. Did you expect your grade(s) to increase as a result of this tutoring session?

- Yes No

7. Did you feel comfortable with seeking help from the Student Success Center?

- Yes No

8. Would you visit the Student Success Center again for tutoring?

- Yes No

If No, please explain:

9. We welcome your suggestions for improving the tutoring program:

Thank you for taking the time to help us improve our program for you!

Revised 12-Nov-15

APPENDIX C:

Permission to Utilize the SSC Evaluation Form



To Whom It May Concern:

I hereby give Larry Mitcham permission to utilize the Student Success Center Evaluation form in regards to his doctoral research.

Please contact me with any questions.

A handwritten signature in black ink that reads "Peter J. Higgins". The signature is written in a cursive style with a large initial "P".

Peter J. Higgins

Director of Student Success, Advising, and Testing



APPENDIX D:
Institutional Review Board Approval



**Institutional Review Board (IRB)
for the Protection of Human Research Participants
PROTOCOL EXEMPTION REPORT**

PROTOCOL NUMBER: 03469-2017

INVESTIGATOR: Mr. Larry Mitcham

SUPERVISING FACULTY: Dr. E-Ling Hsiao

PROJECT TITLE: *Explanatory Sequential Study of the Academic Success and Retention of Peer Tutored Postsecondary Students.*

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is **Exempt** from Institutional Review Board (IRB) oversight under Exemption **Category 2**. You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research.

ADDITIONAL COMMENTS:

- *Please be reminded upon completion of your research study all acquired data must be securely maintained for a minimum of three years.*

If this box is checked, please submit any documents you revise to the IRB Administrator at irb@valdosta.edu to ensure an updated record of your exemption.

Elizabeth W. Olphie

Elizabeth W. Olphie, IRB Administrator

04/17/2017

Date

Thank you for submitting an IRB application.

Please direct questions to irb@valdosta.edu or 229-259-5045.

Revised: 06.02.16