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First-year students: investigating the impact of participating in a mathematics learning community

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FIRST-YEAR STUDENTS: INVESTIGATING THE IMPACT OF PARTICIPATING IN A MATHEMATICS LEARNING COMMUNITY

by

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Dedication

I would like to dedicate this thesis to all my classmates, professors, mentors, and supervisors during my internship. You have all taught me something in the past two years, without the motivation and support I don't think this would have been possible, and without all of you I don't think I would have found my passion in higher education. Through this experience I have learned that with a positive mindset anything is possible.

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Abstract

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The purpose of this study was to investigate how participating in a mathematics learning community can impact a first-year students' experience in college. The total population in the Math Learning Community (MLC) was 40, 36 of these members participated in a survey and five volunteered to participate in an interview. The survey collected demographic information and responses to statements regarding the students' transition to college, their connectedness to Rowan, their peer interaction, faculty interaction, and their overall satisfaction at Rowan. The interview questions asked about their most and least satisfying aspects of participating in the MLC and what recommendations they had to help improve the MLC. Through data analysis findings suggested that participating in the MLC had some impact on their peer interaction, faculty interaction, their connectedness to Rowan, and overall satisfaction at Rowan. Through content analysis the responses from the interview showed that there were more satisfying compared to least satisfying aspects from participating in the MLC and with implementing their recommendations, the MLC can be very helpful to first-year students.

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Chapter 1

Introduction

Retaining students involved in the science, technology, engineering, and mathematics (STEM) majors is a issue for campuses nationwide. Recently math majors, particularly at institutions all over the country, have seen a declining enrollment (Mathematical Association of America, 2004). Students who enter their first year of college declared in one of the STEM majors often feel discouraged within their first year because of the workload, difficulty of classes, and feeling overwhelmed. At Rowan University retention in the math department was and still is a issue, the problem has been attacked with the creation of the math learning community offered to incoming freshman math majors. Before Dr. Christopher Simons and Dr. Ronald J. Czochor created the math learning community eight years ago, almost 60% of students were leaving the program. Some of these students were leaving the major in the middle of their sophomore year or after their sophomore year; since the creation of the learning community the percentage of students leaving has decreased to 50%. Dr. Simons says, although the numbers percentages improved there is still work to be done (personal communication on November 11, 2015.)

Statement of the Problem

Higher education plays an important role in preparing those who are interested in working in the science, technology, engineering, and mathematics (STEM) fields. There is a great need in the United States today for graduates from the STEM fields. While there are many students who have potential to be successful in these fields, students are

avoiding these fields early on in their college careers. Although higher education institutions all over the United States are working to prepare these students for careers in the field, the retention rates are quite low. Learning communities are available on many campuses to not only help with the retention rates for the institution as a whole but also for specific areas of study offered on those campuses. There is a large amount of research on science and engineering learning communities, but not much in the technology and math learning communities.

When looking at Rowan University I was interested to research the math learning community that is offered and how helpful it is to the students. So I chose to focus on the math learning community offered at Rowan University because there are many students leaving the math major early on in their time there. Eight years ago Dr. Christopher Simons and Dr. Ronald J. Czochor decided there was a need for something to boost retention for the first year math major students while aiding the students during their transition into college so together they formed the math learning community. While Dr. Czochor was an intricate part of the formation of the learning community, he is no longer directly involved and Dr. Simons is in charge of running the learning community today. The learning community was made to address the amount of students who were either leaving the mathematics program for another major or just not performing well within the math major. Together, the two professors thought a learning community would be a great program to try. Early on it was a very informal program that Dr. Simons and Dr. Czochor oversaw and were trying new approaches to reach students and help them achieve their academic goals. Three years ago it became a formal and funded program on

the campus with hopes to retain students at Rowan. There was a learning community class that the students were encouraged to attend but was not made mandatory so the attendance was very low. For the first time in the fall 2015 semester, the class was made as a pass/fail course, which increased the attendance significantly.

In 2003-2004, 28% of bachelor degree students entered into the STEM field majors, with biological/life sciences as the most popular major attracting about 11% of the students and mathematics and physical sciences as the least popular majors only attracting two to three percent of students (Chen, 2013). Many of the students that entered as STEM majors left after several years with "a total of 48 percent of bachelor's degree students who entered stem field between 2003 and 2009 had left these field by spring 2009" (Chen, 2013, p. 14). Consequently, "roughly one half of these leavers switched to a non-STEM field" (Chen, 2013, p. 2).

Offering learning communities is one way a college or university can support student persistence and retention. Learning communities are designed to contribute to a student's academic achievement, increase a student's persistence, and a student's transition to college. Learning communities also provide students with the support from their peers, advisors, professors, and mentors to help them succeed in college.

Background of the Problem

In the 1920s at the University of Wisconsin, Alexander Meiklejohn introduced the first learning community and called it "Experimental College" (Smith, 2001; Stassen, 2003). Those who participated in the Experimental College gained hands on learning experiences by actively participating in and outside of the classroom. The students

gained knowledge and tools to work through situations that could occur in their everyday lives. This was seen as more beneficial because the students could be involved in life experiences instead of listening to traditional lectures. The students in the "Experimental College" were encouraged to work with other students on projects to gain the experience of cooperative working with others. One of the most critical factors of the "Experimental College" was for students to build relationships with their professors so there could be meaningful discussions in the classroom rather than the students memorizing information that was being taught to them (Meiklejohn, 1930). In the beginning, there were aspects of the Experimental College that needed to be worked out to be more effective for the students and keep the faculty on the same page, but with the foundation of Meiklejohn's thoughts it has helped shaped what colleges and universities all over the U.S. offer to students, now calling them learning communities.

There are four different types of learning communities: paired or clustered, first-year interest groups (FIGs), team taught courses, and living-learning communities (Inkelas & Weisman, 2003). No matter which type of learning community a student is involved in, the similarity between all of them is to increase academic success. Rowan University offers a learning community for the following students: art majors, biology majors, communication radio/TV/ film majors, computer science majors, engineering majors, EOF/MAP, history majors, mathematics majors, and students who need special accommodations (Learning Communities at Rowan University, 2015). For any student entering college with the following declared major: computer science, biology, engineering, and mathematics, all first-years students are placed into these learning

communities. The art, communication radio/TV/film, history, EOF/MAP, and special needs students are directed to contact someone involved or apply to become a part of the learning community. Not every university or college offers the same learning communities as Rowan does.

There are positive and negative outcomes of participating in learning communities; however, research has shown that the positives outweigh the negative. Zhao and Kuh (2004) note that students who are more engaged in educational activities directly linking to their persistence in the area of study, increase retention, form stronger relationships between students and the faculty/staff, participate more in class, and become more socially engaged. Those who are involved in the learning communities also can grow personally by creating effective study habits, working together with others; social developments, diverse experiences, and have a positive outlook on their undergraduate experiences (Smith et al., 2006). Not only do the students benefit from these communities, parents who are sending their students to school can feel more at ease as participation in learning communities can help their child adapt to the college life in a way where the student focuses on their studies while having a social life with students with similar interests, taking the parents worries away from their students getting involved in things such as underage drinking (Brower et al., 2003).

In 2011, the Office of Undergraduate Research at a large research university developed a program called LEARN (Learning Environment and Academic Research Network). This program was developed to give students involved in the STEM fields' early practice with conducting research earlier on in their undergraduate experiences.

The students live together in residence halls, take specific classes together, work with mentors, and engage in a 12-week mentored research apprenticeship (Schneider, Bickel, & Morrison-Shetlar, 2015). Students can benefit from being around students who are in the same major as well as sharing similar interests of study. The program was based off research at the University of Michigan, which studied hundreds of first year and second year students from different ethnic backgrounds who were involved in learning community programming. The results showed that the students who participated earlier had higher graduation rates compared to those who started later. The LEARN program earned positive feedback resulting in higher critical thinking skills, higher GPAs, and increased retention rates.

To make a learning community beneficial takes resources, communication, and dedication from the faculty/staff involved as well as the students. There are many important pieces to the learning community such as housing, faculty, administrators, admissions, and university leaders (Flynn, 2012). Without communication and hard work from all of the groups, the learning community could not be effective. Astin (1993) discusses some of the negative outcomes of participation in these communities could result in being sexually active, smoking cigarettes, alcohol consumption, and too much time being spent with peers as opposed to studying with peers.

Purpose of the Study

The purpose of the study was to identify the practices and activities that the Mathematic learning community at Rowan University uses and how the Mathematic learning community positively affects the students in the following ways: persistence

within the mathematics major; Grade Point Average (GPA); socially and academically integration into the university; and preparation for the rest of their career at Rowan University. To gather data this study used a mixed method of surveys and interviews with students involved in the math learning community.

Significance of the Study

There are many math learning communities at institutions nationwide and to hold a study that could reach all of those would be ideal. This study investigated the impact of participation in the Mathematics learning community at Rowan University. Students committing to the STEM related majors are declining and one of the reasons is because of the difficulty of the fields. There is a need for professionals in these fields and the students need the support from their peers, faculty/staff members, and advisors to be successful throughout their undergraduate experience to graduate and move onto a promising career. Findings of this study could help improve the learning community for the students, assist in determining what practices have been helping, and what practices can be adjusted or changed.

Assumptions and Limitations

As with any study, there are some important assumptions and limitations to be addressed. For the possible limitations of this study, by design, this study only includes participants from Rowan University. This limits the future application of the findings. I also only surveyed students who were involved in the math teaching community, which could also limit the applicability of my findings because I was not comparing what I find in this research to another learning community. Another limitation is the sample size for

my survey and interviews; there are 40 students who actively participated in the Mathematic Learning Community during the 2015/16 academic year. The final limitation is the timing of the study. I conducted this survey in the second semester of the students' first year at Rowan.

For the assumptions of this study, one is the idea that anyone who participates in a learning community is going to gain some benefit. Another assumption about a math learning community is that it was the reason a student had a higher GPA and is successful in the major. Also, there is the potential for researcher bias as I worked in a campus advising center as a graduate intern that serviced the Mathematic Learning Community at Rowan University.

Operational Definitions

1. Living-learning Community: A first-year to four-year experience that aims to support student success and offers an environment that increases their satisfaction, adjustment, and persistence to graduate.
2. Persistence: In this study, persistence is classified as one who remains in the math program throughout their college career and work towards finishing their degree in the major.
3. Residence Assistant or Resident Adviser: Student who lives in the residence halls with other students, he/she is there to enforce rules, mediate disagreements, and provide support for the students. While attempting to create a sense of community among the students they are there to make sure

the students obey the college or university's rules (My College Guide's Blog, 2015).

4. Retention: A measure of the rate at which student persist in their educational program at an institution, expressed as a percentage. For four-year institutions, this is the percentage of first time bachelors degree-seeking undergraduate from the previous fall who are again enrolled in the current fall (National Center for Education Statistics, 2015).
5. STEM Majors: Refers to science, technology, engineering, and mathematic majors. Majors that are involved in mathematics, physical sciences, biological sciences, computer science, science technologies.

Research Questions

This study was guided by the following research questions:

1. What do MLC members report their transition to college, connectedness to the university, peer interaction, student-faculty interaction, and their overall satisfaction at Rowan University and with the College of Mathematics and Science?
2. What were the most satisfying and least satisfying aspects of participating in the MLC?
3. What recommendations do MLC participants make about improving the learning community?

Overview of the Study

Chapter II reviews and discusses literature used to gain more information on the topic of learning communities. Theories that are involved with the development and anticipated outcomes of learning communities are discussed.

Chapter III includes the procedures and methods used in the study performed. It also includes the description of the study, population, sample selected, demographics, processes, and how the data were analyzed.

Chapter IV presents a profile of the sample, the findings from the survey and interview instruments, and presents the information in both tables and narrative form describing the data.

Chapter V concludes the study with a summary of the research and discusses the findings, conclusions, and offers suggestions for practice and further research.

Chapter II

Review of Literature

I can remember visiting my friend who lived in the same dorm building as I did freshman year and thinking to myself that her floor was so different compared to mine. I wondered why and how because we were both freshman living in the same building just on opposite sides. The common areas on my floor were never filled with people doing their homework, my floor mates were quiet and kept to themselves. But on the other side of Chestnut at Rowan University was a floor filled with math majors, their lounge was always filled with students on their floor doing homework or just hanging out. I grew envious and even though I was not a math major, I found myself going over there often to do my homework because I liked the atmosphere. I can remember telling my friend that it was cool that she could do her homework with the people she was living with; I wish I was a part of that environment, one of the learning communities that were offered to freshman.

Today, over 500 colleges and universities offer learning communities and the number continues to grow. This chapter presents the history of learning communities, when and where they first started, and how this foundation shaped the learning communities we have today. Next, the different types and structures of learning communities are explained, although each community works hard to reach similar goals for the students, there are different structures to reach every students' learning needs. The benefits as well as the potential problems of student participating in learning communities are also discussed. This chapter also discusses how learning communities

can increase retention and satisfaction rates for both students and higher education institutions. Finally, the chapter concludes with theories involved within learning communities and empirical research implementing on the uses of these theories.

History of Learning Communities

Learning communities have become popular recently in higher education, but the concept of this type of community is not new. When it was first introduced by Alexander Meiklejohn in the 1920s it was first called the "Experimental College" at the University of Wisconsin (Smith, 2001; Stassen, 2003). The Experimental College was designed around a curriculum where students could explore the values of democracy and provide a positive interaction between the students and faculty members (Stassen, 2003). Meiklejohn (1930) said the purpose of the experimental college was to formulate and to test under experimental conditions, suggestions for improving teaching methods, the content being studied, and conditions of undergraduate liberal education. In the learning community the faculty stressed active learning rather than lecturing and focused on how the students could use what was being learned into life situations (Flynn, 2012).

Students were given the opportunity to work with peers on collaborative projects. One of the students' assignments was called a Regional Study. In this study, students at the end of their freshman year were asked to select some community, the students were able to choose their own town or village and they were asked over a period of six or seven months try to get acquainted with their community in ways they did not before, such as: historical origins, geographical settings, geological setting, politics, art, schools, churches, customs or beliefs, manners, and more (Meiklejohn, 1930). Experimenting in a

community, gave the student the hands on work and connections to what was being taught in the classroom. Meiklejohn (1930) felt that it was important for the student to feel the attraction or the importance to what was being studied to raise interest in the subject being taught. Along with teaching the importance of what was being studied, Meiklejohn also thought it was important for the teachers to give their own reactions to the books that they were reading; this was done so that the student could hear the adults opinions and then expand their own idea. Meiklejohn wanted the students to feel a relationship with the teacher versus envy, the students were still going to respect or take into consideration what the teacher thinks and was telling the class. Lastly, Meiklejohn (1930) stressed the most important factor of the experimental college was the personal relationship between the teacher and pupils, as students could take a greater interest in studies when they had an intellectual conversation or felt they are on the same page as the teacher.

Although Meiklejohn's Experimental College only lasted about five years due to low enrollment at the University of Wisconsin, Meiklejohn battled with some of the faculty who believed, "the students were often seen as unruly, and the teaching method unorthodox" (Smith, 2001, p. 2). Others on the campus saw the huge impact on the students and thought it was a positive experience given to them from the Experimental College.

Meiklejohn's idea came to life again through a student of his in the mid-1960s at a number of institutions such as: The Evergreen State College, The University of California-Berkeley, and San Jose State College, although most of these programs ran

into the same problems Meiklejohn faced in the past (Smith, 2001). Evergreen State College benefited from being a brand new institution, which helped with the design of the learning community since it was seen as innovative and student centered. In the 1990s, Tinto, a very influential figure in the higher education system in the student retention area, decided to conduct a study on the impact of learning communities and collaborative learning, comparing two very different types of institutions: The University of Washington and Seattle Central Community College. His results showed how learning communities were very effective in promoting student learning (Smith, 2001). From there learning communities began to flourish throughout higher education institutions as new styles were being introduced.

Different Types of Learning Communities

Rowan University Learning Communities (2015b) defines a learning community as a living and learning first- to four-year experience that aims to provide support for students in a higher education learning environment to increase the students overall satisfaction, adjustment, and persistence to graduation. Rowan University's main goal of the learning communities is to increase interaction among students while getting to know one another, provide a comfortable learning environment, and letting students work together in the classroom as well as outside of the classroom (Learning Communities at Rowan University, 2015b). Although all learning communities work hard to reach similar goals, colleges and universities provide different types of learning communities for their students. Inkelas and Weisman (2003) list the four major learning community types: the first is paired or clustered courses that link students and classes together for

example, a writing course and a literature course. The next is cohorts in large courses or first-year interest groups (FIGs), which link freshmen together by their major of choice and provides a seminar or advisors to provide discussions. Another style is team-taught courses, which are marked by multiple styles of teaching to increase the percentage of reaching different students and their styles of learning. The last type is a living learning program or community where students can be grouped by major and live in common areas in a residence hall.

Paired or cluster courses, FIGs, and team taught courses are based more on curriculums, whereas students who participate in living learning communities participate in the curricular activities as well as living together in a residence hall where there is academic programming and services (Inkelas & Weisman, 2003). It is important for faculty and staff to be creative in their teaching to reach all students and their own individual learning styles, as a result of being more creative the students improve their potential of learning and retaining information (Lenning & Ebbers, 1999).

Tinto (2003) talks about community service within the learning communities as a linking activity, just like Meiklejohn discussed the importance of putting what the students learned into their everyday life. Tinto explains how service-learning "is a pedagogical strategy, an inductive approach to education, grounded in the assumption that thoughtfully organized experience is the foundation for learning (as cited in Jacoby, 1996). Through service-learning, students and faculty are able to participate in time-intensive and interdisciplinary study of social problems to help students collaborate and test what they have learned in the classroom through outside experiences (Jacoby, 1996).

Rowan University's learning communities themes are often linked courses with the students registered within the learning community, these linked courses assist in building exposure with other students while building a community among the students (Learning Communities at Rowan University, 2015b).

Positive Outcomes of Learning Communities

Learning communities provide students with a different view of their academics, faculty, and environment as compared to other students. Studies have shown that students who participate in learning communities gain positive results linking to: academic performance, student engagement with educational activities (active and collaborative learning), increase in retention rates of college attendance, stronger relationships with faculty members, being more active in the classroom, helping with first year student transition, and being more engaged socially as well as academically (Tinto, 2003; Zhao & Kuh, 2004). Moreover, students benefit from having a support group in the classroom as well as outside of the classroom. Zobel (2011) noted that Pike (1999) conducted a study of overall effects on a students' learning and intellectual development while participating in a living-learning community, the study suggested that the social interaction were extremely beneficial, the community members were more involved on the campus and possessed a stronger intellectual development compared to students who did not participate in the living-learning community.

Students who are involved in learning communities develop peer group support as well as friendships that last well-beyond the college years (Reames, Anekwe, Wang, & Witte, 2011). In addition to the social aspect, students tend to spend more time on task as

well as learning activities and are perceived to be learning more when compared to students who were not involved in learning communities (Reames et al., 2011).

In 2012, Margaret Flynn conducted a study titled *Engineering Residential Learning Communities: Evaluating the Impact on Freshman Engineering Students.* Her study was constructed based on two similar surveys, first Joanne Damminger's survey in 2004 for undeclared freshman learning community participants and Patricia Zobel's study in 2011 for freshman engineering living learning community students (Flynn, 2012). In her study, Flynn investigated the impact of participating in a living learning community (LLC), specifically the freshman engineering students, due to the lack of published research on this population. Research suggests that students who participate in living learning communities (LLC) often practice critical thinking and are more likely to perform better academically (Flynn, 2012; Sharipo & Levine, 1999; Zhao & Kuh, 2004).

In addition, research also suggests participation in living learning communities can increase student involvement in and out of the classroom as well as overall satisfaction with the college (Flynn, 2012; Zhao & Kuh, 2004). Flynn's study employed a mixed method design using surveys and focus groups. Out of 200 students enrolled in the freshman clinic, 181 completed the survey (Flynn, 2012). In regards to the focus group section in this study, the students were purposively selected to represent diversity in the Engineering Learning Community (Flynn, 2012). All participants were freshman engineering students who lived on the same floor of their residence hall as well as being enrolled in four of the same classes (Flynn, 2012). The results of this study showed that the Engineering Living Learning Community positively impacted the student transition

into college, their connectedness to the college, peer relationships, and their overall satisfaction with the university (Flynn, 2012).

Smith et al. (2006) reported on the *National Survey of Student Engagement* (NSSE) study that released positive findings that learning communities related to all five of their engagement benchmarks which included: diversity experiences, gains in personal and social development, practical competence, general education, and overall satisfaction with their undergraduate experiences. Students who come from different backgrounds can be brought together through similar interests in courses or majors. Along with the student engagement benefits, learning communities also assist in the transition into college and can often help students to feel more at ease during the somewhat stressful experience (Inkelas, Daver, Vogt, & Leonard, 2007).

Another benefit of learning communities can contribute to the worries many parents experience when their child goes away to college, binge drinking. Brower et al. (2003) conducted a study on this issue with students in higher education today; the results showed that students who participated in learning communities had a much lower rate of binge drinking and other health issues compared to those students who did not participate in learning communities.

Geri, Kuehn, and MacGregor (1999) suggest that introducing a learning community to a campus is not an "add-on." They do not refer to learning communities as "add-ons" because it changes the relationships within the campus between everyone involved, such as relationships between: students and faculty, faculty and staff members, faculty and the administration, and student's relationships with other students. For all of

these relationships to be successful and beneficial there has to be constant communication. Learning communities in the end show results of successful collaboration and achievement, the students can walk away with a sense of community, responsibility, being a part of educational innovations, and a clear sense of putting their knowledge to work in society (Geri et al., 1999).

Finally, in 2011, the Office of Undergraduate Research at a large research university developed a program called LEARN (Learning Environment and Academic Research Network. "LEARN is a living-learning community where first-year students live in the same residence hall, take specific classes together, work with mentors, and engage in a 12-week mentored research apprenticeship" (Schneider, Bickel, & Morrison-Shetlar, 2015, p. 37). According to the Association of American Colleges and Universities (AAC&U), living-learning communities are considered, "a high-impact practice that positively impacts student retention, GPA, graduation time, and increase satisfaction with the institution," (AAC&U, 2011, as cited in Schneider, Bickel, & Morrison-Shetlar, 2015, p. 38). Before the development of LEARN this university discusses that was common for most students to get involved with research later in their college careers; the LEARN programs had the students ease into research in their first year and continue to build off of it throughout their time at college so when they were upperclassmen they felt comfortable conducting more in-depth research.

To support this idea, they researched a study that was done at the University of Michigan. The University of Michigan followed hundreds of first and second year students from different ethnic groups and found that students who were involved in

research in their first two years compared to students who were just getting involved in research their junior and senior year, African American student graduation rates were 19% higher when they participated in research early in their undergraduate careers. It also showed that Hispanic females and White males were moving onto graduate work at higher rates compared to those students who were not involved in early undergraduate research. The LEARN program started in the fall of 2011 and combined living-learning communities as well as the early research component. For the first year of this program the study targeted a population of first-generation students, or underrepresented students on the large campus that declared a STEM major.

The students involved in the LEARN program were engaged in academic, social, and community service programs. The university offered $250 per semester for students who actively participated in this program, but to be able to earn the scholarship they had to fully complete each semester. Each student was also assigned a peer mentor, these mentors were upperclassmen and were specifically chosen and were high-achieving students involved in undergraduate research as well. All of the students involved in the LEARN program were enrolled into a one credit course in the fall and spring called Research I and Research II. In this class the students learned the importance of research, the possible impact they could make by conducting research, tour research facilities, laboratory environments, and research literature. This is a unique aspect to the program because when student conducted research later on in their schooling the students often do not know how to properly research, read and articulate literature, and write at a scholarly standard. The class met once a week and ran until the middle of each semester. Once

this class was over the students then engaged in research actives for a minimum of three hours per week.

The students worked with doctoral and graduate students, who introduced them early to opportunities after undergraduate work, and gave the doctoral or graduate students experience with mentoring. During the students first year, academic advisors were encouraged to attend some of the meetings or events to assist students while picking classes, explore minors to add to their majors, and be available to discuss their future. The results showed that the students made close friends and there was a strong sense of community that helped create the bond between students. The students worked together, spent time together in class, spent time together at the social events, and also gave back to the community through community service. "They shared outcomes such as, common goals and majors, and often attended meals, social events, and participated in study groups together," (Schneider, Bickel, & Morrison-Shetlar, 2015, p. 41). The students were asked how they thought their first year experience would have been different if they did not participate in the LEARN program, the students reported that, "they would not have been as motivated and would have received worse grades," (Schneider, Bickel, & Morrison-Shetlar, 2015, p. 41).

The results for the early introduction to research students gave positive feedback about the research facility tours, learned how to read research papers correctly, and found the material to be interesting and worthwhile. Overall, this program was a success to the campus and achieved its goals of creating a small community on a large campus; the

students gained critical thinking skills, earned higher GPAs, and had higher retention rates at the beginning of their undergraduate careers.

Negative Outcomes of Learning Communities

While learning communities have many positive attributes on a college campus, there can be problems that the community or institution may experience when developing and integrating them into their environment. To successfully run a learning community takes much work, and communication, as discussed before when Meiklejohn first started with the Experiential College not all faculties agreed with the college, so it was less successful than it could have been. Bringing a learning community to a campus takes much work, communication, and resources to be successful for everyone involved. Flynn (2012) discusses how important it is to have the support of the housing department, faculty, administrators, admissions, and university leaders for a residential learning community to be run properly. Similar to running a business it is imperative that there is communication between all departments to make sure the learning communities runs smoothly so that student success is achieved.

Not only is communication important when having a learning community but so is necessary funding. Some of the expense items include training for the faculty, making sure the residence halls are able to fulfill the goals of the learning communities, having the resources for smaller class sizes, and having mentors or advisors available for the students involved in the communities. Shapiro and Levine (1999), discuss that having bigger class sizes is a way for a university to save money, but having smaller class sizes

is a way to best benefit the students, so class size is a major issue for learning communities.

Besides the academic and departmental involvment in making a learning community run as efficiently as possible, people outside of the direct communication can look at learning communities and think that there can be a downside to students socializing and spending too much time together. Astin (1993) found that learning communities could lead to negative outcomes for students involved. Some of the negative outcomes included being sexually active, smoking cigarettes, alcohol consumption, and too much time was being spent with peers rather than studying (Astin, 1993). Although learning communities do not prevent curious students from participating in those activities, they also do not promote such activities. Most students who are away from parents or family for the first time may be interested in trying new things because of the new-found freedom. A learning community promotes good study habits as well a group of friends who can be a positive influence in and outside of the classroom.

Retention Impact

For many years colleges have worked hard to retain students and promote higher graduation rates. As noted earlier, students who are a part of learning communities have helped to increase retention rates at colleges and universities. Some colleges and universities bring learning communities to their campus solely to assist in raising the retention rates. Reames et al. (2003) quote Tinto (1987) "the more integrative their experiences at colleges, the more likely students will persist until degree completion."

Zobel (2011) reported from her study on Engineering Learning Communities that students who participated in the learning communities felt the benefits and were excited about continuing their education, finding that academically it was easier to work with fellow students who were also friends.

Hill and Woodward (2013) found that students who participated in learning communities helped increase retention rates. The study took place on a Mid-Western campus that had decreasing retention rates; a decision was made to organize a learning community on the campus for incoming freshman for the College of Education to test how participation in a learning community could help students with high risk factors, including poor preparation for college remain in college (Hill & Woodward, 2013). Results showed that for those students who participated in the learning community increased the retention rate (Hill & Woodward, 2013).

Theories Practiced in Learning Communities

There are two theories that are consistently practiced and can directly connect within learning communities. The two include: Schlossberg's Transition theory and Tinto's Model of College Student Departure.

Schlossberg's Transition Theory draws heavily on the works of others such as: Levinson (1978), Neugarten (1979), Lowenthal and Chiriboga (1975), Vaillant (1977), and more. Her theory originally targeted adult learners, but she realized that no matter the age of the student, the traditional or non-traditional student faces a number of transitions or changes that can last short- or long-term (Evans, Forney, Guido, Patton, & Renn, 2010). Schlossberg also believed there was a need of developing a framework to

better understand adults in transition and helping them to get through the process (Evans et al., 2010). Schlossberg (2011) suggests that transitions for adults in their careers can be quite complex because one can change their jobs and careers multiple times, so it is important to understand the changes the individual might be going through; for higher education professionals it is important to understand the transition a first-year student is going through, assuming it is the first time the student is going to be living away from their parents the transition can be complex.

The transition timing process can differ from person-to-person, the ideal outcome from a transition is for the individual to feel integrated in their new environment and surroundings. Evans et al. (2010) state that transitions may lead to growth within the individual but just like the timing of the transition process it can vary between individuals and can sometimes lead to a decline in the individuals growth. Schlossberg's Transition Model (2011) explains that there are ways to understand the transitions as well as ways to cope with transitions. Understanding the transitions is important because there are different types of transitions including: anticipated transitions which are major life events that are usually expected, such as: graduating from high school or college, a first job, starting a career, getting married, or becoming a parent. Unanticipated transitions are often disruptive to the individuals everyday lives and are often unexpected, examples of this transition could include: having a surgery, being injured, getting sick, and not being accepted to a college or university. The last transition is a nonevent transition, which are expected events that do not occur such as: not going to college, not getting married, or not getting a promotion. Everyone at some point experiences a transition, there is a

process of role changes with each transition whether it be anticipated, unanticipated, or a nonevent, the process happens more quickly than it does for others, being able to understand the transition and learn how to cope with it is what is most important.

Schlossberg came up with the four Ss to provide a framework for coping with these transitions that are experienced. The four Ss' are situation, self, support, and strategies. The first 's' refers to the situation that the individual is in at the time of the transition, in this stage there are factors that are considered, such as: trigger, timing, control, role change, duration, previous experience with a similar transition, concurrent stress, and assessment (Evans et al., 2010). For an individual who is entering college for the first time, there could be stress present. Thinking about the factors, it can be stressful to think about being alone and on their own for four years or more, they are more than likely to not have previous experience with a similar transition, and the stress of the transition was expected for most.

The second 's,' self is classified into two categories: personal and demographic characteristics and psychological resources. The personal and demographic characteristics are how an individual views life; it can include socioeconomic status, gender, age, health, and ethnicity/culture (Evans et al., 2010). The psychological resources include: ego development, outlook, commitment and values, and spirituality and resiliency (Evans et al., 2010). Support is the next 's,' and Schlossberg (2011) has described it as one of the most important aspects while coping, the support is critical to one's sense of well-being. With no support an individual may take longer to adapt which makes the transition process longer and harder on the individual experiencing it, a first

year student may not know anyone at the school he/she is attending, if a student is struggling to fit in socially or academically it is important to have programs available so the transition does not make the students first impressions bad (Schlossberg, 2011).

The last 's' is strategies, Pearlin and Schooler (1978) define coping strategies as those that try to change the situation, try to reframe the situation, and those that help reduce stress (as cited in Schlossberg, 2011). If there are not ways to directly change the situation, is there a way the individual can view the situation differently? If an individual is going through a stressful experience such as a transition, it is important to try to reduce the stress, helping guide the individual to their personal stress relievers.

DeVilbiss (2014) performed a study using Schlossberg's theory to understand the transition experience of all different types of students in higher education some of which included: first-time students, full-time, conditionally admitted students, and more. She conducted two series of interviews of eight students during their first fall semester in college to help understand the transition experiences. DeVilbiss found there were differences among the individuals in the study as she went through and explained each 's' and how it can connect to the students she interviewed.

Tinto (1975) studied why students leave college and what are the reasons causing students to dropout; the result was the Student Integration Model. This model helps explain how students who become integrated academically as well as socially at an institution warrants the student to commit to achieving the desired degree. Tinto describes the individual characteristics and college dropouts to include: family background, individual characteristics, past educational experiences, and goal

commitment. Tinto explains that family background can hold significance in a student persistence to receive a degree. For students who come from a low-income family or low socioeconomic status, these students tend to have higher dropout rates compared to students who come from a middle class or high-income family (Tinto, 1975). A student who comes from a home where the parents are educated and college graduates it is likely that they will stay in college.

The individual characteristics of the student are just as important as the family background of the student when looking at dropout rates. The individual's ability to deal with education and academics plays a huge role, if a student is accepted into college and had average grades and the student begins to struggle academically and find themselves doing poorly, just from the grades alone can leave the student feeling that he/she is unable to do the work and lead to dropping out. If they are struggling academically the student can then feel that no matter what he/she does they won't be able to graduate, and personal commitment or persistence can begin to feel unreachable. Tinto (1975) suggests that past educational experiences are closely tied with the individual's characteristics, and how the student directly performs in high school can be some indication of how he/she will perform in college. In high school, students are measured by grade point average or class rank, but if the student comes from a low resource school (one where the students are not in the best educational environment, not provided with the highest tools, resources, or coming from a low income district) and does well in high school that does not mean they will do well in college.

Finally, the last characteristic is goal commitment. Tinto (1975) states, "once the individuals ability is taken into account, it is his commitment to the goal of college completion that is more influential in determining college persistence," (p. 102). When the student can set goals, work hard to meet expectations, and plan for the future the student can see that without the commitment to the education nothing they are working for can be reached (Tinto, 1975).

Not only is the academic integration important for students to stay at their institution but it is important for students to feel integrated in their social environment as well. Tinto (1993), describes the academic integration as feeling connected to academic activities or programs that are offered at the institution, he also describes social integration as feeling connected to the social activities at a college or university. Damminger (2004) conducted a study that examined the low retention rates that were connected to undeclared freshmen in result of low access to the Rowan Seminar Courses. This study was significant to represent how students who enter college with a declared major often feel more connected to the college community compared to those who do not have a declared major.

Summary of the Literature Review

The literature suggests that learning communities can benefit colleges and universities as an innovative way for students to learn. Learning communities can assist students while they are transitioning into college and help them gain the persistence to graduate. Students create relationships with peers as well as professors and advisors that serve as a support system while they are adjusting to the college lifestyle. Without,

Meiklejohn's experimental college, this collaborative way to learn would not be where it is today. Without the framework of Meiklejohn's work in forming this style of learning, there would not be the different types of learning communities for students to be able to choose from.

There are many types of learning communities that are offered to students to increase their chances of being successful within their chosen major. Learning communities are made to enhance the relationships between students as well as the relationships between professors and administrators and students, which can assist students in being successful during their time college career. In order for these communities to be successful communication is key, without communication and dedication the learning community the students will not benefit from participating in these communities. The research on the topic of math earning communities is limited, therefore the following study examines First-Year Students: Investigating the Impact of Participating in a Mathematic Learning Community and provides findings on the 36 students who participated in the study.

Chapter III

Methodology

Context of the Study

Rowan University's main campus is located in Glassboro, New Jersey, and in recent years has expanded to satellite campuses in Camden and Stratford, New Jersey. Rowan is a selective, medium- sized public state research university offering bachelor through doctoral degrees to about 16,155 students (13,169 undergraduates, 2,078 graduates, and 908 professionals) (Fast Facts, 2015a). As of 2013, Rowan is now the second public research institution in New Jersey and is the second in the nation to offer both M.D. and D.O. medical degrees (Fast Facts, 2015). Rowan offers a wide range of degrees and certificates such as: 74 bachelor's, 51 master's, four doctoral, two professional, seven undergraduate certificate (CUGS), and 38 post-baccalaureate certificates (COGS & CAGS) (Fast Facts, 2015a). Rowan offers different types of housing to students; eight residence halls, five apartment complexes, Rowan's International House, as well as the 220 Rowan Boulevard building that opened in summer of 2015.

A unique housing offered by Rowan is the math learning community which is offered as a living-learning community but is voluntary. About 70% of the students choose to live on the same floor or room with a math major, the other 30% chose to not participate in the living aspect of the learning community. In past years there have been R.A.s who were math majors and were placed on the floors or dorms where the math learning community students lived.

Students who are involved are in two classes together, the two classes do not consist of the same students but there is a mix of familiar students. The two classes offered in the fall are pre-calculus and symbolic logic, then in the spring semester the classes offered to the students are calculus or calculus 2 and discrete math. Currently the math learning community is designed for freshman math majors only and does not accept transfer students into the community. There has not been much research conducted on the effectiveness of this learning community.

Population and Sample Selection

The target population would be any practice of math learning communities at institutions nationwide. The available population is the students involved in the math learning community offered at Rowan University. The total population for this study consisted of 40 freshman students who entered the 2015/16 academic school year. The students were automatically placed into the learning community when they entered Rowan. Convenience sampling was practiced during this study as the students were available to be studied during the time of the math learning community class. All students involved in this study were asked to participate in the study and 36 of the students completed a survey and five volunteered to be interviewed.

Instrumentation

The instrument (Appendix A) used to assess the academic and social outcomes of participating in a freshman math learning community was constructed based on a similar survey used by Margaret Flynn (2012) for freshman students enrolled in the engineering learning community. After contacting Flynn and receiving permission to use her survey,

it was altered so the questions focused on the math learning community students. Flynn (2012) constructed her survey based on two similar surveys done by Damminger's (2004) survey for undeclared freshman learning community participants and Zobel's (2011) survey for freshman engineering living-learning community students.

The research was a mixed method of quantitative and qualitative methods. To collect the quantitative data a survey that included 10 demographic questions and 37 Likert scale statements was used; the students were asked to rate each of the Likert scale items from 5-1, 5 meaning the student strongly agreed with the statement to 1 meaning the student strongly disagreed with the statement. The survey was field tested with five math majors who did not participate in the study (sophomore math majors). The test run showed that the survey took about 10 minutes to complete. The survey was administered on March 7th and March 8th, 2016 to the members of the Discrete Math Learning Community section that was taught by Dr. Nguyen. A Cronbach Alpha was calculated for Likert Scale items 11-47 of the survey instrument to test for internal consistency and reliability. If an Alpha coefficient results show a value of .70 or greater it is considered internally consistent or a reliable instrument. After running the Cronbach Alpha test on these items in SPSS the Alpha coefficient resulted in .924, meaning the survey instrument is considered reliable.

The study also used eight interview questions (Appendix B) to collect more in depth information. These questions were also adopted from Flynn's (2012) study; the questions were altered to focus on the freshman math learning community students. Four of these questions pertained to the student's experience while participating in the math

learning community and the last four focused on the student's experience while being at Rowan University. The students who participated in interview were asked to sign a consent form, which informed them that the information collected would be solely used for data collection, their names would remain confidential, and informed that they had the option to skip a question(s) if they did not feel comfortable answering. I took notes during the interviews as well as recorded the conversations to be able to go back and make sure the data were heard correctly.

Data Collection

For the first time in the fall 2015 semester at Rowan University, members of the Math Learning Community were required to take a mandatory pass or fail course during their fall semester and did not continue into the spring semester. Due to this class not being ran in the spring, I reached out to Dr. Nguyen to visit the Discrete Math Learning Community sections that he teaches. Between the two classes there was a total of 40 students enrolled, I visited two sections of this class on March 7th and March 8th, 2016 in person, as this was the best way to receive a high response rate. Before collecting the data, the Institutional Research Board application (Appendix C) was completed and approved. I received verbal and an electronic approval from Dr. Simons and suggested dates to come and administer the survey. On March 7 and March 8, 2016 the survey was administered to each student in attendance during the Discrete Math class.

Following the survey, the five students who volunteered to participate in the interviews met with me at the convenience of their schedule in Savitz Hall during the last week in March 2016. Participants signed a consent form that allowed me to record their

answers. To keep the students answers confidential the students were given a letter (ex: Participant A) instead of stating a name. Along with the recording I also took hand written notes that were later typed and saved as a document.

Data Analysis

The surveys were analyzed using descriptive statistics (frequencies, percentages, means, and standard deviations) using the Statistical Package for the Social Sciences (SPSS) computer program. An independent samples t-test was used to identify the effectiveness, impact, and usefulness experienced by the students who participated in the Math Learning Community. Each open-ended question was color coded and analyzed to search for common responses. Lastly the Interview questions were also transcribed, analyzed, and color coded to identify any patterns or similarities in responses. Content analysis per Sisco (1981) was used to analyze the interview data looking for common and divergent themes based upon the responses from participants.

Chapter IV

Findings

The findings are divided into two sections because this study used a mixed method, the first section displays the profile of the survey sample and lays out the data gathered from the MLC sample group. The second section discusses results of the interviews organized into meaningful themes based upon content analysis.

Profile of the Survey Sample

This study consisted of a total population sample of the currently enrolled MLC members during the 2015-2016 academic year at Rowan University at the Glassboro campus in New Jersey. In the spring 2016 semester were 40 students who were involved in the MLC, of the 40 students enrolled, 36 students completed the survey yielding a 90% response rate. The survey data were collected in person, 33 of the surveys were collected by attending the Discrete Math Learning Community class taught by Dr. Nugyen, there was an additional meeting in the math department organized by the math advisor for three students who were in the math learning community cohort but not enrolled in the discrete math course.

Table 4.1 displays the demographic information collected, of the 33 students, 22 (61.1%) were male students and 14 (38.9%) were female students. There were 28 (77.8%) students who identified as White/Caucasian, three (8.3%) who identified as Black/African American, three (8.3%) who identified as Hispanic/Latino, and two (5.6%) identified as Asian/Pacific Islander. The participants were asked about their high school GPA, the results showed that five (13.9%) reported having a 4.0 or higher, 14 (38.9%)

reported having a 3.5-4.0, 13 (36.1%) reported having a 3.0-3.5, three (8.3%) reported having a 2.5-3.0, and one (2.8%) reported having a 2.0-2.5 GPA. The data show that 11 (30.6%) answered yes to having at least one parent who has a career in a STEM field, 24 (66.7%) answered no, and there was 1 (2.8%) missing. Regarding the question asking if the student is a part of the MLC, 33 (91.7%) responded yes and 3 (8.3%) did not answer. Of the 36 members surveyed, 6 (16.7%) reported that they lived with a math major, 29 (80.6%) responded no, and 1 (2.8%) did not respond.

Table 4.1

MLC Demographics of MLC (N=36)

Category	Sub-category	*f*	%
Gender	Male	22	61.1
	Female	14	38.9
Ethnicity	White/Caucasian	28	77.8
	Black/African American	3	8.3
	Hispanic/Latino	3	8.3
	Asian/Pacific Islander	2	5.6
High School GPA	4.0+	5	13.9
	3.5-4.0	14	38.9
	3.0-3.5	13	36.1
	2.5-3.0	3	8.3
	2.0-2.5	1	2.8
I have at least one parent who has a career in a STEM field	Yes	11	30.6
	No	24	66.7
	Missing	1	2.8
I am a participants of the Math Learning Community (MLC)	Yes	33	91.7
	No	3	8.3
	Missing		
I live with a math major	Yes	6	16.7
	No	29	80.6
	Missing	1	2.8

Analysis of the Survey Data

Research question 1. What do MLC members report their transition to college, connectedness to the university, peer interaction, student-faculty interaction, and their overall satisfaction at Rowan University and with the College of Mathematics and Science?

Table 4.2 displays the information regarding the MLC members response regarding their transition to Rowan University. The data are organized based on mean scores and are presented in the table from most positive to least positive. A total of 30 students (83.3%) strongly agreed or agreed with the statement that tutoring services are readily available to them. A total of 29 students (80.5%) strongly agreed or agreed that it was easy for them to adjust to college socially. A total of 25 students (69.4%) reported that the requirements for the major are clear and reasonable. A total of 25 students (69.4%) also strongly agreed or agreed with the sufficient number of weekend activities on campus. Twenty-one students (58.3%) strongly agreed or agreed that there are a adequate number of services to help with career planning, and that they know how to get involved in campus organizations. Nineteen (52.8%) of the students strongly agreed or agreed that they felt like a part of the math community, 16 (44.4%) were neutral, and 1 (2.8%) disagreed. Twenty-four students (66.7%) of the members reported that it was easy for them to adjust to college academically. Nineteen students (52.7%) of the members reported strongly agreeing or agreeing that they felt included in the Math Department, while 14 (38.9%) were neutral, and 3 students (8.4%) disagreed or strongly disagreed.

Table 4.2

MLC Response to Transitioning to Rowan University (N=36)
(Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1)

Statement	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Tutoring services are readily available. *M*=4.28, *SD*=.741	16	44.4	14	38.9	6	16.7				
It was easy for me to adjust to college socially. *M*=3.97, *SD*=.774	8	22.2	21	58.3	5	13.9	2	5.6		
The requirements for my major are clear and reasonable. *M*=3.94, *SD*=.754	9	25.0	16	44.4	11	30.6				
There are a sufficient number of weekend activities for students. *M*=3.92, *SD*=1.052	13	36.1	12	33.3	6	16.7	5	13.9		
There are adequate services to help me with career planning. *M*=3.92, *SD*=.937	13	36.1	8	22.2	14	38.9	1	2.8		
I know how to get involved in campus organizations. *M*=3.83, *SD*=1.108	14	38.9	7	19.4	10	27.8	5	13.9		
I feel like I am a part of the math community. *M*=3.72, *SD*=.849	8	22.2	11	30.6	16	44.4	1	2.8		
It was easy for me to adjust to college academically. *M*=3.69, *SD*=.786	4	11.1	20	55.6	9	25.0	3	8.3		
I feel included in the Math Department. *M*=3.53, *SD*=.878	4	11.1	15	41.7	14	38.9	2	5.6	1	2.8

Table 4.3 shows the members responses in regards to their connectedness to the university. A total of 33 students (91.7%) reported that they strongly agreed or agreed that students are made to feel welcome on Rowan's campus. A total of 30 students (83.3%) reported that they strongly agreed or agreed that they felt a sense of belonging at Rowan University. A total of 32 students (88.9%) strongly agreed or agreed that it is an enjoyable experience to be a student on this campus. A total of 24 students (66.7%) reported they strongly agreed or agreed that they generally know what is happening on campus, 8 (22.2%) were neutral, and 3 (8.3%) disagreed.

Table 4.3

MLC Response of Connectedness to Rowan University (N=36)
(Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1)

Statement	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Students are made to feel welcome on this campus. *M*= 4.31, *SD*=.710	15	41.7	18	50.0	2	5.6	1	2.8		
I feel a sense of belonging at Rowan University. *M*=4.25, *SD*=.906	17	47.2	13	36.1	5	13.9			1	2.8
It is an enjoyable experience to be a student on this campus. *M*=4.19, *SD*=.624	11	30.6	21	58.3	4	11.1				
I generally know what happening on campus. *M*=4.03, *SD*=.707, Missing=1	10	27.8	14	38.9	8	22.2	3	8.3		
I feel a sense of pride about my campus. *M*=3.97, *SD*=.971	12	33.3	1	38.9	8	22.2	1	2.8	1	2.8

Table 4.4 displays students' responses regarding peer interaction. A total of 29 students (80.5%) reported that they strongly agreed or agreed with the statement that they consider some students in their major to be their friends. A total of 28 students (77.8%) reported that they strongly agreed or agreed that they spent time with classmates outside of class. A total of 24 students (66.6%) strongly agreed or agreed that it is easy to make friends with students outside of their major. A total of 24 students (66.7%) responded that they strongly agreed or agreed that they were easily able to meet and make friends, while 10 students (27.8%) were neutral and 2 students (5.6%) disagreed. A total of 25 students (69.4%) reported that they strongly agreed or agreed that it was easy for them to make friends with students in their major and the other 11 students (30.6%) were neutral. A total of 27 students (75%) reported that they strongly agreed or agreed that they have a network of supportive peers in the major and 7 students (19.4%) were neutral and 2 students (5.6%) disagreed. A total of 19 students (52.8%) reported that they often study with other students in their major, 15 students (41.7%) were neutral and 2 students (5.6%) disagreed. A total of 21 students (58.4%) strongly agreed or agreed that they have built strong relationships with peers in the College of Science and Mathematics while 14 students (38.9%) responded neutral and 1 student (2.8%) disagreed.

Table 4.4

MLC Response to Peer Interaction (N=36)
(Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1)

Statement	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
I consider some students in my major to be my friends. *M*=4.03, *SD*=.654	8	22.2	21	58.3	7	19.4				
I spend time with classmates outside of class. *M*=3.97, *SD*=.810	9	25.0	19	52.8	6	16.7	2	5.6		
It is easy to make friends with students outside of my major. *M*=3.94, *SD*=.924	12	33.3	12	33.3	10	27.8	2	5.6		
It is easy to make friends with students in my major. *M*=3.94, *SD*=.754	9	25.0	16	44.4	11	30.6				
I was easily able to meet people and make friends. *M*=3.89, *SD*=.887	10	27.8	14	38.9	10	27.8	2	5.6		
I have a network of supportive peers in my major. *M*=3.89, *SD*=.785	7	19.4	20	55.6	7	19.4	2	5.6		
I often study with other students in my major. *M*=3.64, *SD*=.833	6	16.7	13	36.1	15	41.7	2	5.6		
I have built strong relationships with peers in the College of Science and Mathematics. *M*=3.61, *SD*=.645	2	5.6	19	52.8	14	38.9	1	2.8		

Table 4.5 displays the students' responses regarding their interaction with the faculty. A total of 30 students (83.4%) reported they strongly agreed or agreed about feeling comfortable speaking in class. A total of 29 students (82.9%) strongly agreed or agreed that faculty are usually available after class or during office hours. A total of 25 students (69.5%) strongly agreed or agreed that faculty are fair and unbiased in their treatment of individual students. A total of 25 students (69.4%) strongly agreed or agreed that they felt comfortable asking questions in class. A total of 23 students (63.9%) strongly agreed or agreed that the quality of instruction received in most of the classes is excellent, 13 students (36.1%) reported neutral. A total of 19 students (52.8%) strongly agreed or agreed that they felt comfortable approaching their teachers outside of class while 14 students (38.9%) responded neutral, and 3 students (8.3%) disagreed. A total of 20 students (55.6%) reported that they strongly agreed or agreed that their teachers care about them as an individual, while 12 students (33.3%) were neutral, and 4 (11.1%) disagreed. A total of 16 students (44.4%) reported that they strongly agreed or agreed that faculty take into consideration student differences as they teach a course, with 17 students (47.2%) reporting neutral, 2 students (5.6%) disagreed, and 1 student (2.8%) strongly disagreed. A total of 12 students (33.4%) responded that they strongly agreed or agreed that they interact with their teachers outside of the classroom, 18 students (50%) reported neutral, and 6 students (16.7%) disagreed.

Table 4.5

MLC Response to Faculty Interaction (N=36)
(Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1)

Statement	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
I feel comfortable speaking in class. *M*=4.08, *SD*=.806	11	30.6	19	52.8	4	11.1	2	5.6		
Faculty are usually available after class during office hours. *M*=4.03, *SD*=.707, Missing=1	8	22.9	21	60.0	5	14.3	1	2.9		
Faculty are fair and unbiased in their treatment of individual students. *M*=3.86, *SD*=.683	6	16.7	19	52.8	11	30.6				
I feel comfortable asking questions in class. *M*=3.81, *SD*=.856	7	19.4	18	50.0	8	22.2	3	8.3		
The quality of instruction I receive in most of my classes is excellent. *M*=3.75, *SD*=.649	4	11.1	19	52.8	13	36.1				
I feel comfortable approaching my teachers outside of class. *M*=3.67, *SD*=.926	8	22.2	11	30.6	14	38.9	3	8.3		
My teachers care about me as an individual. *M*=3.58, *SD*=.874	5	13.9	15	41.7	12	33.3	4	11.1		
Faculty take into consideration student differences as they teach a course. *M*=3.42, *SD*=.841	3	8.3	13	36.1	17	47.2	2	5.6	1	2.8
I interact with my teachers outside of the classroom. *M*=3.22, *SD*=.797	2	5.6	10	27.8	18	50.0	6	16.7		

Table 4.6 shows how MLC members responded to the statements regarding their satisfaction at Rowan University and with the College of Science and Mathematics. A total of 32 students (86.2%) strongly agreed or agreed that they intend to continue their education at Rowan University. A total of 32 students (88.9%) reported that they strongly agreed or agreed that they intend to continue their education in math. A total of 29 students (82.9%) strongly agreed or agreed that overall they are satisfied with their experience at Rowan, 5 students (14.3%) were neutral, and 1 student (2.9%) disagreed. A total of 32 students (88.9%) strongly agreed or agreed to being confident in their ability to complete their degree. A total of 27 students (75%) strongly agreed or agreed that they were satisfied in their choice of major while 9 students (25%) responded neutral. A total of 30 students (83.3%) reported that they strongly agreed or agreed they are satisfied with their experience in the math department while 6 students (16.7%) were neutral.

Table 4. 6

MLC Response to Being Satisfied at Rowan University and with the College of Science and Mathematics (N=36)
(Strongly Agree=5, Agree=4, Neutral=3, Disagree=2, Strongly Disagree=1)

Statement	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
I intend to continue my education at Rowan University. *M*=4.42, *SD*=.732	20	55.6	11	30.6	5	13.9				
I intend to continue my education in math. *M*=4.31, *SD*=.624	15	41.7	17	47.2	4	11.1				
Overall, I am satisfied with my experience at Rowan. *M*=4.20, *SD*=.797, Missing=1	14	40.0	15	42.9	5	14.3	1	2.9		
I am confident in my ability to complete my degree. *M*= 4.19, *SD*=.624	11	30.6	21	58.3	4	11.1				
I am satisfied in my choice of major. *M*=4.03, *SD*=.736	10	27.8	17	47.2	9	25.0				
I am satisfied with my experience in the Math Department. *M*=4.03, *SD*=.609	7	19.4	23	63.9	6	16.7				

Profile of the Interview Sample

Participation in the interview sample was voluntary. Below is a brief description of each participant, the participants were given a letter to protect their identity. All

participants were freshman and lived on campus. All interview participants lived on campus in a resident hall.

Participant A is a 19 year old Caucasian female student. She is an Elementary Education and Mathematics major. Her GPA from the fall 2015 semester was 2.9.

Participant B is an 18 year old Caucasian male student. His major is mathematics and hopes be become an Actuary. His GPA from the fall 2015 semester was a 3.4.

Participant C is a 19 year old Caucasian Mathematics and Education Subject Matter major hoping to become a high school math teacher. Her GPA from the fall 2015 semester was a 4.0.

Participant D is an 18 year old Caucasian female student. She is a Mathematics and Education Subject Matter major hoping to teach Calculus or Pre-calculus at the high school level. Her GPA from the fall 2015 semester was a 3.3.

Participant E is a 19 year old Caucasian male student. He is a Mathematics and Education Subject Matter major hoping to teach at the high school level. His GPA from the fall 2015 semester was a 3.0.

Analysis of the Interview Data

The interviews last about 20 minutes each and were guided by collecting demographic information followed by asking the eight interview questions. Content analysis was used to determine the common themes and subthemes. The themes and

subthemes were arranged by rank order. Illustrated quotations are presented to highlight themes from the interview data

Research question 2. What were the most satisfying and least satisfying aspects of participating in the MLC?

Most Satisfying Aspects

Content analysis was used in order to determine the students most satisfying and least satisfying aspects of participating in the MLC. The first question asked the student to describe their overall satisfaction with the MLC. Out of the five MLC members interviewed, three MLC members reported being very satisfied or satisfied with their experience, while two reported being satisfied with aspects but overall felt neutral or somewhat dissatisfied about their experience. Table 4.7 shows the common themes that emerged regarding the most satisfying aspects of participating in the MLC. Making friends was the most common theme found.

When the students were individually asked to describe their overall satisfaction with the MLC experience all five participants brought the benefit of seeing familiar faces in the classroom, which was also their response to the question that asked what was the most satisfying aspect of their experience in the MLC. Student A stated that she liked going to her classmates after class or meeting up outside of class to do homework. Student B also said, "seeing familiar faces in math classes specifically was pretty cool, I met two good friends from it."

Table 4.7

Most Satisfying Aspects of MLC (N=5)

Theme	Subtheme	Frequency	Rank
Making Friends in classes	Familiarity of faces in class Studied /did homework together Went to classmates for help	5	1
Academic	Math classes specifically for the MLC members	4	2
Office Hours	Professors made themselves available to help Went to professors with classmates	4	2
MLC Class	Explored different areas of math Academic Advisor	3	3

The MLC members have the ability to choose if they want to be a part of the Math Living Learning community, Student D opted into this and added:

> I opted into the living aspect of the math community, so I have a math major roommate…I came in taking pre-calc and she was in calc so it was helpful to have her there to help me, I have about two or three math majors on my floor, and my RA is a math major,…she has definitely helped me a lot.

Student C said, "I feel more comfortable in his math classes because they are all on the same page, they understand the struggles." Student D also said that she is more inclined to go to her classmates for help before going to the professor. All five MLC

talked about at least one instance where they worked on homework or studied with a classmate outside of class. When asked if participating in the MLC enhanced their connection with math learning community peers Student E stated:

> I think the math learning community class helped me connect to people because there was a group of four of us that would go to the gym together like right after the class, it helped us find something else in common besides just being math majors.

Student C also explained that it gave them the opportunity to relate on a level other than just getting to know someone, they could help each other succeed in the tough major.

In addition to the familiarity of students in the math classes the participants mentioned they liked having their own learning community course offerings. Student C said, " honestly, I liked the advantage of being put into my math classes earlier and knowing that there was kind of a class for us specifically." Student B also said, "I would have switched professors for my discrete course this semester but I had friends in this class, and I liked having all math majors in my class I think it gives class a different environment."

The students were asked to describe how their participation in the MLC enhanced their opportunities to interact with the Rowan math faculty and staff. When the students did not go to each other for help they turned to their professor, four out of the five

participants noted that they went to their professor for help at least once this semester. Student E said:

> I did go to my Discrete professor once a week for like a month which was very helpful, and I went to another professor like four or five times with a friend, it was also very helpful, our Discrete professor also extended his office hours and I definitely took advantage of it with my friend.

Student D explained, "the professor will make it a point before tests to remind the students about their office hours, the professors are approachable and seem to want what is best for the student which is a good feeling." Student A also said, "I went to my professor several times after class, and went to office hours with other students, it helped me get the individual attention I needed."

The math learning community class that was offered in the fall 2015 semester was something that was made to bring the community together. Student B said, "for the most part I liked the idea of presenting different areas of math especially because I am just a mathematics major unlike a lot of my peers who want to be math teachers." Student E also agreed that it was interesting to see the different areas that you could go into after college with a math degree. The most common comment that was brought up when talking about the math learning community class was that it was helpful to have Mike Schillo, the Academic Advisor for the department come in and talk. Student C said:

> It was cool when Mike Schillo came to class, although I met with him pretty much the day before, he talked about what classes we were going to or should

take for the spring, it was nice because he kind of like gave us a heads up for what classes we can expect for the next four years.

Student B also liked that Mike came in because he was planning on making an advising appointment and felt comfortable choosing his classes without having to make an individual appointment. Student A said, "it was cool to meet him before we made an appointment, he seemed like he really wanted to help which was nice."

Least Satisfying Aspects

Table 4.8 displays the least satisfying aspects of the MLC. Through content analysis, the four main themes that emerged were that there were no social activities, no real sense of community, no real connection with the professors, and the math learning community class. When the participants were asked to describe their overall satisfaction with the social activities in the MLC. Student C simply said, " there isn't much going on besides the math learning community class." Student D stated:

> The class does not continue into the spring so because we don't have that there is nothing bringing us together besides going to our learning community math sections, like there is nothing planned or programmed socially last semester or this semester.

Table 4.8

Least Satisfying Aspects of MLC (N=5)

Theme	Subtheme	Frequency	Rank
No Social Activities		5	1
Community	No real sense of community	4	2
No real professor connection		4	2
MLC Class	Areas discussed in the class Same time as the colloquium	2	3

Student B and C brought up the math team was mentioned but that is not something that is directly connected to the MLC. Student B said, "there wasn't anything really targeted for the social aspect." Student E added, "I've gotten emails about like colloquiums that are offered, the honor society and stuff, but no real planned events for us." Student A explained that, "there isn't anything really related going on for the social activities but I'm also not sure how much people would go if there were some, like I'm pretty sure I'd skip them."

As a result of there being no social activities, this could be the reason for the responses in regards to their second least satisfying aspect, no sense of community. The students were asked what the most disappointing aspect of their experience in the MLC. Student C said, "I pretty much forget I'm in it this semester." Student B said, "last semester I kind of felt like I was a part of the community, kind of, but I don't think it was brought into this semester." Student E said:

> There is the familiarity of people in class that reminds us we are in a community, but I don't know that it actually feels like much of a community, we feel good and comfortable going to people in our class for help if we need it, so we sort of take it upon ourselves to do stuff outside of class.

Even though the professors seemed to be available and helpful to students during their office hours, the participants did not feel satisfied with the connection to the faculty and staff. Student B stated, " it's a small department but they don't seem too interested in getting to know us besides teaching us." Student E explained that when the professors came in to talk about different areas of math in the MLC class it was cool to see different types of teaching, "but they didn't seem to open to staying to talk after their presentation." Student C provided an example:

> I am math and education major, I don't really feel connected to the math department or professors or anything, I do kind of feel connected to the College of Education a little more because they had this thing where they had food and it was like a meet and greet with the dean, I guess that's what you could call it, but to talk to the dean of a college is pretty cool, it made the staff feel more personable and approachable to talk about different things other than asking a question after class or something.

The final least satisfying aspect of the MLC had to do with the MLC class. There were aspects that the participants found satisfying but the two that they found least satisfying were the areas presented in the class and that it ran the same time as the colloquium. Student C said, "as a math education major, which I know that's what I

want to do for my career, I don't think I had to go to every meeting that was about crazy math things." Student B stated, "I wish there were things presented that we need to do in life, like taxes and stuff, like real world applications would be useful." The other least satisfying aspect within the class had to do with the overlap of time when the math colloquiums are offered. Student E said, "I actually missed the first meeting because I saw an email about the math colloquium that was being offered the same time and I thought it was something for the MLC, it was very interesting." Student C said, "the people who would go to the colloquiums like me, couldn't go because we had to go to the math learning community class."

Research question 3. What recommendations do MLC participants make about improving the learning community?

Table 4.9 presents the recommendations the MLC participants made about improving the MLC. The three main themes are to improve the social activities, change some aspects of the MLC class, and to incorporate more classwork during class time. The members were asked how their overall satisfaction with the MLC could be improved. Student B suggested that it start with orientation, "at orientation I had one other math major in my group, I wish there was more, I know you can't make all math majors go to the same orientation but maybe have a orientation leader who is a math major." Student E also responded similarly:

> I think if there was an event like maybe early in the fall semester like a meet and greet would help, like more than just icebreakers. I also think the whole idea of

orientation is to meet people maybe in the same major, but my week there was a lot, I did meet one, and I know someone who was in a different group, I just think we should be paired together more.

Table 4.9

Recommendations to Improve the MLC (N=5)

Theme	Subtheme	Frequency	Rank
Social Activities	Meet and greet Orientation	5	1
MLC Class	Make it a time to study together or do homework Continue into the spring semester	5	1
Classwork	Being able to work together more	2	2

Student C discussed having a meet and greet before each semester, because then there is time to mingle but then in the second semester mingle with groups of friends, and spend time during the class to play math games.

The students were asked how their overall satisfaction with the MLC could be improved. In contrast with the idea of more social activities, the participants thought improving the MLC class would improve the overall MLC. Student D said, "I think using the class as kind of a study hall sometimes could be beneficial." Student E also stated, "I think the presentations should still be a part of the class but also make it a space where we can study for like mid terms and finals together, or utilize time to ask the

professor questions." Four of the five participants thought it would be beneficial if the class continued into the spring semester. Student C said, "maybe not meet every week but every other week." Student A said, "I think if it was a space where we could hang out, eat and play games or something it would be more beneficial, I do think some of the presentations are good like the academic advising one but maybe cut out some, or continue it into the spring and spread out the presentations that way."

The last recommendation that was brought up was about working together in class. Student A said:

> I wish there was more time in class given to us to work together, I think sometimes I sit there and if I'm not understanding how the professor is explaining it I want to ask a classmate but have to wait until after class.

Student D also said, "when I'm sitting in class I understand how the professor solves a problem but when I get home later to do it by myself I don't fully get it or kind of forget, so I think being able to practice right away would be good." Student B explained he is the type of learner through discussion so he said, "I think being able to talk to classmates during class would be beneficial."

Finally, the students were asked to describe how their participation in the MLC improved their overall sense of belonging at Rowan. Student E said, "I think it improved my sense of belonging a little bit but ultimately it was my decision to get involved, so I'm

not sure if it did or did not improve it." Student C answered, "I mean I don't know if it helped me that much, like feeling a sense of belong at Rowan." Student A said:

> I think I feel neutral about this question….I feel like a part of Rowan but like I don't know that this particular community had like much effect on it. I honestly don't know, I think if there was more like social stuff going I would really be able to answer.

Chapter V

Summary, Discussion, Conclusions, and Recommendations

Summary of the Study

This thesis investigated the Math Learning Community (MLC) at Rowan University. This study was conducted at Rowan University main campus located in Glassboro, New Jersey, during the spring semester of 2016. The survey sample consisted of freshman math majors who were members of the MLC. The participants were also enrolled in the MLC class that was offered for the first time during the fall 2015 semester. During the spring 2016 semester, there were three math courses that were open to only members who were a part of the MLC. These classes consisted of the following: Discrete Math, Calculus I, or Calculus II. This study used a mixed method, 36 out of the 40 MLC members took part in the survey aspect of the study. The second part of the study was the interview portion, five students from the MLC volunteered to participate in the interviews.

Surveys were distributed in March 2016, in the Discrete Math class after permission was given from the professor and 33 surveys were collected. Additionally, a meeting a was held in the math department by the academic advisor where three other surveys were completed. Out of the 40 MLC students 36 surveys were collected in total. The survey consisted of demographic questions and Likert scale items.

The demographic questions and Likert scale items were analyzed using SPSS to determine the frequency in responses, percentages, mean, and standard deviation. In addition to the surveys, five students volunteered to partake in interviews about their

experience in the MLC. The interviews took place at the convenience of the student's schedules but all took place on campus; four in Savitz Hall, and one in the students' residence hall lounge during the last week in March 2016. The interviews asked questions about the students' satisfaction in the MLC, their most and least satisfying aspects of the MLC, and suggestions on how the community could be improved. The interviews were recorded and later transcribed for analysis. Content analysis was used to analyze the interview data. Through transcribing the interviews, key words and phrases were identified and highlighted then arranged into themes to find patterns of agreement and disagreement.

Discussion of Findings

Schlossberg's Transition Theory (2011) suggests that the first year at school can be a difficult transition for students because this could be their first time living away from home. Schlossberg (2011) stressed that understanding transitions is important because there are different types of transitions including: anticipated transitions which are major life events that are usually expected. Examples include: graduating from high school or college, a first job, starting a career, getting married, or becoming a parent. In this case, a big life event such as going away to school for the first time can be different from person-to-person. Schlossberg's Transition Model (2011) explains ways to help understand the transition while discussing ways to cope. Although first-year students can anticipate that college will be harder than high school academically and a different environment for the student socially can be tough for some to prepare which can make the adjustment more difficult. Through quantitative data analysis, the survey showed that 24 students out of

36 (66.7%) strongly agreed or agreed that it was easy for them to adjust to college academically. This is a positive outcome considering the intensity of being a math major. The students seemed to have adjusted easier socially as 29 out of the 36 students (80.5%) strongly agreed or agreed that it was easy to adjust to college socially. The reason for the positive responses could be a result of the resources available to the students in the MLC.

Schlossberg (2011) designed the four Ss to help students to cope during their transition period. The four Ss are: situation, self, support, and strategies (Schlossberg, 2011). If the student can recognize the change they are going through and utilize support that is available it can ease the transition. MLC members have many areas of support available, the main one being a part of a community for math majors. Moreover, there are other resources available such as: tutoring services, professor's office hours, and working with classmates. Through content analysis, during the interviews all five participants mentioned going to their professor outside of class for help, and found that it was beneficial and went more than once. The survey data supported this finding by showing that 30 students (83.3%) strongly agreed or agreed that there were tutoring services readily available. The faculty made themselves available after class during office hours to help resulting in 29 students (82.9%) strongly agreeing or agreeing with the statement.

Another form of support available to the students was through classmates in and outside of the classroom. The most common theme related to the most satisfying aspect of the MLC was the idea of familiar faces in their classes. Twenty-nine students (80.5%)

strongly agreed or agreed that they considered some students in their major to be their friend. The members also reported that 28 students (77.8%) strongly agreed or agreed that they spent time with classmates outside of class, while this is a slightly lower number, 19 students (83.4%) strongly agreed or agreed that they felt comfortable speaking in class. Twenty-one students (58.4%) strongly agreed or agreed that they had built strong relationships with peers in the College of Science and Mathematics. The interview participants all mentioned the benefit of having friends in the major, but some wished the MLC class continued into the spring 2016 semester as three mentioned that they felt the community aspect fell off in the spring and wished there was something besides just the MLC course sections. There were also 27 students (75%) who strongly agreed or agreed that they had a network of supportive peers in their major.

In contrast with the idea of easing the transition period for first time college students, Tinto (1975) studied why students leave college. He created the Student Integration Model which helps to explain that when a student becomes integrated academically and socially the student commits to attaining their desired degree. Academically, the MLC members transitioned well into the math program; 25 students (69.4%) strongly agreed that the major requirements are clear and reasonable. During the interviews, a common satisfying theme that came up was about the professional advisor Mike Schillo coming to the MLC class to discuss the classes they should be taking and making himself available to go over what their next four years would look like.

In addition to feeling connected to the school through their major, Tinto (1993) explains that it is important for the student to feel connected to academic activities or

programs offered at the institution. The MLC is designed so first-year math majors feel they are a part of a community, a little over half of the students surveyed (52.8%) strongly agreed or agreed that they felt like they were a part of the math community and 52.7% strongly agreed or agreed they felt included in the math department. Looking at the same two questions, which were also asked in Flynn's (2012) survey on the Engineering Living Learning Community (ELLC), 90.9% strongly agreed or agreed that they felt like they were a part of the engineering community, while 77.3% strongly agreed or agreed that they felt included in the engineering department. The higher numbers could be contributed to the frequency of social activities going on within the community. The MLC students reported that the social activities was one of the most least satisfying aspects of the community. This was confirmed in the interviews, although the students reported the benefits from the MLC class in the fall 2015 semester, they felt there was not enough social activities going on outside of the classes that brought them together. The students explained that the class would be more beneficial if there was a "meet and greet" in the beginning, more time given to the students to work together on homework, preparing for exams, or even just time to hang out and play math games.

Tinto (1993) describes the idea of feeling connected to social activities at a college or university is an integral part of a first-year students experience. The subjects reported higher percentages in regards to their connectedness to the campus, 33 students (91.7%) agreed that students are made to feel welcome on this campus. In addition, 32 students (88.9%) strongly agreed or agreed that it is an enjoyable experience to be a

student on this campus. Lastly, 30 students (83.3%) strongly agreed or agreed that they felt a sense of belonging at Rowan. The math learning community class in the fall 2015 semester ran the same time as the math colloquium, and four of the five participants were interested in going to the colloquiums but did not because they had to go to the math learning community class, this was a way to possibly get involved on campus or meet other math majors they did not have the opportunity to go because of the conflict.

Flynn's (2012) similar study was conducted on the Engineering Living Learning Community (ELLC) at Rowan, her results showed that overall the students felt more connected to the community. The reason for a higher percentage in the ELLC could be because there has been a previous study done by Zobel (2011), and it is possible that after that study done in 2011 there was time to improve the ELLC before Flynn conducted her study. The ELLC had more social activities than the MLC members reported, which could also be a reason for the differences.

Overall, 83.3% of the MLC members agreed that they are satisfied with their experience in the math department, 82.9% agreed they are overall satisfied with their experience at Rowan, and 75% agreed they are satisfied in their choice of major. A total of 88.9% agreed that they intend to continue their education in math, 86.2% agreed that they intend to continue their education at Rowan, and 88.9% are confident in their ability to complete their degree. All MLC members reported that they were least satisfied with the amount of social activities or events run by the MLC and wish there were more.

Conclusions

The results of this study suggest that participation in the MLC positively impacted students' transition into college, their connectedness to Rowan, their peer relationships, and overall satisfaction with the university. Schlossberg (2011) explains that when someone one goes through a transition, the better they cope with the transition makes the transition less stressful and they can commit to their goals. Studies have shown that when a student feels connected to their university academically as well as socially, through activities offered on campus, building relationships with students and faculty, and being involved increases their commitment to staying at school to receive their desired degree which in return benefits the school with increased retention rates (Tinto, 1993).

Overall this study shows that the first-year students benefitted from participating in the MLC. Overall the students reported their transition to college was relatively easily. A total of 80.5% of the MLC members reported that they strongly agreed or agreed that their transition to college socially was easy, and 66.7% of the MLC members reported that they strongly agreed or agreed that it was easy for them to adjust to college academically. In Flynn's (2012) study of the ELLC 81.8% of the students felt it was easy for them to adjust to college socially while 77.3% felt it was easy to adjust to college academically. In regards to the statement asking if the students felt that there was an adequate number of services available to help with career planning, a total of 58.3% of the MLC members strongly agreed or agreed, while 61.9% of the ELLC reported that they strongly agreed or agreed. The ELLC has had prior studies conducted and has been

more established over the years which could be a possible reason why there were higher percentages related to the students adjustment to college academically.

In regards to the MLC members connectedness to the university a total of 91.7% of the MLC members strongly agreed or agreed that the students are made to feel welcome on this campus, 83.3% strongly agreed or agreed that there is a sense of belonging at Rowan, and 88.9% strongly agree or agreed that it is an enjoyable experience to be a student on this campus. Looking at Flynn's (2012) results showed that 86.3% of the ELLC members strongly agreed or agreed that the students are made to feel welcome on this campus, 86.4% strongly agreed or agreed that there is a sense of belonging at Rowan, and 95.5% strongly agreed or agreed that it is an enjoyable experience to be a student on this campus. Overall the results showed that participating in the MLC impacted their connectedness to Rowan.

The peer interaction aspect is where the students in the MLC and ELLC differed the most. A total of 80.5% of the MLC members strongly agreed or agreed that they consider some of the students in their major to be their friend while 100% of the ELLC strongly agreed or agreed to that statement. A total of 77.8% of the MLC members strongly agreed or agreed that they spent time with classmates outside of class while 95.4% strongly agreed to agreed that they spent time with classmates outside of class. A total of 69.4% of the MLC members found it was easy to make friends in their major, and 75% of them felt like they have a network of supportive peers in their major. Again, The ELLC has been more established and studies have investigated the same areas prior.

Overall, the MLC members are confident in their ability to complete their degree in math, they want to continue their education in math and at Rowan University. The faculty in the Math department has made themselves available to students outside of class and the MLC members have taken advantage of this opportunity.

The most satisfying aspect of the MLC is the fact that there are so many familiar faces in their classes, during the interviews this was the most common theme. The students reported that they felt comfortable with the students in their class. The members reported that the MLC class in the fall 2015 semester was helpful but could have been more helpful by adding in more social activities, and to use the time to study together or ask the professors questions. In addition the MLC members main ideas to improve the learning community were to add in more social activities, continue the MLC class into the spring semester, and have more time to work together in the MLC class and class in general.

Recommendations for Practice

1. There should be more social activities implemented in to the MLC.
2. There should be a MLC class meeting that is dedicated to the students being able to mingle and get to know one another.
3. The math learning community class should include meetings where students can play math games and socialize, study together for exams, do homework, and use time to ask the professors any questions the student may have.

4. The math learning community class should be continued into the spring semester.
5. There should be math majors grouped together during orientation to give students a chance to meet.

Recommendations for Further Research

1. Future studies should be conducted on the MLC programs at Rowan University and compared to this study to find patterns.
2. Freshman math majors should be surveyed in the first semester to get a better idea of how they feel during the their transition to college.
3. Sophomore math majors should be surveyed to find out about their experience when they are not a part of the community.
4. MLC participants should be tracked throughout their time at Rowan to measure retention.

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Appendix A

MLC Survey Instrument

87

Rowan University

I am/we are inviting you to participate in a research survey entitled First-year Students: Measuring the effectiveness and overall impact of participating in a mathematic learning community We are inviting you because you are a first year math student who is involved in the math learning community. In order to participate in this survey, you must be 18 years or older.

The survey may take approximately 10 minutes to complete. Your participation is voluntary. If you do not wish to participate in this survey, do not respond to this paper survey. The number of subjects to be enrolled in the study will be 46.

The purpose of this research study is to research the effectiveness and impact of participating in a math learning community, and how it has enhanced your transition to the Rowan Community.

Completing this survey indicates that you are voluntarily giving consent to participate in the survey.

There are no risks or discomforts associated with this survey. There may be no direct benefit to you, however, by participating in this study, you may help us understand how participating in the math learning community has impacted the students first year at Rowan University.

Your response will be kept confidential. We will store the data in a secure computer file and the file will destroyed once the data has been published. Any part of the research that is published as part of this study will not include your individual information. If you have any questions about the survey, you can contact me/or the researcher at the address provided below, but you do not have to give your personal identification.

Lindsay Barrie Barrie01@rowan.edu

Dr. Burton Sisco Sisco@rowan.edu

Department of Educational Services and Leadership

College of Education
James Hall, 3rd Floor
201 Mullica Hill Road
Glassboro, NJ 08028

856-256-4755 phone
856-256-5677 fax

Rowan University

Your thoughtful and honest responses to these questions are very important. Thank you for participating.

Please circle, check, or fill in the blacks of those that apply to you.

1. I am: Male____ Female____

2. Ethnic background:
   ____Black/African American
   ____Native American
   ____Asian/Pacific Islander
   ____White/Caucasian
   ____Hispanic or Latino
   ____Other:_____

3. Highest level of Mother's education:
   ____Elementary
   ____Some high school/no diploma
   ____High school diploma/equivalent
   ____Some College/no degree
   ____Associate's degree (2 yr. degree)
   ____Bachelor's degree (4 yr degree)
   ____Master's degree
   ____Doctoral Degree

4. Highest Level of father's education:
   ____Elementary
   ____Some high school/no diploma
   ____High school diploma/equivalent
   ____Some College/no degree
   ____Associate's degree (2 yr. degree)
   ____Bachelor's degree (4 yr. degree)
   ____Master's degree
   ____Doctoral Degree

5. The level of education I hope to complete is:
   ____4 year college degree (Bachelor's)
   ____Master's degree
   ____Doctoral Degree

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6. My GPA in high school was:
   ____4.0+
   ____3.5-4.0
   ____3.0-3.5
   ____2.5-3.0
   ____2.0-2.5
   ____1.5-2.0
7. I am currently a:
   ____Freshman ____Sophomore

8. I have at least one parent who has a career in a STEM field:
   ____Yes ____No

9. I am a participant of the Math Learning Community (MLC):
   ____Yes ____No

10. I live with a math major:
    ____Yes ____No

Please indicate your level of agreement with the statements by circling the number in the box you feel is accurate.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
11. I feel included in the Math Department.	5	4	3	2	1
12. I consider some students in my major to be my friends.	5	4	3	2	1
13. I spend time with classmates outside of class.	5	4	3	2	1
14. It was easy for me to adjust to college academically.	5	4	3	2	1
15. It was easy for me to adjust to college socially.	5	4	3	2	1
16. I was easily able to meet people and make friends.	5	4	3	2	1

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17. I feel a sense of belonging at Rowan University.	5	4	3	2	1
18. I often study with other students in my major.	5	4	3	2	1
19. I interact with my teachers outside of the classroom.	5	4	3	2	1
20. I feel comfortable approaching my teachers outside of class.	5	4	3	2	1
21. I feel comfortable asking questions in class.	5	4	3	2	1
22. I feel comfortable speaking in class.	5	4	3	2	1
23. I intend to continue my education at Rowan University.	5	4	3	2	1
24. I intend to continue my education in math.	5	4	3	2	1
25. I am confident in my ability to complete my degree.	5	4	3	2	1
26. I have built strong relationships with peers in the College of Science and Mathematics.	5	4	3	2	1
27. My teachers care about me as an individual.	5	4	3	2	1
28. It is easy to make friends with students in my major.	5	4	3	2	1
29. It is easy to make friends with students outside of my major.	5	4	3	2	1
30. Faculty are fair and unbiased in their treatment of individual students.	5	4	3	2	1
31. It is an enjoyable experience to be a student on this campus.	5	4	3	2	1
32. Tutoring services are readily available.	5	4	3	2	1
33. I feel a sense of pride about my campus.	5	4	3	2	1
34. There are a sufficient number of weekend activities for students.	5	4	3	2	1
35. Students are made to feel welcome on this campus.	5	4	3	2	1
36. I know how to get involved in campus organizations.	5	4	3	2	1
37. There are adequate services to help me with career planning.	5	4	3	2	1
38. Faculty take into consideration student differences as they teach a course.	5	4	3	2	1
39. The requirements for my major are clear and reasonable.	5	4	3	2	1
40. The quality of instruction I receive in most of my classes is excellent.	5	4	3	2	1

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41. I generally know what's happening on campus.	5	4	3	2	1
42. Faculty are usually available after class and during office hours.	5	4	3	2	1
43. Overall, I am satisfied with my experience at Rowan.	5	4	3	2	1
44. I am satisfied with my experience in the Math Department.	5	4	3	2	1
45. I am satisfied in my choice of major.	5	4	3	2	1
46. I have a network of supportive peers in my major.	5	4	3	2	1
47. I feel like I am part of the math community.	5	4	3	2	1

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Appendix B

MLC Interview Protocol

Interview Questions

Math Learning Community Experience

1. Describe our overall satisfaction with the Math Learning Community experience. How could your overall satisfaction with the Math Learning Community be improved?
2. Describe your overall satisfaction with the social activities in the Math Learning Community
   How could your overall satisfaction with the social activities be improved?
3. What was the most satisfying aspect of your experience in the Math learning community?
4. What was the most disappointing aspect for your experience with the Math learning community?

University Experience

5. Describe how your participation in the Math Learning community improved or did not improve your overall sense of belonging at Rowan University.
6. Describe how your participation in the math learning community enhanced your opportunities to interact with Rowan Math faculty and staff.
7. Describe how your participation in the math learning community enhanced your connection with math learning community peers.
8. Describe how your participation in the math learning community enhanced your connection with non-math learning community peers.

Appendix C

eIRB Approval Notice

Rowan University eIRB: Study Approved

eIRB@rowan.edu

Rowan University

** This is an auto-generated email. Please do not reply to this email message.
The originating e-mail account is not monitored.
If you have questions, please contact your local IRB office **

DHHS Federal Wide Assurance Identifier: FWA00007111
IRB Chair Person: Harriet Hartman
IRB Director: Sreekant Murthy
Effective Date: 2/26/2016

eIRB Notice of Approval

STUDY PROFILE

Study ID: Pro2015000731
Title: FIRST-YEAR STUDENTS: INVESTIGATING THE IMPACT OF PARTICIPATING IN A MATHEMATIC LEARNING COMMUNITY

Principal Investigator:	Burton Sisco	Study Coordinator:	None
Co-Investigator(s):	Lindsay Barrie	Other Study Staff:	None
Sponsor:	Department Funded	Approval Cycle:	Twelve Months
Risk Determination:	Minimal Risk	Device Determination:	Not Applicable
Review Type:	Expedited	Expedited Category:	6 7
Subjects:	40		

CURRENT SUBMISSION STATUS

Submission Type:	Research Protocol/Study	**Submission Status:**	Approved
Approval Date:	2/26/2016	**Expiration Date:**	2/25/2017

Pregnancy Code:	No Pregnant Women as Subjects Not Applicable	**Pediatric Code:**	Not Applicable No Children As Subjects	**Prisoner Code:**	Not Applicable No Prisoners As Subjects

Protocol:	Thesis Survey Focus Group Questions Protocol	**Consent:**	There are no items to display	**Recruitment Materials:**	There are no items to display

*** Study Performance Sites:**

Glassboro Campus	College of Education, Education Hall

ALL APPROVED INVESTIGATOR(S) MUST COMPLY WITH THE FOLLOWING:

1. Conduct the research in accordance with the protocol, applicable laws and regulations, and the principles of research ethics as set forth in the Belmont Report.

2. **Continuing Review:** Approval is valid until the protocol expiration date shown above. To avoid lapses in approval, submit a continuation application at least eight weeks before the study expiration date.

3. **Expiration of IRB Approval:** If IRB approval expires, effective the date of expiration and until the continuing review approval is issued: **All research activities must stop unless the IRB finds that it is in the best interest of individual subjects to continue. (This determination shall be based on a separate written request from the PI to the IRB.) No new subjects may be enrolled and no samples/charts/surveys may be collected, reviewed, and/or analyzed.**

4. **Amendments/Modifications/Revisions** : If you wish to change any aspect of this study, including but not limited to, study procedures, consent form(s), investigators, advertisements, the protocol document, investigator drug brochure, or accrual goals, you are required to obtain IRB review and approval prior to implementation of these changes unless necessary to eliminate apparent immediate hazards to subjects.

5. **Unanticipated Problems**: Unanticipated problems involving risk to subjects or others must be reported to the IRB Office (45 CFR 46, 21 CFR 312, 812) as required, in the appropriate time as specified in the attachment online at: http://www.rowan.edu/som/hsp/

6. **Protocol Deviations and Violations** : Deviations from/violations of the approved study protocol must be reported to the IRB Office (45 CFR 46, 21 CFR 312, 812) as required, in the appropriate time as specified in the attachment online at: http://www.rowan.edu/som/hsp/

7. **Consent/Assent**: The IRB has reviewed and approved the consent and/or assent process, waiver and/or alteration described in this protocol as required by 45 CFR 46 and 21 CFR 50, 56, (if FDA regulated research). Only the versions of the documents included in the approved process may be used to document informed consent and/or assent of study subjects; each subject must receive a copy of the approved form(s); and a copy of each signed form must be filed in a secure place in the subject's medical/patient/research record.

8. **Completion of Study:** Notify the IRB when your study has been stopped for any reason. Neither study closure by the sponsor or the investigator removes the obligation for submission of timely continuing review application or final report.

9. The Investigator(s) did not participate in the review, discussion, or vote of this protocol.

10. Letter Comments: *There are no additional comments.*

—

Study.PI Name:
Study.Co-Investigators:

Appendix D

Permission to use Flynn's (2012) Instruments

RE: Thesis survey

Grant, Maggie Flynn <maf212@pitt.edu>

Tue 12/22/2015 9:11 AM

To:Barrie, Lindsay Frances <barrie01@rowan.edu>;

Hi Lindsay,

You have found the right person! Thanks for your interest in my thesis. Of course you can use my survey in your research!
Best of luck to you. Please tell Dr. Sisco and Mary Beth that I say hi.

Happy Holidays,

Maggie Flynn Grant

External Relations Coordinator / University of Pittsburgh / Institutional Advancement
Phone: 412.648.0234 / Fax: 412.624.3911 / maf212@pitt.edu / 140 Alumni Hall / 4227 Fifth Avenue/Pittsburgh, PA 15260
www.giveto.pitt.edu

-----Original Message-----
From: Barrie, Lindsay Frances [mailto:barrie01@rowan.edu]
Sent: Monday, December 21, 2015 11:31 PM
To: Grant, Maggie Flynn <maf212@pitt.edu>
Subject: Thesis survey

Hi,

Ms. Flynn,

My name is Lindsay Barrie and I am in my second year of the Master's in Higher Education Administration at Rowan University. I am writing my thesis on First-Year Students: Measuring The Effectiveness and Overall Impact of Participating in a Ma thematic Learning Community. I found your study to be very useful when writing ym chapters 1-3 and would like to model my survey off of yours if you allow this. I would be changing all of the engineering to mathematics. I hope you are the right Margaret Flynn, I tried emailing you on your Rowan email but it did not work.

Please feel free to contact me via cell phone or email, Thank you, Lindsay Barrie 609 744 0210

Sent from my iPhone

Appendix E

Logical Analysis of Written Data

RULES AND PROCEDURES FOR LOGICAL ANALYSIS OF WRITTEN DATA

The following decisions were made regarding what was to be the unit of data analysis (Sisco, 1981):

1. A phrase or clause will be the basic unit of analysis.
2. Verbiage not considered essential to the phrase or clause will be edited out --e.g., articles of speech, possessives, some adjectives, elaborate examples.
3. Where there is a violation of conventional syntax in the data, it will be corrected.
4. Where there are compound thoughts in a phrase or clause, each unit of thought will be represented separately (unless one was an elaboration of the other).
5. Where information seems important to add to the statement in order to clarify it in a context, this information will be added to the unit by parentheses.

The following decisions were made regarding the procedures for categorization of content units:

1. After several units are listed on a sheet of paper, they will be scanned in order to determine differences and similarities.
2. From this tentative analysis, logical categories will be derived for the units.
3. When additional units of data suggest further categories, they will be added to the classification scheme.
4. After all the units from a particular question's responses are thus classified, the categories are further reduced to broader clusters (collapsing of categories).
5. Frequencies of units in each cluster category are determined and further analysis steps are taken, depending on the nature of the data-- i.e. ranking of categories with verbatim quotes which represent the range of ideas or opinions. (p.177).

Sisco, B. R. (1981). *A study of the attitudes of selected academics and selected decision-makers toward adult learners.* (Unpublished doctoral dissertation). Syracuse University, Syracuse, NY.