The Impact of Structural Supports on the Success of Students of Color in the K-16 Educational System

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Collective Abstract

This collective dissertation contains the efforts of two practitioners in the field of education who possess a shared vision for designing student experiences with the mission of preparing all students for success in secondary and post-secondary education. The researchers believed that by creating structural supports for students in underserved populations, these same students will increase their educational attainment and access to long-term career opportunities. With successful completion of postsecondary education and with increased career opportunities, students can improve their lives, their families’ lives and the lives of members of their community.

Many students struggled on their educational journeys from elementary, middle, high school, and throughout college. Those most affected were derived from communities that were traditionally marginalized by the American education system, including many African-American students living in poverty and first-generation college students. The researchers believed that attention should be given to building supports that address the social, academic, and financial needs of students which are necessary for students to achieve academic mastery and post-secondary educational attainment. Without strategies to support students in building new skills, nurturing their talents, and maneuvering life’s challenges, many were unable to reach these goals.

The researchers sought to find solutions to inequities experienced by underrepresented groups in the educational system by investigating the impact of interventions at two key, transition times in students’ educational experiences. The first study examined the transition to middle school with a focus on mathematics, and the second study addressed the transition to a four-year university, with attention paid to
technology and efforts of increasing community cohesion. The proposed studies will explore barriers faced by students from low-income backgrounds within educational settings. The studies are uniquely connected because they will examine barriers faced by marginalized groups in education and will offer solutions to remove these barriers. This co-authored dissertation offered a unifying framework in which academic and social support practices were closely associated with an increase in academic achievement and educational attainment. Although each study within the dissertation was anchored in its own axiom of the continuum, that was the continuum of educational equity in the kindergarten through high school sector. Though the points of interest represented a diverse cluster of perspectives, experiences, and communities, a single thread connected both studies: Each study investigates the impact of Structural Supports on the Success of Students of Color in the K-16 Educational System.

By implementing and examining targeted Structural Supports, the researchers found these efforts to have a significant, positive impact on outcomes at both the middle school and post-secondary level. Through the studies, researchers saw an increase in sense of agency, self-efficacy, advocacy, and grit amongst marginalized students.
Collective Introduction

The researchers sought out solutions to inequities experienced by under-represented groups in the educational system by investigating the impact of interventions at two key transition times in students’ educational experience. The first study examined the transition to middle school with a focus on mathematics, and the second study looked at the transition to a four-year university with attention paid to technology. The studies explored barriers faced by students from low-income backgrounds within educational settings. The studies were uniquely connected, because they connected barriers faced by marginalized groups in education and offered solutions to remove these barriers.

The two studies were situated within a student’s trajectory based upon access to pedagogical experiences that promoted student ownership in middle school and later programs that supported first-generation college students to have a successful transition to college through technology opportunities. Both of these studies aimed at students from low-income backgrounds and had the ability to yield results to inform educators on best practices to prepare students for success in mathematics and technology. Graduating from high school, successfully transitioning to and graduating from college have been important steps in a student’s educational career. However, completing these steps was only the beginning of one’s career journey. The obstacles faced by low-income students often have not disappeared over time. In the two studies, the two researchers sought to understand obstacles presented in the field of education that prevented marginalized groups from attaining success and to design and to study interventions that could have contradicted the barriers.
The Impact of Structural Supports in Education.

Front Seat Learning: Using a Student-Led Classroom Mathematics Model to Increase Mathematical Mastery and Student Ownership

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Abstract

In reviewing the trends of math proficiency nationally, African-American students consistently scored much lower than Asian-American and White students (ACT, 2014). Mathematics underachievement in the kindergarten through 12th grade sectors affected students’ preparedness for college and a successful career (ACT, 2014). The researcher suggested that by increasing African American students’ mathematical mastery and ownership, students improved their college and career readiness, thereby increasing long-term career opportunities to improve their lives, their families’ lives, and the lives of members of their communities. The purpose of the sequential explanatory mixed-methods study with a quasi-experimental design was to examine the effect of student-led pedagogy on mathematics achievement and student ownership. The researcher explored the effects of student-led classrooms using the program, Front Seat Learning, as a way to improve mathematics achievement in urban youth, thereby contributing to the narrowing of the achievement gap and potentially impacting the college and career readiness gap. The overarching research question for the study was: What are the effects of the Front Seat Learning program on math achievement and student ownership? The researcher conducted the study in a Title I middle school in Saint Louis, MO, during the 2018-2019 School Year.

The researcher designed a comparative experiment using a pre- and post-analysis with Renaissance Learning’s STAR assessment. The control group received teacher-led instruction and the experimental group received the intervention, Front Seat Learning, as a student-led instruction. Both groups were tested using Renaissance Learning’s STAR assessment for the independent variable, which in this case was the student-led classroom
model Front Seat Learning. Both the experimental group and the control group were administered the post to review and to understand the effects of manipulating the independent variable on the dependent.

Data was collected from assessments, interviews, and surveys over nine months then analyzed for themes and connections to the research question. The findings for this study indicated that Front Seat Learning was a beneficial intervention in both mathematical mastery and student ownership for African-American middle school students in low-income urban areas students.
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Chapter 1: Introduction

A phrase for many educators from time and time over the years has been “I hate math.” This attitude of apathy and inattentiveness toward the subject of mathematics has affected students’ academic achievement (Rich, 2015). What have been the reasons so many students have felt this way? In speaking with other educators, many researchers have noticed the same pattern over the years (Rich, 2015). In the state of Missouri, less than 50% of the students in grades three through eight took the Missouri Assessment Program (MAP) in the Spring of 2016 and scored Proficient or Advanced in Math (Missouri Department of Elementary and Secondary Education, 2019). Thus, more than half of Missouri’s students scored Basic or Below Basic on the Math MAP test (Missouri Department of Elementary and Secondary Education, 2019). Statistics across the nation mirrored Missouri’s students’ academic performances in mathematics (Pajares & Miller, 1994). A recent examination of nationwide student performance on standardized assessments provided evidence of waning science and reading scores and a steady decline in the area of mathematics (Rich, 2015).

Over the last 20 years, one student subgroup that has continued to perform poorly on standardized assessments has been African-American students (Lee & Ransom, 2011). The poor performance of African-American students has been researched and documented (Lee & Ransom, 2011; Tate, 1997). Tate (1997) suggested students consistently have scored lower than Asian-American and Caucasian-American students. Mathematics underachievement in the kindergarten through 12th-grade sectors affected students’ preparedness for both college and successful careers (Tate, 1997). Despite advances in technology, medicine, and most other areas of American society, public
education has stayed frozen in time (Lee & Ransom, 2011). Desks formed in arrays, with
teachers lecturing in the front of the room using textbooks and worksheets (Lee &
Ransom, 2011). Teachers utilizing outdated curriculum materials, one-size-fits-all pacing
guides, with student discourse and collaboration seen as a rarity (Kena et al., 2016). More
recently, the trend in education has been centered around student-led classrooms and
moving from the more traditional teacher-led model where the teacher is distributing
information (Kena et al., 2016).

The problem with teacher-centered teaching has been that most of the information
given by the teacher could not have been stored in long-term memory (Sousa, 2009).
Teachers were busy teaching, without realizing that many students were not making
meaningful connections which lead to understanding and application (Sousa, 2009). As
an educational researcher, Sousa (2009) wrote, “Newly acquired knowledge is stored in
the brain’s long-term memory when it has some type of meaning to the learner” (p. 105).
Effective teachers encouraged students to develop their own understanding, to question
ideas, and to seek answers divergently (Browne & Keeley, 1998). Successful teachers
focused their attention on improving students’ agency, student efficacy, and grit, so that
students learned to be successful leaders in their classrooms, in colleges, in their future
careers, and in their communities (Christopoulos, Lakioti, Pezirkianidis, Karakasidou, &
Stalikas, 2018).

Statement of the Problem

In recent years, African-American students in public schools have not been
considered college and career ready in math as their white counterparts, according to the
latest test scores from the American College Testing (ACT, 2012). This
underachievement was not exclusive to academic skills (ACT, 2012). Additionally, too often African-American students were not prepared to successfully navigate life in academia after high school because they did not possess important student ownership behaviors (Connell, Spencer, & Aber, 1994). A study conducted by the ACT (2017) reported that while student scores increased by four points in English Language Arts (ELA) to 31% and two points in math to 27%, racial achievement gaps persisted and, in some cases, widened over time. In America’s capital, the District of Columbia Public Schools, there was a 50% difference in performance in students in the Northwestern section labeled Ward Three, which was comprised of mostly affluent white residents, versus students who lived in the mostly poor and black South East’s Ward 7 (ACT, 2017).

At the kindergarten through 12th-grade school level, the variance in math performance was seen throughout the elementary level (ACT, 2017). For the most part, African-American students from high poverty areas entered kindergarten without basic math skills, and few of these students were counting to 100 or able to recognize shapes (ACT, 2017). Consequently, the same students later left middle school still unprepared and lacking the skills necessary to be successful in high school mathematics courses (Balfanz, Ruby, & Maclver, 2006). National data indicated that student achievement declined as these students progressed from fourth to eighth grade, and African-Americans students from poor neighborhoods with failing schools, in particular, were at the highest risk for this descent (Balfanz et al., 2006). Pelavin and Michael (1990) also found that many times African-American students from poor areas were inadequately prepared during middle school and ended up being unsuccessful in high school and lacked opportunities that fostered lifelong success. In this study, the researcher proposed to
examine the methods of instruction that increased student achievement in math and student ownership of their learning.

**Purpose of the Study**

The purpose of this study was that the researcher sought to add to previous literature by using a sequential explanatory mixed-methods study with a quasi-experimental design to examine the effect of the student-led pedagogy on mathematics achievement and student ownership. The researcher believed that by increasing African-American students’ mathematical mastery and ownership of learning skills, students would improve their college and career readiness, thereby increasing long-term career opportunities in order to improve their lives, their families’ lives and the lives of their communities. The researcher used quantitative analysis to determine the results of implementing a mathematics student-led classroom using statistical analysis of scores from the STAR Math Assessment data of sixth-grade students at Berkeley Middle School, which was located in the Ferguson-Florissant School District during the 2018-2019 School Year. The researcher used qualitative analysis to further understand the results and to analyze to reveal possible explanations of the impact of implementing a mathematics student-led classroom. The researcher explored the effects of student-led classrooms using the program, Front Seat Learning, or FSL, as a way to improve the mathematics achievement in youth, thereby contributing to the narrowing of the achievement gap and potentially impacting the college and career readiness gap.

**Research Questions, Hypotheses, and Null Hypotheses**

The overarching research question for the study was the following: What are the effects of the Front Seat Learning program on math achievement and student ownership?
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For the quantitative phase of this study, the research questions were:

1. What was the effect of Front Seat Learning on students’ performance as measured by the STAR Math assessment?

2. Were there significant differences in student’s math mastery scores with regard to receiving the student-led instructional approach in Front Seat Learning versus the traditional teacher-led instruction approach as measured by the STAR Math assessment?

For the qualitative phase of this study, the research questions were:

3. Did the Front Seat Learning program in mathematics impact student achievement?

4. Was there a relationship between student ownership and mathematics achievement?

In regard to these questions, the researcher had the following hypotheses:

1. Implementing Front Seat Learning at Berkeley Middle School in the sixth grade will increase students’ mathematical mastery as measured by the STAR Math Assessment during the 2018-2019 School Year.

2. The null hypothesis associated with this question was:

H₀: Students’ mathematical mastery will not improve in students that received the student-led intervention Front-Seat Learning as measured by the STAR Math Assessment during the 2018-2019 School Year. There was a significant difference between the improvement of mathematical mastery in students who received the student-led intervention Front-Seat Learning and the mathematical mastery of students that
received teacher-led instruction as measured by the STAR Math Assessment during the 2018-2019 School Year (Renaissance Learning, 2018).

a. The null hypothesis associated with this question was:

\[ H_0^2: \text{There was no difference between the improvement of mathematical mastery in students that received the student-led intervention, Front-Seat Learning, and the mathematical mastery of students that received teacher-led instruction as measured by the STAR Math Assessment during the 2018-2019 School Year.} \]

3. Implementing Front Seat Learning at Berkeley Middle School in the 6th-grade increased student ownership as measured by surveys and interviews with students who experienced Front Seat Learning during the 2018-2019 school year.

a. The null hypothesis associated with this question was:

\[ H_0^3: \text{There was no difference between the improvement of student ownership in students that received the student-led intervention Front-Seat Learning as measured by surveys and interviews with students who experienced Front Seat Learning during the 2018-2019 school year.} \]
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Table 1

Front Seat Learning: Mastery-Based Program Implementation Schedule

<table>
<thead>
<tr>
<th>Strategies</th>
<th>August/September</th>
<th>October/November</th>
<th>December/January</th>
<th>February/March</th>
<th>April/May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery-Based Learning</td>
<td>Establish academic competencies and learning targets</td>
<td>Learning is based on the individual student’s goals. Students progress to a new skill after mastery of the current skill. Students spend time reflecting and updating PLP if needed</td>
<td>Students are able to present information learned in the manner they choose (presentations, models, etc.) Students create progress reports for parents/guardians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data-Driven Instruction</td>
<td>Full screening to assess and diagnose (STAR) (September 1 – 15) Create a learner profile and plan</td>
<td>Assessments are embedded throughout the learning cycle and signal to the student to move on or revisit the skill Monthly Progress Monitoring using STAR</td>
<td>Winter Screening (January 1 – January 15) Analyze Data individual and class Students are able to adjust their learning profiles based on assessment data Monthly Progress Monitoring using STAR</td>
<td>Spring Screening (May 1 – 15)</td>
<td></td>
</tr>
<tr>
<td>Technology Integration</td>
<td>Introduce Chromebooks Introduce Google Apps Present Learning Programs Introduce Flipped Lessons</td>
<td>Learning plan disseminated through Google Classroom 7:00 PM class check-in Personalized exercise online with immediate feedback and support</td>
<td>Students co-create a learning plan deciding which program to use Implement programs that allow the presentation of learning</td>
<td>Problem/Inquiry-Based Learning (Weekly-Friday) Problem/Inquiry-Based Learning (Weekly-Fridays) Project-Based Learning Final of Year extended the activity</td>
<td></td>
</tr>
<tr>
<td>Experiential Learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaboration</td>
<td>Goal setting with student and teacher Introduce group expectations Students voice learning styles, preferences, and passions</td>
<td>Teacher Feedback Teacher/Student Conferences Peer Helper/Feedback</td>
<td>Student Co-create presentations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Implementation of Front Seat Learning during the School Year of 2016-2017 at one middle school in St. Louis, MO.

Front Seat Learning Program

The researcher developed a program called Front Seat Learning (FSL) to increase mathematical mastery in urban elementary and middle school students in a city in the state of Missouri. Front Seat Learning was a mastery-based educational approach that
used data-driven decision-making, technology integration, experiential learning, and collaboration, and the program fostered student ownership (Sams, Bergmann, Daniels, & Bennett, 2019). Front Seat Learning was not one direct approach, as it was composed of several different components, existing frameworks, and theoretical perspectives (Lynham, 2002). In FSL, students decided what they were learning, how they learned, and the pace of their learning (Sams et al., 2019). In this concept, the teacher provided students with experiences to learn independently, to construct their own knowledge, and to learn collaboratively (Sams et al., 2019). The teacher was the facilitator who coached and supported their learning processes, and here it was the student who had an active role and did the heavy lifting (Sams et al., 2019).

**Mathematical Mastery**

Recently, researchers have indicated that in mathematics, most students used superficial reasoning and had no conceptual understanding of the problems they completed (Pellegrino & Hilton, 2012). Pellegrino and Hilton (2012) found that many students struggled with problems that were not procedural. During the 20th century, the measurement of math achievement changed dramatically over time (Pellegrino & Hilton, 2012). In the early 1900s, success in math meant computational procedures of arithmetic with many teachers emphasizing skills performance, such as computing accurately and quickly (Herman & Margaret, 2017). In the 1990s, though, math reform focused on reasoning and connecting mathematical ideas (Herman & Margaret, 2017). Reform then removed the emphasis on memorization and computation and focused on students being able to prove and explain math problems (Haavold, 2010). Mathematical mastery was a crucial component of the Front Seat Learning (FSL) concept (Haavold, 2010). The
researcher recognized it was impossible to completely capture all aspects of competence, expertise, and knowledge in math with one term.

Thus, the researcher chose mathematical mastery to encompass the skills, knowledge and attributes necessary for students to learn, to apply, and to extend mathematics successfully. The researcher suggested the following description of mastery. Herman and Margaret (2017) is defined as a knowledge of concepts and technical expertise. It was to be understood as the application and transfer of knowledge across subjects and in a variety of contexts (Herman & Margaret, 2017). Mastery assisted students in recognizing how math was used in the real world and taught students to make fact-based decisions and judgments (Bonk & Cunningham, 1998; Balfanz et al., 2002). Students mastered a subject when they were not only fluent, procedurally competent, and able to display technical expertise, but when they were generative with their knowledge, skills, and understanding in performance-based contexts (Belfanz & Herzog, 2005). If a student only possessed skills and facts in isolation requiring prompting, then that student has not mastered the skill (Belfanz & Herzog, 2005).

The concept of Front Seat Learning used mastery-based learning as a system of knowledge acquisition, assessment, and academic reporting that was based on students demonstrating their mastery levels (Sams et al., 2019). Students used personalized learning plans to direct their learning (Herman & Margaret, 2017). As students displayed mastery of the required knowledge and skills, they progressed to the next standard on their plans (Sams et al., 2019). Front Seat Learning applied grade-appropriate state learning standards to determine mathematical expectations (Sams et al., 2019). Front Seat Learning’s intent was to facilitate the acquisition of academic knowledge, as well as the
ownership behaviors that students needed to be successful in secondary education, throughout their college and career paths, and as contributing adults (Herman & Margaret, 2017).

If students were struggling with skills, they received additional support from the teachers or fellow students until they achieved mastery of the skills (Sams et al., 2019). Students were expected to achieve 80% proficiency in their skills before moving on to other objectives (Sams et al., 2019). Understanding that proficiency in procedures and concepts on isolated skills was not the final goal, but it was a necessary pathway to the mastery and extension of learning (Sams et al., 2019). Front Seat Learning placed students on a continuum of performance in order to move from novice to master (Thigpen, 2014). Front Seat Learning utilized several computerized programs as methods to assess student learning (Thigpen, 2014). These programs were critical components of student-led classrooms in that they delivered constant feedback and reporting of student learning (Thigpen, 2014). Front Seat Learning drew on the conceptual framework from the Principles and Standards for School Mathematics (see Figure 1) published by the National Council of Teachers of Mathematics.
Data-Driven Decision Making

Data collection and analysis has been at the forefront of Front Seat Learning and was necessary for the program to be successful (Sams et al., 2019). Using data from state and district assessments was an easy way to capture summative benchmark information, as well as formative assessments. Qualitative data, such as digital presentations, profiles of learning, and teacher observations, were all powerful methods in assessing understanding (Creswell & Clark, 2011). In FSL, both academic and behavioral decisions were informed by up-to-date real-time data. Through such analysis, both teachers and students identified trends and adjusted learning inputs to meet students’ needs (DeFillippi...
& Millter, 2009). Student groups also were formed and adjusted based on the most recent data (DeFillippi & Millter, 2009). Collaboration and communication with teachers, parents, and students were all supported by the use of data (Creswell & Clark, 2011).

Using their personal data notebooks, students were given opportunities to analyze and to reflect on their experiences and to monitor and to adjust their goals. This allowed the students to have voices and choices toward their own success (DeFillippi & Millter, 2009). Students facilitated conferences with parents and spoke to their learning processes. The FSL concept created a data-driven culture in the schools that encouraged parents to be engaged and students to be empowered students, which, in turn, helped them to develop ownership by becoming active, vocal, and responsible for their own successes.

**Technology Integration**

Teachers have been forced with the challenge of keeping students engaged in meaningful tasks (Park & Ertmer, 2008). Recently, students have been engulfed with technology more than ever (Park & Ertmer, 2008). Gadgets like computers, cell phones, and tablets have allowed students to access information anytime and anywhere (Park & Ertmer, 2008). The flipped classroom has enhanced these technological advances and embodied the Information Age to its advantage (Flipped Learning Network, 2014). According to the Flipped Learning Network (FLN) (2014), “A flipped classroom is a pedagogical approach in which direct instruction occurs with students via videos and online activities” (para. 4). This Flipped Learning concept has replaced whole group teacher-led instruction and has allowed teachers to construct learning based on individual students’ needs (FLN, 2014).
In addition to applying the concept of flipped learning, teachers employed Front Seat Learning, or FSL, in which the teacher used learner profiles to craft lessons designed to introduce and to teach mathematical procedures (Sams et al., 2019). Students in classrooms with the Flipped Learning concept and the FSL, watched the videos, took notes and attempted to master the assigned on-line activity (FSL, 2014). Support was available in the form of peer-help, which involved on-line assistance from other students, or teacher reinforcement, during which teachers answer questions as needed (FSL, 2014).

In this model, once the skill was mastered, students had the opportunity to apply learned concepts to application problems with meaningful real-world applications (Sams et al., 2019). Integrating technology in the classroom was an incredibly effective method of addressing students’ individual needs at scale (Sams et al., 2019). The FSL paperless model allowed the teachers to have the ability to provide customized content at varying paces, while also providing individualized attention when needed (Sams et al., 2019). With the use of technology, Front Seat learning provided real-time data to address learning progressions and allowed the teachers to make adjustments quickly (Sams et al., 2019, para. 6).

The objective of FSL was to optimize learning for every individual student (FSL, 2014). Perhaps the most crucial function of the program was the personalized learning, which happened through direct interactions with the mastery-based system with content delivered by a combination of on-line and off-line experiences (FSL, 2014). Regardless of where the learning took place, the program facilitated learning experiences based on individual student needs, interests, and motivations (FSL, 2014).
Experiential Learning

According to Moon (2014), experiential learning was defined as, “The strategic, active engagement of students in opportunities to learn through doing, and reflection on those activities, which empowers them to apply their theoretical knowledge to practical endeavors in a multitude of settings inside and outside of the classroom” (para. 2). The Association for Experiential Education (AEE) defined experiential education as “a learning process in which the student actively engages in posing questions, investigating, experimenting, being curious, solving problems, assuming responsibility, being creative, and constructing meaning” (as cited in Chapman, McPhee, & Proudman, 2002, p. 16).

In experiential learning, students directed their own learning through the discovery of new information, experimenting with trial and error, and observing, interacting, and reflecting on the newly acquired information, which usually focused on a real-world context (Chapman et al., 2002). There were several methods of experiential learning that had the objective to integrate learning experiences using real-world contexts, such as project-based learning, problem-based learning, and inquiry-based learning (Chapman et al., 2002).

In this study, the researcher used two methods of experiential learning to promote mathematical mastery and ownership with the intent of preparing students for college and successful careers (Sams et al., 2019). In project-based learning, students explored the problem, using multiple points of reference and subjects, and by collaborating with their peers (Chapman et al., 2002). Students took ownership and were placed in the proverbial front seat of their own learning experiences, while the teachers acted as the facilitator, guiding the learning (Chapman et al., 2002). Project-based learning often has been
compared to problem-based learning, because they both used real-world application and integrate various concepts and subjects (Chapman et al., 2002). Project-based learning required more time because the scope of learning was much broader (Sams et al., 2019). In both project-based and problem-based learning, students were given the autonomy to choose topics and the method of learning (DeFillippi & Millter, 2009).

During experiential learning, students more often participated in self-reflection following their learning experiences (DeFillippi & Millter, 2009). The students consequently thought increasingly about the obstacles they faced during their lessons and the strategies they used to overcome the difficulties (DeFillippi & Millter, 2009). This practice fostered self-awareness and confident learners (Chapman et al., 2002). Ownership and creative problem solving were increasingly important in the workforce (Chapman et al., 2002). The highly motivated, self-directed learners continued to unlearn, learn, and relearn during their experiences (Chapman et al., 2002).

Student Ownership

The concept of Front Seat Learning (FSL) promoted student ownership by fostering behavioral dispositions, such as student agency, grit, and self-efficacy. Self-directed learning had the potential to create meaningful opportunities for students to take active roles in their learning. Piaget (1977) wrote that when students began to own their learning, engagement increased. As a result, self-direction and goal setting became the catalyst for lifelong learning (Piaget, 1977). Front Seat Learning required students to engage in planning their learning, monitoring their progression, and celebrating their successes (Richardson & Abraham, 2009). With a mastery-based system like FSL,
students had a clear picture of what they had already mastered, and what they needed to know to master future standards and skills (Richardson & Abraham, 2009).

The FSL model incorporated long-term and short-term goal setting, along with constant feedback as a way of progress monitoring and making adjustments along the way (FLN, 2014). Students not only used their individualized data to diagnose, to direct, and to drive their learning, but students also worked collaboratively to set and to master goals as a class (FLN, 2014). With the use of frequent formative assessments, students had multiple opportunities to direct, to reflect, and to improve on their learning (FLN, 2014). Also, in Front Seat Learning, students increased self-awareness, self-management, and self-regulation, and they also improved decision-making, organizational skills, and time management (Sams et al., 2019).

**Student Choice**

Another benefit of the concept of Front Seat Learning was that the concept offered student choice in the classroom with the intent to increase learning and to foster ownership within students (Sams et al., 2019). Providing students with choice promoted agency and ownership by including students in the decision-making processes. Student choice personalized learning and was a key component in Front Seat Learning (Sams et al., 2019). The FSL used a foundation of mastery to create personal pathways for individual students (Sams et al., 2019). This platform allowed teachers to tailor learning experiences to address student needs (Sams et al., 2019). In this case, FSL aimed to improve student achievement by allowing adaptability, range in pacing and differentiation, and autonomy (FLN, 2014).
Student engagement increased because students were actively involved in their learning (FLN, 2014). In a world where many African-Americans often have felt invisible or victimized, FSL counteracted some of those feelings giving students a voice and allowing them to create personal pathways toward successes (Sams et al., 2019; Connell, Spencer, & Aber, 1994; Cooper & Fashola, 1999).

![Diagram of Front Seat Learning and Student Ownership](image)

**Figure 2.** Graphic demonstrating the components of Front Seat Learning and its support of the skills that increased student ownership in the classroom (Jones, 2019).

**Student Agency**

Another theme consistent with Front Seat Learning was the concept of student agency (Sams et al., 2019). Student agency referred to the level of autonomy given in the
classroom (Bonk & Cunningham, 1998). Student agency often has been fostered by supporting choice, and several instructional practices have increased agency in students (Balfanz et al., 2002). For example, authentic assessments, such as portfolios, promoted agency, because assessments offered students choices in displaying the content knowledge learned (Balfanz & Herzog, 2005). Authentic assessments provided students with opportunities to express their thoughts and creative thinking (Thigpen, 2014). It allowed students to use and to apply acquired knowledge across categories using real-world situations (Thigpen, 2014).

Authentic assessments helped students to place student learning into context by understanding how real-life situations were ambiguous, complex, and unpredictable (Sousa, 2009). Experiential learning also supported student agency by ensuring that learning was personal and relevant (Sousa, 2009). Thigpen (2014) wrote mastery-based learning promotes agency, because it fostered intrinsic motivation by using practices like goal setting. Mastery-based learning boosted autonomy and purpose, which was necessary for motivation (Thigpen, 2014). In mastery-based environments, students only progressed to another skill once they demonstrated proficiency in the previous skill (Sousa, 2009). In Front Seat Learning, technology provided each student with a personalized learning experience, which included autonomy in pace, place, and even the path of learning (Ford & Moore, 2014).

All of these were strategies to increase student agency and to support ownership and commitment to the learning experience (Ford & Moore, 2014). Front seat learning prioritized empowerment and divergence over compliance (Sams et al., 2019). This concept was transferrable to African-American students, who often even in today’s
educational arenas, faced a number of obstacles—academically, socially, and politically (Fryer & Levitt, 2004). As Richardson and Abraham (2009) suggested, students who displayed characteristics of grit were more able to overcome socioeconomic disadvantages that led to a cycle of undesirable life circumstances. Educational institutions that provided educational experiences and taught the essential 21st-century skills helped students to navigate obstacles and setbacks successfully, in addition to navigating post-secondary life and the global workforce.

**Grit**

Grit has been defined as the tendency to maintain effort and interest in goals using dedication, self-control, self-discipline (Duckworth & Gross, 2014). In this study, the definition of grit accompanied all three terms (Duckworth & Gross, 2014). The researcher defined grit as the ability to preserve and to remain tenacious toward the goal of being resilient despite setbacks and obstacles (Duckworth & Gross, 2014). People with grit continued working toward the goal and did not allow challenges to deter them from completing their goals (Duckworth & Gross, 2014). They were resistant to failure in the short term in favor of a long-term goal (Duckworth & Gross, 2014). In the Front Seat Learning (FSL) concept, students learned to persevere through challenges using trial and error (Duckworth & Gross, 2014). Students learned that mistakes were necessary for future success and the amount of time required to complete a goal was irrelevant (Duckworth & Gross, 2014).

In considering the FSL concept, African-American students still suffered from the lowest amount of academic achievement and the highest amounts of college dropouts (Fisher & Rickards, 1998). A strong factor in effect was due to the lack of grit of the
students involved (Duckworth & Gross, 2014; Farmer, Allsop, & Ferron, 2015). An analysis from the University of Pennsylvania found that students' mindsets were strong predictors of college graduation (Christopoulou et al., 2018). According to Christopoulou et al. (2018), the report stated that grit accounted for more than test scores, socio-economic statuses, and familial backgrounds.

Another variable in the report for students was poverty (Christopoulou et al., 2018). A factor in the report recognized that for students being poor was difficult and being African American on top of that made the students’ successes even more difficult (Christopoulou et al., 2018). Because of these difficulties, the quality of grit was essential to academic achievement in poor African-American students (Christopoulou et al., 2018; Ford & Moore, 2014). If talent and intelligence were isolated, students often were not ready for colleges or careers because of their abilities, alone, were insufficient for success for African Americans (Ford & Moore, 2014).

Although African-American students have not been able to immediately change the systematic structures that stood as barriers, they still controlled their mindsets (Ford & Moore, 2013). With the use of Front Seat Learning (FSL), educators reportedly were sources of empowerment, especially for students from disadvantaged backgrounds to withstand the difficulties of college and to obtain college degrees that can transform their futures (Ford & Moore, 2013). Ownership required that they took responsibility for experiences, which included setbacks and failures (Ford & Moore, 2013).

Self-Efficacy

Bandura (1977) defined self-efficacy as individuals’ beliefs in their capacities to successfully complete tasks or to perform certain actions. Students who had efficacy
embraced challenges and difficult tasks, and often they were more intrinsically motivated (Bandura, 1977). In education, self-efficacy has been an integral part of student achievement (Schunk, 1991). According to previous research, self-efficacy often has resulted in increases in achievement (Schunk, 1991). Students who believed they were capable of successfully completing tasks put forth more effort and grit, therefore, student-led environments, such as Front Seat Learning, promoted self-efficacy (Schunk, 1991). Educators’ attitudes, behaviors, past experiences with similar tasks, and progress clues all impacted student self-efficacy (Schunk, 1991).

Along with this concept, teachers promoted students’ efficacy by using positive and motivating phrases like, “Good job” or “You can do it” (Balfanz & Herzo, 2002, p. 35). Students also became more engaged throughout the use of progress markers and instant feedback (Schunk, 1991). Through the use of technology, Front Seat Learning provided several cues and opportunities for trial and error with instant feedback (Schunk, 1991). These cues signaled how students were performing on tasks and established their efficacy levels for similar tasks in the future (Pellegrino & Hilton, 2012). According to Schunk (1991), signals during the learning process helped communicate the measure of learning to the student. Students then used this information in future learning (Schunk, 1991).
Chapter 2: Literature Review

Introduction

In this section, the researcher surveyed scholarly articles to examine research related to student-led pedagogy and the framework of Front Seat Learning. African-American students fared the worst when trying to obtain career opportunities that provided access to financial security (Ford & Moore, 2014). For example, African-American students had the highest high school dropout rates (Lee & Ransom, 2011). Of the African-American students who completed high schools and who attended four-year universities, only 37.6% completed and earned degrees (U.S. Department of Education, 2016). This was compared to 47.9% of Hispanic and 67.2% of White students (U.S. Department of Education, 2016); in two-year institutions, only 19.8% earned degrees, which compared to 28.6% of Hispanics and 30.4% of White students (U.S. Department of Education, 2016).

The disparities began in early childhood and gradually increased throughout African-American students’ educational careers, especially in the first through eighth grades (U.S. Department of Education, 2016). Students who successfully completed rigorous curricula in the early years of their educational experiences were better prepared for high school, which resulted in an increase in college and career readiness (U.S. Department of Education, 2016). Research from the American College Testing’s (2008) report, The Forgotten Middle, reported that achievement levels in eighth-grade math had a critical amount of impact on college and career readiness. This was in contrast to most bodies of thought who believed that what happened in high school is a greater predictor of success (ACT, 2008). According to a report from the ACT (2008), African-American
students met the expected performance indicators for college readiness at lower rates than any other group of students, according to race. Regardless if they graduated high school or not, the coursework did not seem to adequately prepare African-American students for college (ACT, 2014). It was essential to study the achievement and career and college readiness gap between the sub-groups of students, as well as the victims and stakeholders, to understand how to help students of color navigated and counteracted the disadvantages that prevented them from achieving their academic potentials (ACT, 2014). The American Psychological Association explained that a low socioeconomic status correlated with low educational achievement, high poverty, health disparities, and high incarceration rates (Sampson, Morenoff, & Gannon-Rowley, 2002). Educational attainment affected household incomes, and household incomes affected the quality of life (Sampson et al., 2002). Increasing access to high-quality education for African-Americans students will not only increase opportunities for those students but will also strengthen the overall economy.

**Theoretical Framework**

In educational research, there have been three types of frameworks: a) practical, b) theoretical, and c) conceptual (Creswell & Clark, 2011). Of these three, each has had different characteristics and has played an important part in scientific research (Creswell & Clark, 2011). In a theoretical framework, the activities in the research were guided by established formal theories (Creswell & Clark, 2011). Each framework has explained the why behind the research (Creswell & Clark, 2011). Practical frameworks discusses the how in studies (Creswell & Clark, 2011).

This kind of framework was led by a long history of research from practitioners
who are involved in the matter (Creswell & Clark, 2011). One conceptual framework was a product that “explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them” (Miles & Huberman, 1994, p. 278).

**Constructivism Learning Theory**

The concept of Front Seat Learning has leaned on the Constructivism Learning Theory which has been explained to be a theoretical viewpoint based on scientific research about the way children learn (Sams et al., 2019). Constructivists have believed that children created their understanding by interacting with the world (Honebein, 1996). When students were presented with new information, they reconciled it with their prior knowledge (Honebein, 1996). In order for learning to be meaningful, students needed to curate their knowledge by experimenting, using inquiry and exploration, and having self-reflection (Ormrod, 2000). The FSL concept used the Theory of Constructivism to create lasting learning experiences, such as experiential learning (Sams et al., 2019). In this model, students worked collaboratively with their peers and required minimal instructor influence (Flipped Learning Network, 2014). Students were not merely accumulating information from their teachers, but instead, they gathered data and were thinking critically about their experiences, transmitting knowledge to other students and making sense of information on their own (FSL, 2014).

In Front Seat Learning, knowledge acquisition occurred within individual students and within their communities of students (Sams et al., 2019). This was derived from Piaget’s Developmental Theory, which stated that students developed knowledge by interacting within the community (Piaget, 1977). In addition to Piaget’s Theory,
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Vygotsky’s developmental theory heavily influenced social constructivist learning as well (Vygotsky, 1978). According to Vygotsky (1978), children’s initial learning came from within their surroundings. Because of this, classroom learning activities and materials should have been contextualized and relevant to students’ lives (Vygotsky, 1978).

Secondly, children learned through social interaction by absorbing the knowledge around them and constructing new knowledge (Vygotsky, 1978). In addition, adults assisted children in order to help them to reach higher levels of learning by providing opportunities for the construction of knowledge (Vygotsky, 1978). Rather than relying on memorization, constructivism in the classroom assisted in the development of critical thinking skills (Vygotsky, 1978). As a result, these skills stimulated intrinsic motivation, so that students became lifelong learners (Bonk & Cunningham, 1998).

The application of the Constructivist theorist approach in education began in the United States in the late 20th century (Vygotsky, 1978). At the time, constructivist methods were being developed and applied extensively in education in developed countries (Hiebert et al., 1999). According to the study of Hiebert et al. (1999), data indicated that in countries with high performing students, instructional methods were constructivist in nature. In these countries, educators focused on logical explanations, real-world applications, scientific inquiry, complex problem-solving, collaborative discussions, and projects with open-ended results (Stigler & Hibert, 2004).

Theorist Perspectives

Dewey (1929), Piaget (1980), and Vygotsky (1978) collectively contributed to the concept of student-led classroom models like Front Seat Learning. Another educational
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theorist, Rogers (1969), said that self-discovered knowledge was the only knowledge that significantly influenced student learning. Along those same lines, Montessori’s model was one of the earliest student-centered models (Kendall, 1993). In the Montessori model, children learned through independent and self-directed with previously presented knowledge (Kendall 1993). It also focused heavily on student collaboration (Kendall, 1993). Vygotsky’s Zone of Proximal Development (ZPD) Theory explained that students can learn more from their peers than from their teachers (Vygotsky, 1978). Peer-to-peer interaction fostered collaborative thinking which led to increased learning (Piaget, 1980; Vygotsky, 1978). The Self-Determination Theory explained why autonomously-motivated students thrived, and it explained why students benefited when teachers support their autonomy (Ryan & Deci, 2000).

Students become intrinsically motivated when they are able to contribute and gauge their learning (Ryan & Deci, 2000). Self-Determination Theory (SDT) was rooted in the Theory of Motivation using traditional empirical methods combined with the theory that deals with intrinsic motivation (Ryan & Deci, 2000). Self-Determination Theory suggested that a person’s drive was rooted in unconscious cognitive needs. Ryan and Deci (2000) reported, “The need for autonomy, competence, and relatedness are believed essential for enhancing motivation are especially important in intrinsic motivation. The need for autonomy is the need to engage in self-directed behavior” (p. 575).

The educational theorists believed students’ competence stemmed from their desire to experience fulfillment in improving their abilities (Ryan & Deci, 2000). Often people desired to relate to other people in the group (Honebein, 1996). People
subconsciously sought out environments that supported their needs (Ryan & Deci, 2000). Self-Determination Theory used the term autonomy for the feeling people have that their choices and behaviors were determined by their desire to improve (Ryan & Deci, 2000). Competence was developed by external factors, like feedback and rewards, which built efficacy (Ryan & Deci, 2000). Relatedness referred to how students felt in regard to their communities (Ryan & Deci, 2000). This could have been in a class, in a school, or outside of school (Ryan & Deci, 2000). Feeling connected or related to others could have instilled intrinsic motivation for learning (Ryan & Deci, 2000).

**College and Career Readiness in Elementary and Middle School**

Preparing students for college and future careers should have begun before students reach high school (Ryan & Deci, 2000). Ryan and Deci (2000) explained that readiness training should have been focused on elementary and middle schools. In the past decade, there has been more of an emphasis on preparing students for post-secondary education (Pellegrino & Hilton, 2012); however, unfortunately, much of the work has been at the high school level (Herman & Margaret, 2017).

A study from the University of Chicago and the ACT (2017) presented data that indicated the academic achievement in the middle years, which involved the grades fourth through eighth, was a predictor for students’ high school performances and college readiness. Research also has shown that “the level of academic achievement that students attain by eighth grade has a larger impact on their college and career readiness by the time they graduate from high school than anything that happens academically in high school” (ACT, 2008, p. 32). Many African-American students have left high school without the skills they needed to be lifelong learners and to become successful in life
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(ACT, 2018). To put these statistics in context, the ACT (2018) stated that in the 1950s students left high school knowing less than 75% of the knowledge required to be successful in life, and today that number was less than 30%. This has been less of an issue of a decrease in knowledge and rather more of an issue with the rapid increase of expected knowledge (ACT, 2018).

Student-Led Classrooms

Proponents of student-centered classrooms have argued that great teachers can turn mathematics into engaging learning environments (Hansen & Mann, 2018). Student-centered classrooms have allowed students to assume responsibility for their learning and make relevant real-life connections (Hansen & Mann, 2018). Researchers have begun to provide resources that educators can use to guide the principles and best practices of student-centered learning (Hansen & Mann, 2018). There has been much to learn in regard to student-centered learning, especially in the area of mathematics in grades kindergarten through 12th grade (Haavold, 2010). Although there has been an increasing body of research related to student-centered instruction, less has been investigated about how student-centered approaches applied to mathematics education (National Council of Teachers of Mathematics, 2018).

Student-centered instruction has been a style of teaching that puts the responsibility of learning on students rather than on the teachers (Walton, 2007). In student-centered classrooms, both teachers and students acted as partners in the learning process (Walton, 2007; Lee & Ransom, 2011). Students became active members in their learning by choosing the method of instruction (Lee & Ransom, 2011). This environment placed the learners in control, as opposed to the instructors (Nelson, 2008; Wimberly,
In this context, students have found the learning process meaningful when topics were relevant to their lives and when they actively participated in developing, processing, and connecting to topics as required (McCombs, 1997). The term, student-led pedagogy, did not refer to an exact method of instruction (McCombs, 1997). Student-led learning consists of multiple instructional approaches that draw from an array of theories, trends, and disciplines in the field of education (McCombs, 1997).

The origin of student-led classrooms began in Piaget’s Constructivism Theory (Piaget, 1977). Piaget’s theory was the opposite of the rationalist and empiricist approaches about how knowledge was constructed (Piaget, 1977). The rationalist believed knowledge was innate, and the empiricist believed that understanding was formed when the individual gathered data from using the five senses (Hume, 1993; Locke, 1996). In contrast, Piaget (1977) believed knowledge was acquired when an individual interacts with the world. He rejected the idea that knowledge was derived from merely copying information (Piaget, 1977).

For Piaget (1977) to obtain knowledge one had to be able to understand and to apply it to their current knowledge. Hancock, Bray, and Nason (2010) described student-centered classrooms where: (a) students established and enforced rules, (b) teachers provided feedback and required students to seek alternate responses, (c) questions were divergent in nature, (d) students had choice in their learning activities, (e) students learned from examples and were encouraged to identify the skills within in the content, (f) students summarized and reviewed learning objectives throughout, and (g) students decided their readiness for transition to the next objective. It was here that the philosophical differences of teacher-centered and student-centered education (Hancock et
Teacher-centered learning aligned with the empiricist model of thought in that knowledge began with the teacher and was transferred to the student (Hancock et al., 2010). Student-centered pedagogy challenged traditional lecture-and-test models of education (Hancock et al., 2010). Educators who believed in constructivist learning advocated for student-centered pedagogy and were opposed to teacher-centered pedagogy (Hancock et al., 2010). This implied diminishing roles for the teachers as the students have active roles in the construction of knowledge during the learning process (Hancock et al., 2010). Teachers were required to relinquish a level of power in the classroom (Hancock et al., 2010). In a teacher-led class, the teacher was in charge of the learning and the pedagogy was teacher-centered and responsive to the needs of the adult (Hancock et al., 2010). The teacher who stood in front of a class for any extended length of time to teach is in a constant battle to maintain engagement, ownership, and retention (Cohen, 2004). Teacher-centered learning created a culture where the learner never outgrew the instructor, nor their dependency on the teachers (Cohen, 2004). This process was unilateral and inefficient (Cohen, 2004).

Oftentimes, teacher-centered classrooms ignored meta-cognitive skills, such as analysis, evaluation, synthesis, critical thinking, and self-regulation (Cohen, 2004). Because the students were being assessed by the instructors, self-reflection and peer reflection was not a part of teacher-centered learning (Cohen, 2004). In contrast to Front Seat Learning, which used an innovative grading system, where evaluations were multi-perspective and focused on the students' understandings and performances as divergent thinkers (Sams et al., 2019). Leaders in the global workforce quoted cross-cultural communication competencies, problem-solving skills, the ability to work as a team, and
adaptability as required to be successful in the workforce (Sams et al., 2019). Teacher-led classrooms do not account for future employment competencies.
Chapter 3: Research Methodology

Research Design

Mixed-methods research referred to the methodical integration of quantitative and qualitative data within one study (Creswell & Clark, 2011). This synergy allowed for better data analysis and a thematic picture that was more complete (Creswell & Clark, 2011). The researcher’s philosophy was pragmatic in that the focus was on successful practice and the inquiry and drawn from both quantitative and qualitative assumptions (Creswell & Clark, 2011). Because the research held the pragmatic worldview, the researcher had the freedom to choose the methods and procedures that best suit the needs of the study. Real-world experiences and different viewpoints were examined throughout the study (Creswell, 2009).

In the current study, the researcher sought to contribute to an understanding of student-centered learning by using a sequential explanatory mixed-methods design to examine the effect of Front Seat Learning on mathematics achievement and ownership in African-American students in urban environments (Creswell, 2009). The researcher believed that by using a student-led classroom instructional approach, educators assisted in narrowing the achievement and the college and career readiness gap. This study was a comparative experiment for establishing the efficacy of Front Seat Learning as a student-led classroom comparative to the effects of traditional teacher-led classrooms. The overarching research question for the study was: What are the effects of the Front Seat Learning program on math achievement and student ownership?

Research Questions. For the quantitative phase of this study, the research question was: What is the effect of Front Seat Learning on students’ performances as
measured by the STAR Math assessment? To answer the quantitative research question, the researcher collected math assessment data in August of 2018, Winter of 2018, and Spring of 2019 by administering the STAR Math screener to all students and comparing it to data of students who had not been exposed to FSL.

For the qualitative phase of this study, the research questions were:

1) Did the Front Seat Learning in mathematics impact student ownership?

2) Is there a correlation between student ownership and mathematics achievement?

To answer this question, the researcher developed student surveys and an interview protocol that was conducted in May of 2019 in order to record mindsets and the behavioral disposition of students as it relates to ownership.

**Research Method**

The design of this study was an experimental pre-test and post-test design because students were placed into the teachers’ classrooms by random assignment. (Creswell, 2009). The researcher controlled the variables in order to increase the probability that the independent variable has a direct impact on the dependent variable (Creswell, 2009). The researcher used comparative analysis to determine the effectiveness of Front Seat Learning. Students were randomly assigned to either the experimental or the control group. Both groups were pre-tested using the STAR assessment for the independent variable, which in this case was the student-led classroom model, Front Seat Learning. The experimental group received the treatment as well, and both groups were post-tested to examine the effects of manipulating the independent variable on the dependent variable (Creswell, 2009).
The quantitative phase of the study focused on comparing the student-led instructional approach to the traditional teacher-led instruction by using independent samples T-test analysis and analysis of covariance (ANCOVA). This analysis was appropriate for the research in order to determine what relationships exist between student achievement and pedagogy. The researcher analyzed the quantitative data after the last STAR screener. The qualitative data was collected and analyzed at the conclusion of the quantitative phase in order to provide a more in-depth understanding of how Front Seat Learning impacted student achievement and behavioral dispositions.

![Visual Model of Explanatory Sequential Project Flow](image)

*Figure 3. Exploratory, nested, concurrent, mixed-methods research design.*

**Setting, Population Sample, and Participation**

The researcher studied participants who were enrolled in an urban middle school in a school district located in St. Louis, MO. The school’s current enrollment at the time of publishing was 367 sixth through eighth-grade students, and 100% of the school’s
population qualified for the free lunch program. The racial makeup of the school was as follows: 97% were African-American, 2% were Caucasian-American, and 1% of the students identified as other. The school had a current attendance rate of 83%. Sampling was a process of selecting individuals or groups from the population, they served as a representation of the general population (Creswell, 2009). The goal in sampling was to make generalizations about the population as a whole. The researcher used probability sampling because of the use of randomization. Every sixth-grade student at the school had an equal opportunity of being chosen for the study (Creswell, 2009).

The study took place in two phases—the Quantitative Phase I and the Qualitative Phase II. In order to participate in the study, the researcher required students to have taken both the Fall 2018 and Spring 2019 Screener. The entire population of students in both the control and experimental group was required to participate in Phase I and to complete the STAR Math Assessments. The control group 6A consisted of 27 general education students, which included 20 females and nine males. The experimental group consisted of 32 general education students, 17 females and 15 males. Three students from this group received special education services.

In Phase II, the Qualitative Phase utilized surveys and interviews as methods of data collection. All students from 6A and 6B were required to take the survey, for a total of 41 surveys. The sample size of the quantitative phase was sufficient because it allowed the researcher to collect data from the entire population of the study. The sample size in qualitative data analysis was smaller than that of the quantitative phase. As Creswell and Clark (2011) explained, individuals are complex (e.g. an observation or an interview vs. a set of numerical values); therefore, this made the analysis more complex because of the
number of categories or themes identified within the data (Creswell, 2011). This report
did not document the effects of student-led classrooms in suburban or rural areas
regardless of socioeconomic status or grade level, nor was the intent to compare the
results to students of the selected population to their counterparts.

**Variables**

The design of the study required the researcher to limit the qualitative and
quantitative data collection to one site. This allowed the researcher to better identify
variables within one setting, as explained by Creswell and Clark (2011). The
experimental pre-test and post-test design were used to measure the correlation between
the quantitative and qualitative variables. The methods of instruction were manipulated
among the control and experimental groups; therefore, the method of instruction was the
independent variable. In this case, the researcher controlled whether or not subjects were
exposed to the student-led Front Seat Learning or the traditional teacher-led, whole group
instructional model.

The dependent variable in this study was the amount of growth in mathematical
achievement from August 2018 through May 2019 as measured by the STAR Math
Assessment. The dependent variable was measured to determine if the manipulation of
the independent variable had any effect on student growth on mathematical mastery.
Figure 3. Comparative Analysis Plan based upon this study and referencing Sams et al. (2019) Front Seat Learning concept.
Threats to Validity. The researcher disclosed possible threats to internal and external validity that related to this experiment. In this study, the researcher used triangulation as a validation strategy. Several forms of data were analyzed and compared within and across the study. The researcher analyzed in-person interviews, standardized test scores, and students’ surveys to establish construct validity by using multiple sources of data (Yin, 2009). According to Yin (2009), using many different sources of data as evidence was most valuable in minimizing threats to validity as it allowed for the triangulation of data enhancing the validity of the study.

Threats to internal validity in the quantitative portion of the study were minimized because of the lack of selection bias (Yin, 2009). The class population was selected independent of the researcher by an objective software program. Although the selection was a convenience sample, students were not categorized according to academic skills or disability at the time of teacher assignment. The classrooms contained a variety of academic abilities and personalities. Threats to validity due to testing will be minimized due to the STAR assessment being adaptive and personalized. For the qualitative phase of this study, threats to external validity included the interaction between selection and treatment and the interaction between setting and treatment. External interview design validity threats were minimized by giving a detailed description of participant selection. Surveys were administered by a teacher within the same school and remained anonymous.
Chapter 4: Results and Discussion

In the current study, the researcher sought to add to previous literature by using a sequential explanatory mixed-methods study with a quasi-experimental design to examine the effect of the student-led pedagogy on mathematics achievement and student ownership. The researcher believed that by increasing African American students’ mathematical mastery and ownership of learning skills, students would improve their college and career readiness, thereby increasing long-term career opportunities in order to improve their lives, their families’ lives, and the lives of their communities. This chapter contained the results of the data analysis as it related to the two research questions proposed in Chapter One. The purpose of this study was to compare the achievement of sixth-grade students in math mastery and student ownership who participated in the Front Seat Learning, or the student-led classroom model, from the achievement and ownership skills of sixth-grade students who participated in the traditional teacher-led classroom model.

Analysis of Research Questions, Hypotheses, and Null Hypotheses

The overarching research question for the study was: What are the effects of the Front Seat Learning program on math achievement and student ownership?

For the quantitative phase of this study, the research questions were:

1. What is the effect of Front Seat Learning on students’ performance as measured by the STAR Math assessment?

2. Are there significant differences in student’s math mastery scores with regard to receiving the student-led instructional approach in Front Seat Learning versus the
traditional teacher-led instruction approach as measured by the STAR Math assessment?

For the qualitative phase of this study, the research questions were: 1) Is there a relationship between student ownership and mathematics achievement?

The researcher has the following hypotheses:

1. Implementing Front Seat Learning at Berkeley Middle School in the 6th-grade will increase students' mathematical mastery as measured by the STAR Math assessment during the 2018-2019 school year.

The null hypothesis associated with this question was:

H.1: Student’s mathematical mastery will not improve in students that received the student-led intervention Front-Seat Learning as measured by the STAR Math assessment during the 2018-2019 school year.

2. There is a significant difference between the improvement of mathematical mastery in students that received the student-led intervention Front-Seat Learning and the mathematical mastery of students that received teacher-led instruction as measured by the STAR Math assessment during the 2018-2019 school year.

The null hypothesis associated with this question was:

H.2: There is no difference between the improvement of mathematical mastery in students that received the student-led intervention Front-Seat Learning and the mathematical mastery of students that received teacher-led instruction as measured by the STAR Math assessment during the 2018-2019 school year.

Implementing Front Seat Learning at a middle school in the sixth grade will
increase student ownership as measured by surveys and interviews with students who experienced Front Seat Learning during the 2018-2019 School Year.

a. The null hypothesis associated with this question was:

H.3: There is no difference between the improvement of student ownership in students that received the student-led intervention Front-Seat Learning as measured by surveys and interviews with students who experienced Front Seat Learning during the 2018-2019 school year.

Population Demographics

The population demographics gathered from the school district’s student information system were displayed in Figure 5 through Figure 9. African-American females aged 12 who were below the poverty line account for the majority of the population studied.

*Figure 5. Race of the participants in the study.*
Figure 4. The gender of the population studied is reported in the figure.

100.0%

Free/Reduced

Figure 5. The number of students who qualified for Free-Reduced Lunches.

Analysis of Research Questions

A dependent t-test was used to address Research Question #1 that was used to determine if Front Seat Learning impacted math mastery. The researcher used univariate analysis of variance (ANOVA) to determine if there were significant differences in the grade level equivalents, between students who received the intervention, and those who did not receive the interventions. The independent variables were the methods of
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instruction. The dependent variable was the amount of growth in the Grade Level Equivalent, or GLE, which was derived from the Spring 2019 post-test.

The researcher used Statistical Program for the Social Sciences (SPSS) to analyze the assessment scores with a significance level of .05. English as Second Language (ESL), poverty-level, and race were used to compare because the school had a homogenous population and did not have a significant amount of diversity in the subgroups.

![Chart](image)

*Figure 6.* The special education statuses of the student population studied were reported in Figure 9.

**Research Question Number One: What is the effect of Front Seat Learning on students’ performances as measured by the STAR Math assessment?**

In order to investigate if student-centered instruction impacted student learning in mathematics, the mean difference in pre-test and post-test scores was calculated (see
Table 1). To answer this question a paired sample t-test was conducted to evaluate the effects of the experimental treatment, Front Seat Learning, as an instructional model on math mastery as measured by comparing the grade level equivalence in pre-test scores to that of the Grade Level Equivalency (GLE) in the post-test. The independent variable was the type of classroom organization, and the dependent variable was the GLE (post-test minus pre-test). The paired sample t-test was significant, with a pre-test mean of GLE 5.32 and a post-test GLE of 7.99, resulting in a growth mean of 2.66. There was a significant difference between the means of the pre- and post-test. The p-value was less than .000. Therefore, H01 was rejected. There was a relationship between Front Seat Learning as an instructional method and students’ GLE’s in math. Because the overall f-test was significant, post hoc multiple comparisons were conducted to evaluate pairwise differences among the means of the two groups.
Research Question Number Two: Are there significant differences in student’s math mastery scores with regard to receiving the student-led instructional approach in Front Seat Learning versus the traditional teacher-led instruction approach as measured by the STAR Math assessment?

In order to determine whether or not student-centered instruction impacted student learning in mathematics more than students who received the teacher-centered instruction, the mean difference in pretest and posttest scores were calculated and compared (see Table 2). To answer this question a one-way analysis of variance was
conducted to evaluate the relationship between the difference in student improvement scores in math on the STAR math assessment and the instructional method Front Seat Learning and that of teacher-centered instruction. The independent variable was the type of instructional method and the dependent variable being the math GLE (posttest minus pretest). A relationship in the mean of growth in grade-level equivalency in the treatment group compared with the grade level equivalency in the control group displayed a 64% increase. The ANOVA was significant, $p = .009$. Therefore, $H_0$ was rejected. Levene’s Test of Equality of Error variances was conducted with a significance value of $P=0.014$ (see Table 3).

Table 2

Descriptive Statistics: Dependent Variable Growth in GLE

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>1.62</td>
<td>1.0244</td>
<td>27</td>
</tr>
<tr>
<td>Treatment Group</td>
<td>2.66</td>
<td>1.761</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>2.19</td>
<td>1.5496</td>
<td>59</td>
</tr>
</tbody>
</table>

*Note.* Rounded to the nearest tenth.
Research Question Number Three

For the qualitative phase of this study, the research questions were:

1. Is there a relationship between student ownership and mathematics achievement?

Through the analysis of the quantitative data, it seemed clear that attitudes and habits developed through increased ownership improved mathematics achievement in participants in the treatment more so than students in the control group. During this phase of the study, data was collected from the use of interviews and surveys. A total of eight students were interviewed in the experimental group. The same survey was administered to all students. The qualitative data gathered through this study’s semi-structured interviews also offered possible answers to this study’s third research question.

Table 3

Levene’s Test of Equality of Error Variances

<table>
<thead>
<tr>
<th>Levene’s Test of Equality of Error Variances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable: Growth2</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>6.366</td>
</tr>
</tbody>
</table>

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Group
Front Seat Learning Surveys

In addition to examining the effect of Front Seat Learning on students’ performances, the researcher also sought to investigate students’ feelings and attitudes about the components of Front Seat Learning. Using a researcher-designed electronic survey to establish current attitudes toward FSL, an analysis was conducted for each question to determine the prevalence of the components of FSL. The researcher searched for evidence of a mastery-based educational approach that uses data-driven decision making, technology integration, experiential learning, collaboration, and attributes of student ownership.

The researcher chose to use a Likert scale in which respondents chose the option that best supports their opinion. A Likert scale was selected to measure the participants’ attitudes by measuring the extent to which they agreed or disagreed with a particular question or statement. There were 20 questions on the survey with three collecting demographic information, which included age, race, gender, six using Likert type scales collecting perceptual data around student-led pedagogy.

Participants were surveyed and asked, During the school year how often did you participate in the following?

- I take assessments regularly, and you that information to make learning goals.
- I am able to track my learning using multiple sources of data.
- I often make adjustments to my learning goals.
More than 50% of students answered, At least half of the time to All of the Time. Results from the survey indicated that regular surveys and the use of data to make learning goals were prevalent throughout the intervention. Using data to gather information about know only the initial learning gaps but students were able to make adjustments once the learning gap was closed.

Figure 7. Data-driven decision-making responses, ranging from Always to Never.

Data-driven decision making allowed both teachers and students to be specific about each individual’s progress toward learning goals. This, in turn, helped students become aware of their own abilities which led participants to become more confident and increased agency and self-efficacy through self-directed learning. With the use of regular assessments, students received feedback, set goals, and were motivated to demonstrate
math mathematical mastery. Front Seat Learning is designed to incorporate data-driven decision making to ensure every student has the opportunity and support needed to learn.

![Collaborative Learning Experience](image)

*Figure 8. Participants were surveyed and responded in regard to Collaborative Learning Experience.*

Participants were surveyed and asked, During the school year how often did you participate in the following?

- I give and receive feedback to/from students in this class.
- I work with other students on group assignments in this class.
- I help my classmates and they help me with the work in this class.

With one exception, more than 50% of students answered at least half of the above questions. When asked, how often do you receive and give feedback to classmates, 68% of students answered sometimes. This was an unintended result. Although peer
feedback was not specifically stated in the goal of Front Seat Learning, the other components of FSL should have produced more evidence of the practice. Peer review benefited students because they were able to teach and to provide feedback to other students. As Nelson-Le Gall (1991) wrote, “When information is relevant, students become more engaged and invested in working to complete the task successfully” (p. 32).

Peer feedback also fostered agency, because students’ voices were heard.

![Experiential Learning Chart]

**Figure 9.** Participants’ responses about Experiential Learning.

Participants were surveyed and asked, During the school year, how often did you participate in the following?

- I learn about things that connect to life outside the classroom
- I get to design or create evidence of my learning.
- Most of what I learn in my class is necessary for success in the future.
• During this school year, have you participated in a course that uses PBL, or Real-World Problems?

More than 50% of students answered at least half of the time to all of the questions. Overall, students responded they had encountered experiential learning situations on a regular basis during the class. Students were able to apply the math concepts and knowledge to real-life problems and situations. Students responded they could encounter the same situations outside of the classroom and in the future. During this study, the researcher observed the increase in engagement, which, in turn, supported students’ motivation. The FSL model presented learning opportunities that focused on material meaningful to students’ lives, which had a positive impact on their mathematical mastery and ownership skills.

Figure 10. Participants’ responses about Technology Integration.
Participants were surveyed and asked, during the school year how often did you participate in the following?

1. I use other technology tools in class to move at my own pace on class assignments.
2. I can learn complete work anywhere or anytime (at home or somewhere outside of school).
3. I use other technology tools in class to collaborate with other students on class assignments.

More than 50% of students answered at least half of the time to all of the questions. There were some instances in which students answered Sometimes or Never. When students were asked to respond to the statement, I can learn complete work anywhere or anytime (at home or somewhere outside of school), more than 50% of the students responded Sometimes. These responses had more to do with access to technological devices and access to reliable Internet service in urban areas, rather than with the intervention teachers provided. This concern was related to what Ford and Moore (2014) wrote about the achievement gap with African Americans in that the gap will continue to widen if students cannot access the technological resources for them to succeed.

The researcher also noted the question, I use other technology tools in class to collaborate with other students on class assignments. Students responded evenly across the Likert Scale of 1 through 5. The researcher had the following question. Why are some students collaborating online with each other and other students are not? This will be addressed in the discussion section of this dissertation.
The survey also included questions related to student ownership.

![Self-Efficacy chart](chart.png)

**Figure 11.** Students’ responses to questions regarding Self-Efficacy.

Participants were surveyed and asked, do you agree with the following?

- I feel that I have learned a lot in this class compared to previous classes.
- I feel like I am able to complete the tasks the teacher assigns, despite the level of difficulty.
- I feel that my teacher cares about how I’m doing.

The majority of the students answered either somewhat agree or strongly agree to questions related to self-efficacy.
Participants were surveyed and asked, do you agree with the following:

- I have a clear idea of what I will do after I graduate from high school
- I am interested in the work I get to do in math class
- I feel that my ideas and opinions can influence decisions made in math class.
- Most of what I learn in my class is necessary for the future.

The majority of the students answered either Somewhat Agree or Strongly Agree to questions related to agency.
Participants were surveyed and asked, do you agree with the following:

- The teacher expects us to work through challenging tasks without giving up.
- Mistakes don’t keep me from learning, they’re necessary for success.
- Even when I encounter setbacks or the work is hard, I keep trying.

The majority of the students answered either Somewhat Agree or Strongly Agree to questions related to grit.

**Front Seat Learning Interviews**

The interviews took place during the month of May of 2019. They were conducted during the students’ regular classroom times. The interviews lasted from 20 to 30 minutes and were held in the classroom. The researcher interviewed students during independent practice time. Technology devices were used to assist with the collection,
transcription, coding, and the security of data. An audio recording was used to record interviews. Responses from the semi-structured interviews were analyzed after recording.

In order to seek insight into the above qualitative question, the four a priori codes of student agency, grit, and self-efficacy were used to identify moments in the interviews during which students addressed these topics. In addition, the researcher looked for terms that signified that the core components in FSL were utilized. The core components of FSL were data-driven decision making, technology integration, experiential learning, collaboration, all of which fostered and promoted student ownership. The responses associated with these codes were then read in search of themes that might help elucidate the role that these factors may have played during the study in improving math achievement. Four major themes emerged from the participants’ responses:

1. Student-teacher relationships affected motivation.
2. Engagement promoted efficacy and motivation which affected mastery.
3. Self-efficacy affected and promoted grit.

The participants had a variety of thoughts about the effectiveness of the program in improving their math mastery and ownership skills. According to the STAR Math Assessment, the students in the experimental group who improved the most during the study mostly had positive opinions of the impact of FSL on the classroom structure and its effect on growth in both math mastery and ownership skills. Most students noted that because they were engaged in the learning process, they now approached math more actively and with intentionality. Other students reported that while they appreciated the
personalization and freedom of the classroom, they still struggled in their math classroom. One student was open about his disappointment, saying, “I know that I grew from where I was in August, but I am behind where I should be.” (Student #5, Female, May 22, 2019) When asked which part of FSL was most difficult the same student said, “You didn’t teach as much, you kind of let me figure it out on my own. Sometimes I never did.” (Student #5, Female, May 22, 2019)

Table 4

*Interview Population*

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Gender</th>
<th>Interview Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student # 1</td>
<td>Female</td>
<td>May 20, 2019</td>
</tr>
<tr>
<td>Student # 2</td>
<td>Male</td>
<td>May 20, 2019</td>
</tr>
<tr>
<td>Student # 3</td>
<td>Female</td>
<td>May 21, 2019</td>
</tr>
<tr>
<td>Student # 4</td>
<td>Male</td>
<td>May 21, 2019</td>
</tr>
<tr>
<td>Student # 5</td>
<td>Female</td>
<td>May 22, 2019</td>
</tr>
<tr>
<td>Student # 6</td>
<td>Male</td>
<td>May 22, 2019</td>
</tr>
<tr>
<td>Student # 7</td>
<td>Female</td>
<td>May 23, 2019</td>
</tr>
<tr>
<td>Student # 8</td>
<td>Male</td>
<td>May 23, 2019</td>
</tr>
</tbody>
</table>
Efficacy

In regard to the questions, do you enjoy being in the classroom with the instruction method used by the teacher? and How does this learning environment support your learning? Seven out of eight students responded that they enjoyed the classroom, and it was beneficial to their learning. Student #1, a female, responded by saying, “Yeah, my old teacher would just teach the whole class on the board all day, or if we read a book, she would have to choose it. I feel like you care about what I need and what I think.” (Student #1, Female, May 20, 2019)

When asked, “How does this type of classroom support your learning,” Student #5 answered:

I like it when you teach at the board. If there is something that we can't get past. Then after you re-teach it, I go back, and I get it right and move on. I enjoy being here because I learned a lot. This class was easy and hard at the same time.

The researcher asked this participant to elaborate and she answered, “It’s hard because you really got to get your work done, but it’s easy cause you to know exactly what you got to do.” (Student #5, Female, May 22, 2019)

According to the students’ accounts when asked about efficacy, the student responses were consistent. Students became engaged through the use of progress markers and instant feedback. Through the use of technology, the programs in Front Seat Learning were able to provide several cues and opportunities for trial and error with instant feedback.
THE IMPACT OF STRUCTURAL SUPPORTS IN EDUCATION.

Student #2 responded by saying, “I like that we work on computers. It makes learning fun. I actually want to work in this classroom.” (Student #2, Male, May 20, 2019)

These cues signaled how they are performing on a task and established their efficacy for similar tasks in the future. Goal setting played an important role in promoting self-efficacy in Front Seat Learning. Students entered learning activities with goals set by both the teacher and the student. As students worked on tasks, they observed their own performances and evaluated their own goal progress. A participant made the following statement, “When we have our goal sheet and check off our skills, it’s motivating. It makes me feel good when I accomplish my goals.” (Student #8, Male, May 22, 2019) Another participant, Student #1 said, “I work hard to get the badges in Khan. Me and my friends see who can get the most badges every day.” (Student #1, Female, May 20, 2019)

Students working harder for positive reinforcement was not too surprising. Pajares (1994) explained, “When students perceive satisfactory goal progress, they feel capable of improving their skills; goal attainment, coupled with high self-efficacy, leads students to set new challenging goals” (p. 197). These findings from the interviews and survey suggested that when students had strong beliefs in their self-efficacy, the more likely they were to set challenging goals for themselves which may have, in turn, resulted in stronger commitments to attaining those goals.

In addition, students who were assured in their abilities to achieve success in their studies were most likely to possess the need to achieve excellence. As Student #4 said:
Yeah, it’s cool. My last math teacher worked at the board a lot and she would tell us what to do. We would have to like listening to her talk and then, and then write it down in my notebook. But I would always get off track and start talking and stuff, and then I would get in trouble. But here you don't have to really explain too much because you already put my skills on the computer. I like doing my own thing. I never get in trouble here. Plus, you get to work with other people. I don’t get bored. (Student #4, Male, May 21, 2019)

Furthermore, the results suggested that students who possessed the need to achieve excellence or demonstrated higher levels of achievement and motivation had the tendency to set more challenging goals than those with lower levels of achievement motivation.

For example, one student replied, “I like that we work on computers and using the goal sheet made me work harder cause I want to go to the goal parties.” (Student #7, Female, May 23, 2019)

The students also seemed to be motivated by their perceptions of the teachers’ beliefs in regard to their capabilities. Student # 6 said, “You would give me things that actually helped me in class. You actually make us work. You want a lot.” (Student #6, Male, May 22, 2019)

Students reportedly enjoyed the level of autonomy in the class. All of the students interviewed agreed Front-Seat Learning set them on clear paths for success and they were motivated by reaching their goals. Due to the high levels of self-efficacy, the students responded, students were active participants in their learning, they persisted longer and had fewer adverse emotional reactions when encountering difficulties.
Grit

The researcher defined grit as the ability to preserve and remain tenacious toward the goal of being resilient despite setbacks and obstacles (Duckworth & Gross, 2014). Duckworth and Gross (2014) explained that people with grit continue working toward their goals and did not allow challenges to deter them from completing their goals. People with grit have been resistant to failure in the short term in favor of long-term goals (Duckworth & Gross, 2014). In Front Seat Learning, students learned to persevere through challenges using trial and error (Sams et al., 2019). They learned mistakes were necessary for future success and the amount of time required to complete a goal was irrelevant.

Though the assessment results from the quantitative phase showed a tremendous amount of growth, there was something the data did not capture. That was the grit that students developed over the course of 10 months from participating in the Front Seat Learning Program. Success was not necessarily defined by how well students performed on standardized tests or their rankings in classes, but their abilities to work hard, to struggle, and to persevere until they accomplished their tasks. The students in the experimental group spoke of the perseverance developed through the study. When asked, “How does perseverance help you in this class when you suffer challenge, failure or setback? One student explained she liked that the teacher focused on having a growth mindset. The student said, “In my other classes if I get something wrong, I would just move on. But not in here.” (Student #5, Female, May 22, 2019)

Another student explained the trial and error required by Front Seat Learning by saying, “So, if you put me on one thing, then it will be hard. We can go back to it, and we...
go relearn it again. I don’t want to move on until I understand it.” (Student #2, Male, May 20, 2019)

Knowing how to persevere in a task may be just as important as the knowledge within a task, which was necessary for grit (Duckworth & Gross, 2014). When grit was taught in the classroom, it had a long-term impact that went beyond their classrooms’ doors.

Students also were asked, How did you feel when you did not understand something in the class? Student #4 answered, “It’s frustrating to keep getting the wrong answers. But if there is something I don't understand. I can watch your videos, go to YouTube, or ask somebody in class.” (Student #4, Male, May 21, 2019)

Another participant, Student #3, said, “I can ask you if I need help or I can ask another student.” (Student #3, Female, May 21, 2019)

This revealed that students felt as if they had to learn perseverance through various experiences, which allowed them to stay motivated.

The researcher elaborated by asking Student #1 about soft skills and what he/she learned and how this would benefit his/her in the future and outside of the classroom. Student #1 said:

Definitely, you taught me about trial and error. The websites we use give feedback right away. That way, I can know that I got the answer wrong and fix it.

I learned to set a goal and not give up in the class.

Learning how to promote grit in the classroom supported students in adopting growth mindsets, so when mistakes were made, students perceived them as opportunities
to grow. Students also formed grit in their classrooms through relationship building, challenging tasks, and active reflection. (Student #1, Female, May 20, 2019)

Student #7 said, “At first, you used to get on my nerves, because you were always on me, but after a while we got cool.” (Student #7, Female, May 23, 2019)

When this student was asked how the negative relationship impacted her learning, she said, “It impacted a lot, ’cause if I don’t like you, I’m not going to do anything you say.” (Student #7, Female, May 23, 2019)

As students engaged in pursuing their goals, they may have encountered a wide range of challenges. Students were more likely to persevere when the learning environment had a fair and respectful climate, conveyed high expectations, emphasized effort over ability, and provided the necessary resources, and had strong, supportive relationships (Farmer et al., 2015).

While grit itself was unlikely to be harmful, some misconceptions about it have been that it can potentially be damaging when applied. For example, persevering to accomplish goals that are unrealistic, unimportant, or in some way inappropriate for the student might have detrimental impacts on students’ long-term retention in school, conceptual learning, and psychological well-being. When asked, Is this classroom structure hard for you? Student #2 said, “One time I was stuck on something for like two months. That’s too long.” (Student #2, Male, May 20, 2019)

When asked, if he/she sought help or why he/she didn’t seek help, the student responded by saying, “You would have just said use your circle of resources first. I don’t want to hear that sometimes.” (Student #2, Male, May 20, 2019)
When asked if there was anything that was difficult for her, the student stated, “I wish that you were more specific in your directions, and I don’t always know what you want me to do. It frustrates me sometimes. I wish we could take more brain breaks.”

Student #8 said, “I like that I know what I need to do to bring my grades up, but sometimes it was too hard. I never could catch up. Other teachers would give me extra credit or help more.” (Student #8, Male, May 23, 2019)

The research synthesis indicated two potentially important factors. First, students needed opportunities to take on worthwhile long-term or higher-order goals that were optimally challenging and were aligned with the student’s value. Optimally challenging goals were those that were within the student’s range of proximal development—not too difficult and not too easy. Second, students needed a rigorous and supportive environment to accomplish these goals and to develop critical psychological resources.

**Student Agency**

Student agency referred to the level of autonomy given in the classroom (Walton, 2007). Student agency was fostered by supporting choice and through activities that were meaningful and relevant to learners, driven by their interests, and often self-initiated with appropriate guidance from teachers (Walton, 2007). According to the participants’ interviews in this study, several students noted the autonomous environment of their classrooms and spoke to autonomy promoting engagement. One student said, “The best thing about this class is that you get to choose what you work on. Plus, I like it when we get to the group projects.” (Student #2, Male, May 20, 2019) When the student was asked which project was his/her favorite, the student answered, “The high ropes. I like to be outside, and it was fun.” (Student #2, Male, May 20, 2019)
Another student mentioned the autonomy of completing tasks. When asked “How do you monitor or assess how well you are doing in this class,” Student #8 answered, “I look at my goal sheet; I love crossing out skills that I passed.” (Student #8, Male, May 23, 2019)

Another student explained, “You come in class, look at your goals, and figure out what skills you need to work on.” (Student #5, Female, May 22, 2019) The student explained that the teacher and student set goals together. The student then elaborated, “Well, you don’t care how we learn the information, all you care about is that we figure out ways to help us pass.” (Student #5, Female, May 22, 2019)

When the researcher asked another student “How do you monitor or assess how well you are doing in this class?” She said, “If it’s something that I know I passed, but you don’t think I did, then you always make us prove it.” Like you will give us a quiz or make us put on a presentation.” (Student #7, Female, May 23, 2019) I asked, “Do you like that?” She said, “Not really, it’s a lot of work for something that I know how to do.” (Student #7, Female, May 23, 2019)

Simply, student agency gave students a voice and, often, choice, in how they learned. Their abilities to make a decision triggered a greater investment of interest and motivation. Student agency built the critical thinking and problem-solving skills students needed to thrive. One student was asked, “What happens when you disagree with your teacher about the progress you have made on the goal sheet?” The student responded by saying:

If you question what we were doing, we have to prove to you the reason why we're doing something. If I said that I passed adding and subtracting decimals, I could
take a test using Khan Academy. One time I created a shopping list of the stuff I wanted for my birthday. I had to total it all up and subtract it from the amount of money I started with. I like it in this class, we always doing that kind of stuff. (Student #3, Female, May 21, 2019)

In this response, the student made a personal connection to the required material. This was an important part of FSL because students who have engaged actively in their learning tended to build deeper understandings of content. When students were given the opportunities to provide meaningful input, they learned leadership skills like active listening, the ability to give and receive feedback, and how to pose creative solutions to complex challenges. One participant explained:

Everybody’s voice matters in this class. This classroom setup allowed me to share some of my thoughts and I was able to learn from my friends. You’re a cool teacher because you really care about us and what we think. I’m not used to that. I like doing my own thing. I never get in trouble here. Plus, you get to work with other people. I don’t get bored. (Student #7, Female, May 23, 2019)

As such, FSL allowed the participants to have a choice and voice in their educational experiences as they progressed through mathematics mastery by harnessing their own intrinsic motivations to learn. The researcher in this study observed participants striving to take full ownership of their own learning.

By the end of each conversation, the researcher was able to see how Front Seat Learning promoted student agency and meaningful ownership in students. Student #6 wrote, “This was the kind of mind I would need to succeed in college. This provided new insights and information.” (Student #6, Male, May 22, 2019)
Several students made references to the relationship building between themselves and the researcher and themselves and their peers. The researcher also realized that students were thinking about how this type of instruction would help them succeed in their future academic endeavors and even college.

Front Seat Learning promoted in agency in students by recognizing learners as active participants in their learning and engaging them in the design of their learning experiences. The newly formed bond between teacher and student assisted students’ realization of their achievements in ways that were beneficial to the student beyond the classroom.

It seemed probable that the student-centered Front Seat Learning mastery-based educational approach that used data-driven decision making, technology integration, experiential learning, and collaboration fostered student ownership, which thereby increased student’s mathematical achievement. Front Seat Learning promoted student ownership by fostering behavioral dispositions, such as student agency, grit, and self-efficacy. Possibly one of the most compelling attributes of personalized learning stemmed from its potential to create meaningful opportunities for students to take ownership of their own learning.

Overall, students had a positive impression of Front Seat Learning as a method of instruction and classroom structure and appreciated that the instruction was individualized. For example, one student said, “The best thing about your classroom is that it is personalized.” (Student #5, Female, May 22, 2019)
She further explained that she liked that she could go on to a new skill if she passed the previous one by saying, “I don’t have to stop my learning process because of other people in the class.” (Student #5, Female, May 22, 2019)

Another student agreed and said, “I learned the most in your classroom and more than I ever have in any other classroom.” (Student #1, Female, May 20, 2019)

Student #3 agreed as well and said, “I like the freedom, it’s not boring.” (Student #3, Female, May 21, 2019)

Although most of the feedback was positive, there were a few students who were not fans of FSL. Student #8 explained that she did not enjoy the classroom structure as much as her previous math classes. He said, “I like it when teachers teach me, I can’t learn by myself.” (Student #8, Male, May 22, 2019)
Chapter 5: Discussion and Conclusions

Summary of Study

The purpose of this chapter was to summarize the study and to provide recommendations and implications for future research. The project began with a desire to increase middle school students’ mathematical mastery and ownership skills. From 1974, a wide gap has existed between Caucasian and African-American children in mathematics during the middle and high school years (Fryer & Levitt, 2004). African-Americans have been underrepresented in categories that were often associated with success in both college and careers and overrepresented in most categories that were associated with failure (Christopoulou et al., 2018). When measuring achievement using standardized assessments, African-American students have regularly scored well below Caucasian and Asian students in all core academic areas, including science, mathematics, reading, and writing (Cooper & Fashola, 1999). In addition to academic achievement, African-American students have been marginalized in advanced programs, including honors courses, gifted programs, and advanced placement courses while being overrepresented in remedial academic tracks (Darling-Hammond, Ancess, & Ort, 2002).

More recently, studies on the achievement gap suggested continual inequalities despite the many reform initiatives. There has been a lack of significant evidence that these reforms have mitigated the severe challenges faced by this population.

The researcher believed because of the poor performance of African American students in math, the same students lack opportunities for educational attainment, college readiness, and long-term careers. Several studies showed that indicators from elementary school through middle school were strong predictors of which students were likely to
drop out later (Balfanz & Herzog, 2005). The research did not ignore the additional factors in underachievement for example lack of resources, low attendance, suspensions, and teacher quality. The researcher chose to focus on math assessment scores because performance in math was a key predictor of academic performance (Cooper & Fashola, 1999).

The researcher believed that by increasing African American students’ mathematical mastery and ownership skills, students improved their college and career readiness, thereby increasing long term career opportunities in order to improve their lives, their families’ lives, and the lives of their communities.

**Summary of the Findings**

The overarching research question for the study was: What are the effects of the Front Seat Learning program on math achievement and student ownership? In comparing the math achievement of the experimental group and the control group, the experimental group experienced substantially more growth in Grade Level Equivalency at the end of the study. In examining the effects of Front Seat Learning on student ownership, students in the experimental group displayed increased self-efficacy, agency, and grit by the end of the study.

As a result of the work, the researcher identified a surprising indirect connection that all students in the study had. There were dynamics in play that shape middle-school, African-American students’ opportunities to succeed or to fail in mathematics. It was apparent that students were required to navigate the dynamics of interpersonal development, teacher-student relationships, and peer influence on their educational journeys.
During the middle school years, students were developing their interpersonal intelligence (Fisher & Rickards, 1998). They were crafting their own understanding of success, and where they actually fit into that model. The researcher has concluded from the assessment scores and students’ interviews, that interpersonal intelligence affected math achievement. During this study, the students were able to reaffirm or reject their beliefs about their mathematics abilities. Where students were on the interpersonal intelligence spectrum affected the meaningfulness of mathematical knowledge (Fisher & Rickards, 1998). And the meaningfulness of mathematical knowledge impacted the amount of effort students exerted in completing the assigned task. Students discussed a shift in not only their mathematical abilities but their desires to carry out assigned tasks. The researcher believed that the intervention, Front Seat Learning, had a positive effect on their interpersonal intelligence.

During the interviews, students made references to the partnership that took place between themselves and the researcher, as well as previous teachers. They noted the effect this partnership had on not only their mathematical abilities but their efforts and levels of perseverance within the classroom. Often the students made references to the teachers’ beliefs about their abilities and how those beliefs affected their motivation and achievement norms. Teachers’ perceptions of African-American students often have helped shape the mathematics identities of African-American students (Wimberly, 2002). For African-American students, achievement happened when there was a strong relationship between the teachers and the students (Wimberly, 2002). The agreement that took place between students and teachers revealed important findings that led to a clearer understanding of the connection between teacher-student relationships, achievement
outcomes, and student identities. The participants in this study attributed their successes to the trusting relationship developed with the researcher who had high expectations and participation in a rigorous mathematics course with highly motivated peer groups.

In addition to progressing interpersonal identities, positive teacher-student relationships, peer influence, and culture emerged as themes during this study. Front Seat Learning as a student-led classroom included heavy use of collaborative experiences among students. This environment promoted transparency, organizational achievement, and peer accountability. It was assumed that the potential of group achievement promoted transformations of individual behaviors that were aligned with the values of the group (Nelson, 2008). Peer pressure related to academic achievement and African-American students was not just a phenomenon related to low socioeconomic status. In fact, academic peer pressure often was more influential than ethnicity, gender, or income (Johnson, 2000). It was probable to contend that the environments promoted peer support on adolescents’ academic outcomes. The researcher found that support from peers was positively related to the pursuit of academic goals, as well as efforts to achieve social responsibility. Therefore, the students in this investigation who were supported by their peers were more engaged in socially and academically responsible behaviors, which garnered further acceptance by their peers. This study proposed that academic achievement was produced as individuals interacted with others whose goals were aligned.
Implications for Future Research

Self-advocacy. The researcher suggested further research in the area of self-advocacy. Self-advocacy was referred to as the ability to verbalize the needs and desires of one’s self and make appropriate decisions regarding needs (Farmer, Allsop, & Ferron, 2015). It is crucial that African American students be given opportunities to establish goals, make well-informed decisions and develop working relationships with the adults that support them. In college, students are expected to advocate for themselves. Students were required to articulate their thinking and to provide evidence to support their decision-making. The world was a large, depersonalized setting and self-advocacy was an ownership skill that supported students no matter the path in education and throughout life (Stodden, 2010).

Surprisingly, the researcher did not find much evidence of students with advocacy skills. The activities in Front Seat Learning promoted student self-efficacy and agency by offering choice and autonomy in their learning. The FSL taught students to ask for what they wanted, but FSL failed to teach students to advocate for what they needed. This could have been a result of their developing interpersonal skills. It was possible that students were unaware of what they needed to be successful in accomplishing their goals. Due to the close bond with the researcher and the collaborative culture of the classroom, it was unlikely that students were uncomfortable with advocating for themselves.

The ability to advocate for oneself as a learner was articulated by two of the participants in the form of their willingness to ask for help from the teacher on difficult tasks. The other six students made no mention of advocating on their own behalf. While
the other three attributes of student ownership were explicitly stated as essential for student’s achievement, this theme of a lack of self-advocacy needed further attention.

As noted previously, relationships played an important part in mathematical mastery and student ownership during this study. Teachers’ perceptions were also noted as an important factor in student achievement. Educators may have better served students with professional development centered around building effective relationships, and how these relationships could have contributed to student achievement within and beyond the classroom. More research is needed to understand the components in a successful relationship between teachers and African-American students. Walton (2007) stated that “indeed, a sense of social connectedness predicts favorable outcomes” (p. 20). The students were able to articulate in their answers to the interview question that their student-teacher relationship assisted in achieving their goals. They also spoke often about the researcher’s expectations and beliefs in regard to their abilities in and beyond the classroom. According to Tyler (2008), “Student positive perceptions of teacher-student interaction positively influenced their academic success” (p. 112). The researcher believed there should be further attention paid to teachers’ perceptions, teacher-student relationships, and peer relationships in the context of math instruction.

Further Considerations

The technology was one aspect of mastery-based learning that has come to the forefront of education within the last decade (Wright & Wilson, 2009). The researcher recognized that Front Seat Learning could not have been successful without the use of technology. The utilization of technology aligned with FSL core components had a positive effect on student achievement. One study argued that the use of technology
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promoted student engagement because of its student-centered approach with the stipulation that it supported content teaching and did not replace it (Wright & Wilson, 2009). It was the researcher’s belief that all students regardless of background or ability could benefit from learning mathematics strategies through computer-assisted instruction.

The researcher further recognized that the population of the study traditionally had less access to technology than their counterparts. The achievement gap will continue to widen if the technology gap continues to plague African-American communities (Carneval, 2019). The Stanford Center for Opportunity Policy in Education (SCOPE) found that technology—when implemented properly—can produce significant gains in student achievement and boost engagement, particularly among students most at risk (Zielezinski & Darling-Hammond, 2016).

The report, Using Technology to Support At-Risk Students’ Learning, also identified significant disparities in technology access and implementation between affluent and low-income schools (Darling-Hammond et al., 2012). First, low-income teens and students of color were noticeably less likely to own computers and use the internet than their peers (Zielezinski & Darling-Hammond, 2016). Because of their students’ lack of access, teachers in high-poverty schools were more than twice likely (56% versus 21%) to say that their students’ lack of access to technology was a challenge in their classrooms (Darling-Hammond et al., 2012). Zielezinski and Darling-Hammond (2016) wrote, “When given access to appropriate technology used in thoughtful ways, all students—regardless of their respective backgrounds—can make substantial gains in learning and technological readiness” (p. 4).
Computers and Chromebooks were donated to the classroom prior to this study. Before participating in Front Seat Learning, the majority of students had not been exposed to consistent use of technology in the classroom or at home. This, in turn, increased the amount of time that it took for students to become familiar and comfortable with the technology component of FSL. Additionally, many students could have benefited from furthering their studies at home. While FSL offered learning anytime, anywhere, most students did not have the opportunity to participate in the learning outside of school due to the lack of technology and reliable Internet access at home. It was the recommendation of the researcher that policies at all levels of government should aim to have technology access for all students with one-to-one computer access, and that all households have affordable and reliable Internet access.

Conclusions

The American economy has been increasingly becoming knowledge-based (Carneval, 2019); a college degree has become increasingly becoming essential. By 2025, about 75% of American jobs will require some form of post-secondary education, compared with just 23% in 1976 (Carneval, 2019). Moreover, unemployment rates were lower for people with post-secondary education, and their incomes were higher (ACT, 2014).

Educational attainment and higher household incomes have community benefits, such as increased tax revenue and less reliance on public assistance or social programs (Carneval, 2019). Other benefits of obtaining higher education degrees included reduced crime which leads to reduced incarceration, overall improved health, increased positive community engagement, increased political engagement, and increased charitable
contributions” (Lumina Foundation, 2015, para. 3). The researcher hoped that this study may provide insight and awareness around student achievement in middle-school African-American students, so that stakeholders, such as community leaders, policymakers, educators, administrators, businesses leaders, and parents can learn from and utilize to improve education and collaborations to enhance student access and success.
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Appendix A

Semi-Structured Open-Ended Student Interview Questions

Efficacy
1. This classroom is student-led meaning you work at your own pace, use data to determine the goal, track your learning, you have a choice in how and what you learn, work on real-world problems. Do you enjoy being in the classroom with the instruction method used by the teacher? How does this learning environment support your learning?
2. Is this classroom structure hard for you? If yes, could you give examples?
3. Do you think you’re learning a lot in this class, compared to your previous math classes? How do you know?
4. For the most part, do you know what you're supposed to accomplish in this class?
5. How does goal setting in this class help you with learning? Who sets the goals for your day?

Grit
6. How does perseverance help you in this class when you suffer challenge, failure or setback?
7. What happens if you don’t complete a task in this classroom?
8. How did you feel when you did not understand something in the class? Who would you prefer to seek help from?
9. What strategies or tools do you apply to improve your situation?

Agency
10. How do you monitor or assess how well you are doing in this class?
11. How do you feel when you were called on to answer a question or involved in the discussion?
13. How do you react when you have a question about the lesson in the class?
14. Do you ask your teacher or another student?
15. What choices has your class allowed you to make concerning classes, course work or participation in activities?
16. How does this class allow you to work independently and use your knowledge and skills on assignments that really interest you?
Appendix B

Front Seat Learning Survey Questions

Data-Driven Decision Making
I take assessments regularly, and you that information to make learning goals
I am able to track my learning using multiple sources of data.
I often make adjustments to my learning goals

Collaboration
I give and receive feedback to/from students in this class
I work with other students on group assignments in this class
I help my classmates and they help me with the work in this class.

Experiential Learning
During this school year, have you participated in a course that uses PBL, or Real-World Problems
I learn about things that connect to life outside the classroom
I get to design or create evidence of my learning.
Most of what I learn in my class is necessary for success in the future.

Technology Integration
I use other technology tools in class to move at my own pace on class assignments
I can learn complete work anywhere or anytime. (Meaning, at home or somewhere outside of school.
I use other technology tools in class to collaborate with other students on class assignments.

Self-Efficacy
I feel that I have learned a lot in this class compared to previous classes.
I feel like I am able to complete the tasks the teacher assigns, despite the level of difficulty
I feel that my teacher cares about how I'm doing.
Grit

The teacher expects us to work through challenging tasks without giving up
Mistakes don't keep me from learning, there necessary for success
Even when I encounter setbacks or the work is hard, I keep trying

Agency

I have a clear idea of what I will do after I graduate from high school
I am interested in the work I get to do in math class
I feel that my ideas and opinions can influence decisions made in math class.
Most of what I learn in my class is necessary for the future.
## Appendix C

### Student Progress Tracker

**Skill/Standard:**

<table>
<thead>
<tr>
<th>Student:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher:</td>
<td></td>
</tr>
<tr>
<td>Pre-Test Date:</td>
<td></td>
</tr>
<tr>
<td>Post-Test Date:</td>
<td></td>
</tr>
</tbody>
</table>

#### Pre-Assessment

Score: ______

Notes:

#### Post-Assessment

Score: ______

Notes:

<table>
<thead>
<tr>
<th>Formative Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: _____</td>
</tr>
<tr>
<td>Date: _____</td>
</tr>
<tr>
<td>Date: _____</td>
</tr>
</tbody>
</table>

Notes:

- [ ] Student mastered skill/standard.
- [ ] Student did not master. Continue instruction/begin intervention.
References


Barth, R. (1990). Teachers, parents, and principals can make a difference. Improving schools from within.


Publications.


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Supporting First-Generation Technology Agency and Social Integration through a Technology Orientation Program at a Well-Resourced Mid-sized Midwestern University

Sherry Holmes

University of Missouri, St. Louis
Abstract

This study explores benefits of implementing a technology orientation workshop to enhance technical agency and social adjustment of first-generation, Pell Grant eligible students at an affluent, midsized, Midwestern university. The study proposes that first-generation exposure to intensive, Student-led, high-end technology programs, increases technology capacity and improves the sense of inclusion. The study uses an exploratory sequential mixed methods design and was conducted in two phases over seven-weeks.

Phase 1 consisted of obtaining qualitative data through unstructured interviews of local high school college prep students. This data informed development of the Pre and Post Technology Orientation- Campus Resources Surveys distributed in Phase 2 to local high school college prep students (n=3) and first-generation students (n=9). These surveys measured and compared technology capacity of respondents before and after attending intensive workshops. Baseline survey results were used to tailor existing Student-led technology workshops.

Designed to measure and compare technology agency and social integration levels of first-generation students, Phase 2 also consisted of administering qualitative and quantitative Pre and Post First-Generation Technology Orientation- Social Adjustment Surveys and the Pre and Post First-Generation Bio Statement Surveys. A Paired Two Sample T-Test compared and triangulated pre and post findings.

Results show intensive Student-led workshops increase technical agency with all participants. Reported social adjustment levels of first-generation students also improve. Limitations include the study sample size since recruitment efforts were restricted to, and
reflective of the available first-generation population at a well-resourced university.

Future expanded and financially supported research is needed to validate study findings.
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Sherry Holmes
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Background and Rationale

The purpose of this study is to assist first-generation students’ social and technical adjustments into a well-resourced university by implementing engagement opportunities with intensive Student-led high-end technology workshops. Studies have shown that first-generation students can find the transition into higher education arenas daunting, as they have not had lifelong social and financial preparation for this academic and life changing endeavor (Storia and Stebleton, 2012). Navigating through these changes can be incredibly alienating and challenging, so much so that retention rates of first-generation students are much lower than those of their traditional counterparts (Pascarella, et al. 2004). In recent years, colleges and universities have increased efforts in creating retention programs geared toward first-generation students with a primary focus on supporting social capital and financial barriers (Pascarella, et al. 2004). This study focuses on removing technology barriers and enhancing social perceptions that are unique to first-generation, low wealth students at an elite university. Programmatic strategies designed to encourage retention and support of low wealth students require a broad range of reinforcements that extend beyond the academic curriculum and classroom settings. After all, access without support is not opportunity (Tinto, 2008)

Introduction to the Problem

Students that come from disadvantaged backgrounds in terms of both class and race enter elite university environments without points of reference. These students enter a space and culture that family members have never experienced, but yet are expected to
just figure it out. Familial preparation and coaching on how to successfully navigate an institution’s hidden curriculum (Snyder, 1963) is not an available resource for low wealth students. Coupled with meeting the overarching academic demands built into the fabric of a world-class institution, first-generation students are also expected to assimilate and conform into an alien environment. The expectations of learning and mastering social norms and behaviors in order to academically thrive at an elite campus can be viewed in the context of an additional curriculum. However, this inherent learning expectation does not come with a syllabi or office hours. This sphere of institutional unspoken norms, values and tacit cues illustrates components of the Hidden Curriculum and is referenced by Snyder as the ‘emotional and social surround of the formal curriculum’ (Snyder, p. 4).

Elite universities embody systematic standards, values, and beliefs that encompass and promote high academic and social prestige. Although attending a wealthy college historically has been an option reserved for the wealthy (Karabel, 2005), in recent years, highly selective and affluent schools have embarked on efforts to address diversity issues based on financial status by increasing access pools of financial aid to need based students. This silo approach of increasing outreach and enrollment to underserved students, with a primary focus on fiscal gaps, only addresses one dimension of concern. Merely providing money to increase access to a world-class education, does not take into account culture shock first-generation students face once they arrive on to an affluent campus. Students from disadvantaged backgrounds may feel disoriented when completing daily and necessary activities and refrain from asking for support, due to stereotype threat. Through the lens of a first-generation, low-wealth Student, consider the tension one experiences when entering a wealthy college campus recently deemed as
having the best college residential buildings in the country (Princeton Review, 2019). From walking across perfectly manicured lawns, to navigating through continuous and massive construction sites erecting new buildings, to having daily housekeeping services clean one’s dorm room, a first-generation Student could become overwhelmed by all the wealth that surrounds them. Now imagine going into a campus eatery during a mid-day lunch rush and having difficulty choosing a meal due to not understanding the difference between organic cage free eggs and vegetarian free-range eggs. Holding up the ordering process while wondering what exactly a plate of country pate and burrata is, the first-generation Student grows anxious and confused. Students in line likely grow impatient since they all are likely familiar with these choice options. This type of interaction could encourage a first-generation Student to shy away from public dining options and revert to their room to eat alone. While this example might seem extreme, it is representative of the types of social integration conflicts first-generation students face at elite universities. These types of encounters encourage isolation.

Food security issues are not uncommon experiences in the background of many first-generation students, but expectations of knowing which gourmet delicacy to order during a busy lunch hour is foreign territory. Underserved students come from starkly different environments than that of traditional students at an elite university. The term admitted does not correlate to acceptance for low wealth students at top-flight schools. These students are given consent to enter these wealthy institutions based on interviews, essays and data, but are not assessed or taught how to effectively use facilities or high-end resources in order to function like the majority of students on campus. Universities presume that these students will organically come up with viable solutions to navigate
through these challenges. In other words, these students are expected to just figure it out (Venti, 2018).

Elite universities make presumptions that high-achieving, low wealth students are able to effectively use available campus resources, including technology, and only address financial barriers during the admissions process. Increasing financial aid provides a key to many doors but does not expound on the use of networks or tools behind them. Critical thought about orientating first-generation students on how to engage with and use available resources offered in a wealthy academic environment needs to happen prior to the students’ arrival. Considerations that foster engagement and use opportunities with top flight tools and resources that exist throughout the students’ living and learning experience is essential in ensuring that first-generation students feel as if they belong. In general, social and academic gaps exist between traditional and low-wealth students at affluent schools (Harackiewicz, et al 2014). These gaps are widened when environments are intentionally designed to cater to the experiences and expectations of the wealthy. Within these settings, first-generation students tend to self-select isolation as a means of coping with feelings of insecurity and academic under preparedness. Instead of connecting with other students to get help when struggling academically, first-generation students will try to figure out solutions on their own.

One study on black students taking and failing calculus at Berkley revealed that almost 90% of the first-generation students studied only by themselves, a pointed difference from students of Asian descent, who were much more likely to combine studying alone, eating together and studying with peer groups. The study also noted that the hours spent studying were fairly parallel between both groups. (Treisman, 1992) For
the latter group of students, social support blended with academic support yielded higher grades. In short, by weaving academic expectations such as studying into the fabric of social norms such as communal eating, students are more likely to collectively persist and achieve Student success. Without this sense of connectedness and support, first-generation students experience retention problems and gaps that negatively impact academic pursuits.

Encouraging use and facilitating Student-led training on how to use high-end technology resources available throughout an affluent living and learning environment can assist with closing these deficits. At the elite university of focus for this study, high-end technology resources are available for use by all residential students, but many low-wealth students that have attended underserved schools do not have prior exposure or experience with these high-quality tools. Elite universities provide these resources to ensure students can produce the best quality of work and have expectations that underserved students will just figure out (Venti, 2018) how, and when, to utilize them. This lack of foresight does not encourage social integration, but in fact fosters attitudes that encourage withdrawal and isolation. Data shows that first-generation college students that do not see themselves as a member of a community have higher attrition rates than low wealth students that are socially engaged (Tinto, 2008). Understanding and facilitating first-generation Student-led intensive workshops on how to use high-end technology in common spaces is a means of correcting this error in judgment.

Customized first-generation technology orientation workshops, developed and led by students, can help low-wealth students learn how to use state of the art technology resources that they normally would not engage with. This technology orientation program
serves a dual purpose; students are encouraged to learn about and use available campus technology resources—specifically resources that might have once been considered out of scope (i.e. high end computer access/development training); and acts as a catalyst that creates social integration opportunities for first-generation students broadening relationships with support staff and widening networks of peer mentors.

Implementing an intensive technology orientation program, specifically designed for first-generation students can help students adapt to the digital infrastructure at an elite university and create social support structures with peers and university staff. Research shows that students that do not integrate socially and academically are more likely to drop out during the first semester than their counterparts (Sax, Gilmartin, Keup, DiCrisi, and Bryant, 2000). The implicit question from the mentioned dining scenario remains; how can one expect low-wealth students to navigate and master aspects built into a hidden curriculum at an elite university, especially if baseline levels about use and interaction of available campus resources are not assessed and addressed by the university? Intentional programming needs to be developed that includes access to an array of social services, and provides pre-arrival assessments relative to campus living and learning environment readiness and resource exposure/training.

Programmatic strategies need to be put into place that supports and sees first-generation students as individuals with complex needs and unique concerns, both of which transcend monetary solutions and fiscal interventions. The outcome of using the just figure it out philosophy is evident in attrition rates of first-generation students. Due to social, economic and systemic constraints, odds are stacked against students from racial and socially disadvantaged backgrounds graduating within a traditional four-year
timeframe. Elite schools addressing financial issues experienced by first-generation students, experience a boost in terms of diversity numbers but this act does not address the need of developing engagement strategies that foster community integration nor does it help students gain practical and transferable skills using available technology resources.

In the fall of 2014, the New York Times published an article identifying a particular affluent midsized Midwestern university as the least economically diverse institution in the country (Leonhardt, 2014). In direct response to this report, the university announced, in January 2015, that it was planning a major expansion of financial aid offerings and pledged to increase enrollment numbers of Pell Grant eligible students from 6% to at least 13% by the year 2020 (Leonhardt, 2015). Intensive recruiting efforts by university administrative areas such as admissions, office of the provost and financial aid departments were implemented to increase the admissions and yield rate of underserved first-generation students. Although these types of engagement efforts increase enrollment of marginalized students at well-resourced institutions, intentionally designed programmatic strategies that support complex transition and retention needs experienced by first-generation students are not always structured prior to students’ arrival. Monetary actions by elite universities such as increasing aid opportunities in efforts of attracting need-based students, does in fact raise enrollment numbers of first-generation students. However, paying for diversity to increase statistics does not address inclusion issues racial and social disadvantage students uniquely experience. Efforts that focus on diversity merely count people, Efforts of inclusion show that people count. Assessing and acclimating low-wealth students to technology resources shows intentional efforts of the latter.
Studies show that first-generation students are more likely to be academically and socially underprepared in comparison to more affluent students that attend elite universities. Collectively, first-generation students do not perform as academically strong as affluent students on standardized tests due to impediments involving lack of preparatory access and resources. First-generation students that did not attend boarding schools, or expensive private day schools, prior to college entry, are subjected to resources that are woefully outdated if at all even available. There are constraints with access to Advanced Placement courses, mathematics beyond basic classes, and standardized tests preparation programs (Bui, 2002; Engles & Tinto, 2008).

Although there is a plethora of research detailing reasons why standardized tests scores results differ between that of low wealth students compared to well-resourced students, underserved college students enter university with a host of situations and circumstances that present particular conditions and challenges that impact their academic college experience and confidence levels (Cushman, 2007; Robinson, 1996).

Limitations, relative to a lack of social and cultural capital, have significant negative impact on the first-generation students’ college experience, rendering these students frustrated with the educational structure more likely to isolate (Atherton, 2014). Increasing aid and recruitment efforts does help with diversifying college campuses but does not assists world-class institutions with creating environments that assess and address this groups’ readiness of utilizing available campus technology resources nor foster outcomes of Student success. A holistic approach involving the social adjustment and orientation to the tools of the environment is necessary when engaging with underrepresented students. At the minimum, potential technological and social concerns
need to be accessed and addressed in order to assist low-wealth students with their transition and integration into an elite, well-resourced institution. Upon entering into an elite university, disadvantage students that graduated from neighborhood public schools enter into a foreign world, where sounds, space and functions are unfamiliar. Entering this type of academic arena, from an underserved background can be quite disorienting. Gaps that exist for this population include access, adequacy, and equity with regard to prior exposure to high-end educational and emerging technologies when compared to traditional students that attend a well resource university.

**Problem Statement**

In terms of modern academic and trending workforce needs, technology can be perceived as a language. Without access and acclimation to this language, one is left without a vocabulary, rendering the individual incapable of fully expressing contemporary ideas. This disadvantage impacts ability of collaborating with others and stunts potential engagement and research involved in solving critical social and global needs. First-generation students face very unique challenges within the halls of elite universities. Arresting one’s academic potential and development due to a high achieving first-generation students’ sense of social and technical inadequacy should not be one of those challenges.

Pell Grant eligible recipients that lack technology engagement and acclimation experiences are at a disadvantage in comparison to wealthy students and face innumerable challenges and obstacles due to social and economic disadvantages. Ensuring that students from disadvantaged backgrounds, in terms of class and race, are prepared to thrive in an incredibly affluent and competitive academic environment
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requires encouraging and Student-led engagement opportunities to relevant and impressive technologies; resources readily available for Student use throughout elite university computer labs, libraries and residential settings.

Without familiarity and prior use of hardware such as high-end Mac computers, a Student’s ability to use available and bleeding edge software such as ARCGIS, a powerful tool for working with spatial data and research for geographic informational systems, is at best impaired. In comparison, traditional elite university students, proficient with use of high-end technologies such as 3D printing are at an advantage with pursuing, expanding and achieving academic endeavors. This lack of knowledge produces disparities between these two groups and yet both are expected to equally meet and master social and academic requirements expected of them from convocation through commencement. Without addressing Student agency with regard to technology use, first-generation students experience struggles that directly impact Student success and retention rates. Data shows, recruitment data of low wealth students does not remain stable throughout a four-year retention. Underserved students do not achieve graduation rates like their counterparts. (Davis, 2010).

Rates of Student success improve drastically for first-generation low wealth college students who have access to technology tools both inside and outside the classroom environment (Wang et al, 2014). If low-wealth students have no prior exposure to higher end technology upon entrance into an elite school, they are at a disadvantage upon arrival. Technology plays a critical role in shaping one’s college education experience in the 21st century. If students have had limited to no exposure to technology
tools and resources available at a world-class institution, how are they expected to compete or stay on par with counterparts of their class?

**Significance of Study**

Research conducted in this study supports and progresses the academic and social capacity of underserved college students at elite universities in support of achieving Student success. By initiating and fostering Student-led technology engagement opportunities Student success can be obtained for marginalized and at-risk first-generation college students. Important and necessary social integration and learning activities can surface and assist with closing social and technology disparities and gaps experienced by disadvantaged students from underserved backgrounds.

**Research Questions**

The primary research question of this study is –Does attending a Student-led two-month intensive Technology Orientation Program developed for first-generation, Pell Grant eligible students increase one’s ability to use available high-end Student technology resources at a midsized, Midwestern well-resourced school?

This primary question leads to three sub-questions. Two of these sub-questions relate to social components of first-generation students. These two sub-questions are as follows:

1a) Can engagement from attending a technology orientation workshop improve first-generation Pell Grant eligible students' sense of social integration at an elite well-resourced university?

1b) Can attending a two-month Student-led technology workshop program increase first-generation, Pell Grant eligible students' levels of confidence and sense of support at a well-resourced university?
The third question that surfaces from the primary question is related to the local college prep high school technical skills and potential impact. The third sub-question is:

1c) Can local High School College Prep students’ technical skills improve with using campus technology resources at a well-resourced university?

For the primary question, the researcher hypothesizes:

\( H_1 \) Attending a Student-led high-end campus technology orientation workshop will increase first-generation students’ ability to use emerging Student campus technology resources.

Relative to the sub-questions, the researcher contends:

\( H_2 \) First-generation low-wealth students that attend a Student-led technology orientation workshop will experience an increase in levels of self-assurance.

\( H_3 \) First-generation students that attend a Student-led high-end technology workshop will experience an increase of levels of community cohesion.

\( H_4 \) Attending a Student-led high-end campus technology orientation workshop will increase local college prep high school students’ abilities to use emerging Student campus technology resources.

The null hypothesis for the studies’ primary question is:

\( H_{01} \) First-generation students that attend a Student-led technology orientation workshop will not experience an increase in ability of using high-end campus technology resources.

The null hypothesis for the secondary questions related to first-generation students involving social integration and confidence levels are:

\( H_{02} \) Attending a high-end technology orientation program will not increase first-generation students’ sense of social integration levels at a well-resourced university.
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(H01) Attending a high-end technology orientation program will not increase first-generation students’ levels of self-assurance or social support levels.

The null hypothesis for the third sub-question related to the local high school college prep students’ workshop impact experience is:

(H04) Local College Prep High School students that attend a Student-led technology orientation workshop will not experience an increase in ability of using high-end campus technology resources.

Of note:

The theoretical framework used by Vince Tinto’s longitudinal research on learning communities’ outcomes (Tinto, Engstrom, 2008) coupled with the intensive workshop model used by Uri Treisman’s research on first-generation Hispanic and black calculus students (Treisman, 1992) informed the researchers’ design for this study. The researcher used both qualitative data and quantitative data to measure and produce outcomes. Treisman (1992) and Tinto’s (2008) research assisted the build and execution of this study. Both these pioneering researchers’ work encourages critical thought and examination of minority students’ needs in order to achieve Student success. The researcher noted specific elements that surfaced throughout Tinto (2008) and Treisman’s (1992) work with underserved students and embedded these components into the study. The particular themes used in both research models involved; focus on collaborative learning between students and educators (i.e. students are responsible for learning and assist with leading courses, educators actively facilitate collaboration by changing classroom environment or updating syllabi etc.), responsive and intentional support by faculty (i.e. linked classes, collaboration across courses, buy in from administration etc.).
These three elements were incorporated in the researchers’ programmatic structure of the study.
Definitions.

First-Generation Student- A college or university Student from a family where no parent or guardian has earned a baccalaureate degree (Choy, 2001).

Agency- The capacity, condition, or state of acting or of exerting power

Pell Grant - Federal Pell Grants usually are awarded only to undergraduate students who display exceptional financial need and have not earned a bachelor's, graduate, or Professional degree.

Digital Divide – Unequal access between groups of different demographics that make use of internet computer-related technologies problematic, and is defined by descriptors such as socio-economic status (SES), education level, language, geographic location, age, and race.

Stereotype Threat: Negative stereotypes about socially marginalized groups hold that any lack of socioeconomic success may be attributed to internal deficits rather than social, historical, or situational injustice. A Student who identifies as a member of one of these groups may feel anxious about confirming such negative stereotypes through her individual achievement. Insidiously, this experience commonly leads to academic underachievement through an unconscious self-handicapping (Steele & Aronson, 1995).

Impostor Syndrome: High-achieving people may feel that their success has nothing to do with their individual efforts or talents. Instead, they attribute their success to external factors such as luck, coincidence, or the ease of an endeavor. These feelings of what students described as phoniness, negatively affect academic performance, social integration, and emotional health.
Social Integration—Interactions outside the classroom between students and other campus individuals and/or groups (Tinto, 1975). Often reflects peer-to-peer or faculty-to-peer interactions.

Learning Communities Model—Learning communities emphasize collaborative partnerships between students, faculty, and staff, and attempt to restructure the university curriculum to address structural barriers to educational excellence.

Student Success—College completion

Model of Institutional Departure: Theory that argues that to persist, students need integration into formal (academic performance) and informal (faculty/staff interactions) academic systems and formal (extracurricular activities) and informal (peer-group interactions) social systems.

Liquid Networks—A concept that illustrates a situation characterized by the creation and maintenance of an intellectual and physical space. This space nurtures the slow but eventual generation of ideas and resulting innovations through collaborations among individuals and even groups coming from different backgrounds.

Technology Identity—Four areas of an individual’s belief system: beliefs about one’s technology skills, beliefs about opportunities and constraints to use technology, beliefs about the importance of technology, and beliefs about one’s own motivation to learn more about technology.

Federal Work Study Program—The FWS Program provides funds for part-time employment to help needy students to finance the costs of postsecondary education.
Literature Review

There are two commonalities that surface throughout literature review, relevant to this study about technology gaps, social integration and first-generation low-income students; there are social and economic stratifications with regard to access to technologies (Wilson, Wallin, & Reiser, 2003) and social integration is paramount with supporting first-generation Student success. It is of the researcher’s contention that poverty is an industry and is one that can be dismantled. The literature review helps with supporting methods of understanding means to support students that have been underserved at home and face great psychosocial and academic pressures at elite universities. For the first part of this review, focus will be on research conducted about the digital divide that impacts disadvantaged first-generation college students.

Stratification of Access

In simple terms, there are students that have access to technology and those that do not. Access to technology is not equitable or evenly distributed, and thus low-income students identified as high performers throughout their secondary education, that do not attend select private or exclusive schools, face significant struggles with the use of technology upon college entrance. In Access to Technology and the Transfer Function of Community Colleges; Evidence from a Field Experiment (Fairlie & Grunberg, 2014), there is a clear correlation of computer use and low-income Student success rates. The study focuses on individuals that have had exposure to technology both inside and outside the classroom setting throughout their higher educational schooling at a community college. This mixed method research randomly assigned free computers to
286 financial aid need-based students. Course taking and transfer behavior were tracked for two years.

Throughout discovery, lower income students were found to have little or no access to a computer within the home setting and limited availability with regard to Internet usage. Findings showed that students that had consistent computer access were more likely to take courses that could be considered transferable into a traditional four-year college program. Results from the field experiment indicate that the treatment group of students receiving fee-waived computers had a 4.5 percentage point higher probability of taking transferable courses than that of the control group of students not receiving fee-waived computers. This suggestion is less apparent for the effects on actual transfers to four-year colleges. However, the findings of the study do suggest evidence of small positive effects. For instance, the treatment group had an 11- percentage point higher probability of using a computer to search for college information than that of the control group. This finding represents one of the ways computer ownership correlates to a positive Student effect in terms of Student success. (Fairlie & Grunberg, 2014).

Students that had ownership or access to a home computer were more likely to take part in research activities conducive to transferring to a four-year college. These students spent digital time discovering university choices, admission requirements, tuition, financial aid processes, and identifying which of their courses were transferable into a four-year degree program. In contrast, students without home access or limited access to technology showed a lower interest in pursuing transfer into a four-year college after commencing studies at a two-year community college. This study shows a correlation with technology access and pursuit and achievement of an advanced degree.
Coalition for College

Research also shows that affluent universities have made concerted efforts with reaching and admitting high achieving low-wealth students. In 2015 the Coalition for College was launched as a means of creating an online portal to help streamline the application process with a focus on closing financial and information gaps that exist for low-wealth students. The Coalition for College provides free online college-planning tools that assist with the navigation and administrative processes needed when applying to college. Underrepresented students were a target for elite universities with hopes of decreasing socioeconomic deficits impacting diversity and inclusion representation at affluent universities. The goal was to promote access, financial aid support and successful enrollment strategies for all students with a primary focus on reaching underserved students. During the initial launch of the coalition, which consisted of 80 top tier schools including all eight of the Ivy Leagues were promoting affordable tuition along with need-based financial aid for in-state residents. As of 2019, the Coalition for College as well as the numbers of low-wealth students enrolling into college has swelled. Figure 1 shows the current member schools of the coalition as of 2019.
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**Coalition for College Member Schools**

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**Figure 1.** Coalition for College Member Schools. Meet our Members. (n.d.). Retrieved from http://www.coalitionforcollegeaccess.org/members-new.html.
Since 2015, recruiting efforts have been aggressive and successful with getting underserved students through the doors of elite universities, but the institutions are lacking in terms of being able to ensure first-generation students are equipped for success. Simply put, the wants of the majority grossly overwhelm the needs of the poor. Anthony Jack’s (2019) book The Privileged Poor explains the reasoning for the disparity in numbers in the following way:

New data provides a more detailed, and even more discouraging, snapshot of where Americans from families of different income levels go to college. In 2017, the economist Raj Chetty and his colleagues found that students from families in the top 1 percent — those with incomes of more than $630,000 a year — are 77 times more likely to attend an Ivy League college than are students from families that make $30,000 or less a year. The study showed that a startling number of elite colleges — 38, by their count, including places like Colby College and Bucknell University — have more students from families in the top 1 percent than from families in the bottom 60 percent (the growing group of families that make less than $65,000). At Colorado College, the ratio is greater than 2 to 1. At Washington University in St. Louis, it is just over 3.5 to 1.4. (Jack, 2019, pg. 5)

Institutions face challenges with meeting social and economy of scales demands while running parallel the examination and reframing of existing Student services to accommodate non-traditional students’ needs. In an article from an issue of Change, Cliff Adelman referenced the conundrum and suggests that there is no long-term solution to the retention problems of low-wealth students without institutions fundamentally
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changing Student services operations and the approach to addressing first-generation, low-income needs (Cathy Engstrom & Vincent Tinto 2008)

Technology and Student Success

Studies show a correlation with Student academic performance and technical exposure and capacity. A research team investigated 3,083 first-year college students of twelve four-year universities in Taiwan (Tien & Fu, 2008). This research centered on four primary questions:

1) What are the undergraduates doing with the computers they use at colleges?
2) How do undergraduates perform in regard to computer knowledge and skills?
3) With what is the digital divide among college students correlated?
4) What consequences does the digital divide have for Student academic performance?

Tien and Fu’s (2002) research also shows that dedication to academic computer work and computer knowledge helps students succeed academically. The study notes, “In controlling for the effects of other variables, students who devoted a greater proportion of their computer time to academic work tended to obtain higher academic grades.” (2008, p. 432). This work clearly shows a pattern of technology exposure and usage as it relates to higher academic performance. This study reinforces the need of accessing first-year college students’ technology skills and developing measures to address gaps that arise throughout the assessment.

An additional study conducted by Du, Sansing, & Yu (2002) examines the relationship between computer use and academic achievement, showing both generic and specific benefits of computer use based on socioeconomic status and race categories.
While this research revealed the minor discovery of any correlation between computer use at home and academic success; strong findings suggest that students that have exposure to technology outside of drill purposes or traditional classroom settings, are more likely to engage with research and higher cognitive level learning opportunities and experience Student success in higher education (2002).

This theme of academic success for students and its relation to one’s exposure to technology is also illustrated in work produced by Goodfellow & Wade (2007), but of important interest is the assumption by institutions that modern students are naturally tech savvy. This study acknowledges the idea that first-year students enter college with varying experience, exposure and knowledge about technology. However, this study examines the administrative assumption that all incoming first-year students are in fact computer literate, in particular as it pertains to research practices. This study took place over a three-year span at Penn State Schuylkill Campus and involved 888 first-year students and was conducted by way of literature review and ongoing surveys.

Findings of this research clearly demonstrate that a digital divide exists amongst first-year students, especially in key computer literacy domains necessary for college success. Of noted interest was the lack of skill and ability to conduct library searches. Wade and Goodfellow (2007) highlighted this concern and made mention that facilitators and administrators of college success programs need to be mindful of this issue as they create and develop technology gap programs. More importantly, this study prioritizes assessment and meeting the students where they are by intentionally gauging students’ technical performance and knowledge. In contrast to presuming students have a baseline knowledge of technical skills prior to college entry, this research suggests that
administrators assess technical skills of students prior to their campus arrival (2007). The researchers also argue that if universities continue to make assumptions about students' abilities, they make even the most basic transitional problems overwhelming to first-year students, thus perpetuating the barriers brought on by the digital divide. This particular study mentioned limitations of minority participants engaging in this study (2007). There was a lack of minority students and marginal voluntary participation. Due to the results of Goodfellow and Wade's (2007) work and limitations on minority participation, one could presume that figures of computer use and literacy are even lower for racially and socially disadvantaged students.

**Institutional Blindness**

Another study of interest comes from the research of Joanne Goode (2010). The digital identity divide: how technology knowledge impacts college students research explores the sociocultural components that assist in the development of a students' technology identity. The study poses the following question; How can educators reinforce positive attributes to encourage inclusive participation and access across populations?

This mixed method study received 513 respondents from a technology survey conducted at an urban West Coast university within four residential halls. To ensure a high response rate of the initial survey, the survey was distributed during freshman floor meetings throughout the first few days of move-in. This method of participation is a truly brilliant concept to ensure a sufficient response rate. Three students that were identified as having varying technology experiences and cultural identity were selected for the case study. In contrast of a global representation of Student technology experiences, Goode’s work was interested in the individual Student experience. The research proposes that
one’s particular technology identity impacts the academic experience and social growth of college students. Goode’s research (2010) examines and defines the concept of technology identity and applies a theoretical and methodological approach to study the digital divide and impact on first year college students. The study analyzes qualitative data obtained by students through a mixed-method study. Evaluation of qualitative data allows research beyond just access and skills perspectives related to digital inequalities. According to this study “Narratives collected from students demonstrate how powerful sociocultural influences, such as family practices and access to a quality K-12 education, contribute to the development of a technology identity” (Goode, 2010, pg. 497).

Examination of qualitative data in this study, illustrates the frustrations disadvantaged students experience with adapting to the expectations embedded in the digital environment at a university. A Student that arrived in the states from Mexico when she turned 16 recalls her vexation with her college technology experience throughout Goode’s (2010) study:

“If they want to help the freshmen class, do so at orientation. We’re paying $340 and all they do is talk to us, and we take nothing away. What’s the point of the computer labs when students don’t know how to access them? We should learn this instead of the dumb workshops we go through that we already know … they never told us how to drop a course or change classes on [university online registration system]. They never told us … I would also have them teach you to use [the] library’s database” (Goode, 2010, pg. 505).

Goode’s research (2010) takes a holistic approach with defining how a Student interprets their technical abilities and contends that multiple dimensions (i.e. economic
background, self-perception, race, gender and access to technical resources) and perceptions influence academic success rates and impedes the student experience for disadvantaged students. Goode’s work puts more responsibility for change on universities and colleges and urges that these institutions make intentional efforts to address these struggles experienced by first-generation low-income students. The narratives from participants obtained in this study draw attention to the role of schools and universities as institutions that are prolonging – rather than resisting – inequalities associated with the digital divide.

**Digital Divide by Design**

Stacy Hollins’ (2015) research titled The Digital Divide: Through the Lens of Critical Race Theory, details that African American students experience larger technology gaps in comparison to white students. There is no silver bullet that can correct this situation overnight, but the issues and consequences perpetuated by this plight need to be recognized and addressed. In this study Hollins’ (2015) states:

“All students should have the opportunity to begin at the same starting line and be equipped with the tools they need to make it to the finish line. There are various starting lines in the lives of African American college students that white students do not encounter. For example, many African American students come to college underprepared due to the racial and ethnic stratification of educational opportunity in the K-12 education system” (Hollins, 2015, pg. 14).

From this viewpoint, it is an inherent responsibility of elite universities to assess technology skills of first-generation students but it is much easier for administrators to
make assumptions about technology knowledge of low-wealth students, rather than to act on actual assessments.

Hollins’ research also supports the thought that administrative leaders are assuming students from all backgrounds are entering higher education with same or on par technical abilities. The study recounts an alarming encounter at a Midwestern college leadership meeting held in order to detail and design the future state of the general education course curriculum. A rather pointed and spirited debate ensued over whether or not to include computer literacy courses for the general education block and was eventually dismissed by the most senior administrator in the room. Hollins notes:

“I have come to realize that there is a common misconception that all college students come to campus with technology skills and availability to technologies for the successful completion of their college careers. Because I am a technology and business professor, many African American students have shared their stories with me of hardships relating the lack of access to the Internet, hardware, software, technology training, technology support, and community resources - technological resources” (Hollins, 2015, pg. 2).

Administrative goals and objectives can at times impede the development of the most important constituents at a university; the students. Assumptions made by administration can yield devastating effects on underserved students’ academic careers. Institutions need to collectively and intentionally assess and address the digital use divides that occur with low-wealth students.

**Learning Communities Model**

A particular educational model that has been reported to help underprepared students with their socialization and academic endeavors is the implementation of
learning communities. A study conducted by Vince Tinto and Cathy Engstrom (2008) focused on measuring the impact of implementing the learning communities model for underrepresented college students across the country. It is important to note that embedded in the fundamentals of the research teams’ practice of learning communities is Tinto’s Model of Institutional Departure (2008). The Model of Institutional departure represents what psychosocial considerations are needed to ensure a Student is successful, and engaged during one’s academic pursuits. This model frames the entire students’ experience and prediction of success within the lens of integration of a students’ informal and formal networks. To ensure matriculation these integrations need to develop between the Student’s academic performance (formal), faculty and staff relations/academic resources (informal), extracurricular activities (formal) and social/community contacts (informal) that exist within a college community. Tinto’s Model of Institutional Departure (2008) approaches students as more than one-dimensional subjects. Tinto (2008) argues that that students have various attributes, gained prior to entering university, those interact with as well as integrate into the academic and social systems of a university. An example of Tinto’s Model of Institutional Departure (2008) is illustrated in Figure 2.
In this model, Tinto contends that in order to decrease dropout rates of students, social and academic integration into a university are essential factors of consideration that impact Student success. According to Tinto, aspects that predict and impact a Student’s decision to persist through studies are based on five primary factors; a) academic integration; b) social integration; c) goal commitment; d) institutional commitment; and e) the learning community (Tinto, Pg. 95).

Learning communities emphasize the environment and components that underlie pedagogy. Figure 3 illustrates an example of a Professional Learning Communities Model developed by teachers and put into place to help support Student learning.
Tinto and Engstrom’s study (2008) consisted of a four-year systematic, multi-institutional, longitudinal study designed to measure the effects of implementing learning community practices while contemporaneously using collaborative pedagogy that creates these environments. The study included 19 institutions sampled from 40 institutions across the country. Participants were from 13 two-year colleges and six four-year colleges. The total number of study participants were 5,729 of which 2,615 students were
assigned to learning communities and 3,114 were in traditionally taught classroom settings. (2008) By creating a sense of connection, and humanizing the learning experience, students that were in the learning communities persisted through completion of their studies more so than the comparison students. At the end of the study, results showed a 10 – 15% difference between the retention figures and in one particular learning community it was a 20 % difference with the rate of Student success (2008).

The primary driver behind learning communities is structuring a team mentality where students lead and lean on one another throughout a course or block of time. Collaboration and sensing that one is part of a community is vital to the success of the Student using this model. The three components built into these learning community structures were:

1) The linking of basic skills courses such as developmental writing/reading to content courses such as History or Sociology. Such linkages make possible the immediate application of skills being learned in a developmental education course to what is being learned in the course to which it is linked.

2) The use of pedagogies of engagement such as cooperative or problem-based learning that requires students to learn together in a coherent interdependent manner. The evidence in this regard is clear. Students who learn together become more academically and socially engaged, learn more, and in turn persist more frequently.

3) The linking up of classroom activities to support services on campus. In this way basic skills learning communities serve as conduits to other support services that low-income students might not otherwise access. (2008)
These adaptable communities focus on providing specific support structures to an environment. Data collected through surveys and interviews revealed a primary sense and theme experienced by participants of this study:

- A safe place to learn
- A supportive place to learn
- A Sense of belonging.

In reflection of why an intentionally designed learning community’s method of teaching and learning is effective, Tinto noted:

“Learning communities heightened students’ sense of themselves as learners and increased their confidence in their ability to succeed. When we asked students, two years after their learning community experience, what they had learned from it, they spoke of becoming more aware of their needs and responsibilities as learners and themselves as college students. They felt that they belonged in college and had the ability to succeed” (Tinto & Engstrom, 2008, pg. 49).

The research captured narratives from participants and illustrated the impact individual students experienced at the end of this longitudinal study. One Student spoke of feeling like being a part of a community:

“When I went through the program, it changed the whole perspective because I wasn’t an individual in a class. I was part of a class; I was part of a college”. (Tinto & Engstrom, 2008, pg.49)

Another Student spoke about her deep sense of validation as a learner:

“I think I have gotten smarter since I have been here. I can feel it.” (2008 pg.49)
Motivation was another outcome of this style of learning for low wealth students and served as fuel to persist through studies:

“We motivate each other, and we keep each other on track. Cherry and I are in these classes together, so we usually are doing our homework together. We have discussions, sometimes heated discussions, on a lot of different topics. When we get back to class, we know what we want to talk about, ask about, what we want to present. So it helps to have friends to help you with essays, readings, discussion topics” (Tinto & Engstrom, 2008, pg.48).

Simply put, students in the learning communities were more academically and socially engaged and supported one another during academic pursuits. Students worked together, collectively toward a common goal of obtaining Student success.

Applying this methodology to first-generation students at an affluent school might not render the exact same results but implementation could still be helpful. The most prominent point brought out in this research is the fact that similar people helped one another succeed. Embedded into this learning style philosophy was a reach while one climbs effect. There were more students that shared similar backgrounds to connect with and to also form partnerships for group projects. A concern that could rise applying this exact method to first-generation students at an elite university is based on numbers. There would not be enough similar students to pair with and or partner. This method might be difficult to arrange in an equitable manner in a classroom setting at an affluent university.

The greatest advantage that the learning community model brings to the table is that they are flexible and able to change according to use case and needs. More research is needed
about learning communities’ models and implementation within elite universities that are aggressively recruiting low-wealth students.

Another essential component of the learning community model is the faculty and teachers that create and support these arenas. Just as much as students require a sense of connectedness and peer-led mentorship, staff that take part in these learning environments need to maintain the same support structures for one another. According the study Advancing Urban Latina/o Youth in Mathematics: Lessons from an Effective High School Mathematics Department by Rochelle Gutiérrez “These teachers interact on a daily basis to coordinate their mathematics teaching, to mentor other teachers, to develop themselves professionally, and to facilitate meaningful relationships with each other and their students” (Gutiérrez, 1999, pg. 270).

**Intensive Workshops Work**

Further research supports the idea of intentionally designing and weaving community cohesion within a challenging class curriculum yields positive results for underserved and underprepared first-generation college students at an affluent university. Not just assigning and tasking students with group projects but giving critical thought into creating learning spaces that teach students how to work together with a focus on producing stimulating and meaningful work. The lack of stimulation and mandate of remedial courses is likely a reason as to why these typical approaches do not impact academic deficits that underprivileged students bring with them once they enter an elite university leaving services and resources unused. Many first-generation students that attend top-tier colleges are regarded as some of the brightest and smartest people in their families or have graduated in the top of their high school class. To be offered or forced to
take remedial courses or engage with remediably designed support services, is on par with an affront. The researcher knows from personal experience, that no Student wants to be considered the free lunch kid and will go hungry to avoid accepting this label and will refuse to surrender to the pangs. This type of thought process might appear to be baffling but could be considered by an academically and socially disenfranchised Student as a clear logical defense of avoiding being characterized as deficient in comparison to traditional students.

According to work conducted by Uri Treisman in the late 1970’s, study results of challenging African American and Hispanic students by creating an intensive calculus workshop showed incredible and progressive results of an increase and grades, testing and overall performance. It needs to be mentioned that the workshop was open for all students to attend, but was deliberately designed to stimulate thought about one of the most challenging subjects students encounter at college, calculus. This study and workshop was not created for the sake of just helping kids out, but was approached out of needs of succession planning and the replacing of aging mathematic professors at Berkeley and throughout the United States. The interest of getting blacks and Hispanics engaged and equipped with these specific math skills was also addressed by Treisman (1992) because he was aware of the increase and campaign of enrollment of first-generation students from low wealth backgrounds. These students entered Berkeley with interests in math and sciences but did not have the prerequisites completed in order to engage with math and sciences like traditional students, at least not without taking remedial courses. Treisman (1992) goes on to say,

“In 1978 we began to experiment with solutions. Our idea was to construct an
anti-remedial program for students who saw themselves as well prepared. In response to the debilitating patterns of isolation that we had observed among the Black students we studied, we emphasized group learning and a community life focused on a shared interest in mathematics. We offered an intensive workshop course as an adjunct to the regular course. In contrast to the traditional remedial programs that offered reactive tutoring and time management and study skills courses which have a questionable scholarly base, we provided our students with a challenging, yet emotionally supportive academic environment” (Treisman, 1992, pg. 368).

Results from the intensive workshop implementation and study were astounding. First- generation students calculus grades did not only improve but in some cases, students outperformed traditional students. Treisman noted:

“The results of the program were quite dramatic. Black and Latino participants, typically more than half of all such students enrolled in calculus, substantially outperformed not only their minority peers, but their White and Asian classmates as well. Black students with Math SAT scores in the low-600s were performing comparably to White and Asian students whose Math SATs were in the mid-700s. Many of the students from these early workshops have gone on to become physicians, scientists, and engineers. One Black woman became a Rhodes Scholar, and many others have won distinguished graduate fellowships. By 1982, more than 200 ethnic minority students were being served in the workshops, which were then run cooperatively by a faculty committee, the College of Engineering, and the Student Learning Center” (Treisman, 1992, pg. 369).
Treisman’s focus on fostering a sense of community through small Student-led learning sessions coupled with exposure to stimulating and intensive material served as a critical basis for the framework of the researcher’s study. This formula and design for success will be discussed thoroughly in chapter 3.

**Exposure Expands**

Another common theme literature shows about first-generation students is that past exposure and experiences play a major role in academic and social integration at elite schools. Although, the past does not have to dictate one’s future it certainly impacts the course and speed of one’s academic progression. First-generation students do not unlearn habits or erase familial responsibilities just by entering university. Many first-generation students find themselves leading two identities, one of a college Student at a premier institution and one that has been deemed as a responsible resource for family and community left behind at home. This type of pressure coupled with not having prior and equal access to a top tier formative education and resources impacts first-generation students’ cognitive and academic performance. For these students, issues that supersede economic strains and academic preparedness impact performance and integration into an elite institution. There are psychosocial matters that play a role as well. Feelings of guilt, limited parental insight and other non-academic strains are factors that impact the social and academic adjustments first-generation students need to make. In short, these students are stretched thin and often have to maintain the demands put upon them by family members, all while trying to meet up not keep up with their counterparts’ academic and social performances. This type of mindset would likely improve if these students were intentionally exposed to different viewpoints and social capacities that are offered.
through Student-led technology programs. Again, there is no suggestion of a silver bullet but the elements of exposure to race and social disadvantages low-wealth students face could have strong bearing as to the delays and struggles that surface in statistical data and research about this population. Disadvantaged students that struggle with the academic pace and social shock that occurs at an elite university, could experience improved mental health and connectedness if engaged in a technology orientation program specifically designed for their baseline level of interest and knowledge.

The brain’s plasticity allows change to occur by experience or exposure. Patrick Sharkey’s (2010) research shows that children that have been exposed to violence experience mental, language and behaviorally impairments. The work reveals that early life stress, in the form of violence exposure, is related to neurocognitive deficits, including executive functioning and problems in self-regulation (2010). These types of events can regress a child by two grades depending on type and length of exposure. If it’s possible to unwire a brain to unlearn information based on a tragic experience, it is possible to rewire a brain so to speak by non-tragic exposure. Exposure opportunities can in turn enhance one’s psychosocial status.

A 3-year longitudinal study conducted from fall 1992 through the spring of 1993 as part of the National Study of Student Learning (NSSL) on the cognitive and psychosocial of first-generation students’ development during college, reports that within their first year of studies, in comparison to traditional students, first-generation low-wealth students, completed fewer credit hours, worked more hours per week, did not take as many credits in humanities and fine art courses, made little progress on measured standardized reading exams in comparison to counterparts, and believed that faculty was
not concerned about students or the act of teaching (Pascarella, Pierson, Wolniak, and Terenzini, 2004).

Results of this study revealed findings that support the idea that students from low-wealth backgrounds can improve confidence and adjustment levels by exposure to peer lead activities. In the researchers’ realm, the activity that would be the catalyst for exposure would be a Student-led technology orientation program. Findings from this critical study show that joining Student groups and engaging with students from different backgrounds, not similar students, increased higher order level of thinking for underserved students. Metacognitive expansion did not occur with the same intensity for traditional students that took part in the study. Actively engaging with diverse students fostered outcomes of an expanded growth mind-set at a greater rate with low-wealth students of this study.

As mentioned earlier, there is no silver bullet to ensure Student success for first-generation students that enter a well-resourced institution. There are many touchpoints that need consideration when supporting disadvantaged students, however, classroom support structures that encourage self-supporting Student classroom groups have been shown to assist first-generation students with development of critical thought processes and academic success. The study states:

A second area of particular importance to first-generation students was the level of engagement in academic or classroom activities. There were exceptions to this, but the weight of evidence we uncovered suggests that, compared to students whose parents had moderate or high levels of education, first-generation students tended to derive significantly greater educational benefits from engagement in
academic or classroom activities. For example, hours studied, number of term papers or written reports completed, number of unassigned books read, and scores on an overall measure of academic effort/involvement all had more positive effects on a range of end-of-second- or third-year outcomes for first-generation than for other students. These outcomes include critical thinking, writing skills, openness to diversity, learning for self-understanding, internal locus of attribution for academic success, preference for higher-order cognitive tasks, and degree plans. Pascarella et al., (2004).

Participation and exposure to engaging classroom communities and activities enhanced the quality of learning for first-generation students. By facilitating classes that encouraged Student collaboration and a sense of community cohesion, first-generation students’ outcomes of persistence and Student success increased. Critical thinking skills and demonstrative intellect expanded for disadvantaged students. Within this environment, low-wealth students had a sense of support and belonging and their academic performance greatly benefited from this type of planned learning community structure and had more of this impact than on traditional students.
Methodology

Workshop Design.

Using the frameworks and models provided by Tinto and Treisman’s work, the researchers’ goal was to implement a Student-led technology orientation intensive workshop designed specifically for first-generation, low-wealth students that encourages active involvement and agency with using residential campus technology resources. By engaging with this peer led technology orientation workshop, first generation students would also increase integration opportunities into a living learning community enhancing one’s sense of belonging and support at an affluent school.

Research Site Context.

The research took place in a well-resourced, midsized, Midwestern private university. Total costs for the 2019-2020 school year is $72,192 which includes the following: Student activity fee-$542, Student health and wellness fee-$500, room and board $16,900. Please note, the board fee used in this figure references minimum purchase amount required for first-year students. Additional fees not included in the above sum are; estimated books and supplies-$1,126, Travel-$1,346, Miscellaneous-$2,246 (personal care items, clothing etc.).

The endowment as of 2018 is at 7.6 billion dollars. The total number of enrolled students as of fall 2019 is 16,265. There are 7,181 undergraduate day students and 692 undergraduate students enrolled in evening and part-time programs. There are 7,534 Graduate Students enrolled in day school divisions and 858 graduate and professional students enrolled in evening and part-time programs.
The total number of Student enrollment for the class of 2023 is 1744. The total number of First-Generation students is 159, which is 9% of the class of 2023. Lastly, the number of Pell Grant Eligible students is 269 equaling 15% of the class of 2023.

**Demographics.**

Recruitment population for local college prep high school students was identified by a senior staff leader of this need-based program. This senior staff program leader contacted potential participants and parents and provided information about the technology orientation study as well as informed consent. From this outreach, nine local college prep high school students responded with interest. Although 9 students responded and attended two half day technology orientation sessions only 3 students provided signed parental informed consent. All 9 local high school college prep students were invited to attend the technology half day workshop sessions but due to receipt of parental informed consent, 3 of these students were included in this study. Participation represented by the local college prep high school students can be illustrated as n=3. Aside from parental informed consent, no biographical or demographic information that could lead to identify the local college prep students was obtained throughout this study.

Data provided by a Student financial department at the midsized Midwestern university indicating Student federal work-study status was used to send a blind copy email to potential first-generation study participants. Request for discussion for study overview and expectations with informed consent was sent by email to 20 first-generation college students. Out of the 20 first-generation students, 9 agreed to participate in the study, submitted informed consent and met with the principle investigator for study overview and demographics' screening questions.
THE IMPACT OF STRUCTURAL SUPPORTS IN EDUCATION.

Question 1 involving gender representation for first-generation participants (n=9) indicated that 11% were female (n=1), and 89% were male (n=8). Response to Question 2 regarding first-generation response to race identity indicated that 11% (n=1) identified as Asian, 67% of respondents identified as Black/African American (n=6), 11% (n=1) as identified as Hispanic, and 11% (n=1) identified as White/Caucasian (See Table 1).

Table 1

| Participant’s Response to Demographic Screening Q.2, “I identify my race as:” |
|-----------------|-----|-----|
| Race            | Count | Total |
| Asian           | 1    | 11%  |
| Black/African American | 6    | 67%  |
| Hispanic        | 1    | 11%  |
| White/Caucasian | 1    | 11%  |
| Grand Total     | 9    | 100% |

First-generation Status.

A total of 100% (n=9) of participants identified as First-generation students indicating that neither parent had ever been to college or received a bachelors’ degree.
Academic Representation.

Demographic screening notes and pre-technology orientation bio statement captured the range of school year enrollment and participation. The range showed that 39% (n=3) of respondents were seniors, 11% (n=1) was a junior, 39% were sophomores, and 22% (n=2) were freshman (see Table 2).

Table 2

<table>
<thead>
<tr>
<th>School Year</th>
<th>Count</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>2</td>
<td>22%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>3</td>
<td>33%</td>
</tr>
<tr>
<td>Junior</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td>Senior</td>
<td>3</td>
<td>33%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>9</td>
<td>100%</td>
</tr>
</tbody>
</table>
In terms of area of studies 39\% (n=3.5) were Arts & Science majors, 50\% (n=4.5) were Engineering majors, 11\% (n=1) was an Art/Architecture major. Note, one Student was a dual major split between Engineering and Arts and Sciences. The range and representation of studies spanned from the performing arts to mechanical engineering (see Table 3).

Table 3 Participant’s Response to Demographic Screening Q.4 “What school(s) are you currently enrolled in?”

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Arts and Sciences</td>
<td>3.5</td>
<td>39%</td>
</tr>
<tr>
<td>Engineering</td>
<td>4.5</td>
<td>50%</td>
</tr>
<tr>
<td>Art and Architecture</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>9</td>
<td>100%</td>
</tr>
</tbody>
</table>

Tuition Costs.

In response to demographic screening question 5 of “Do you qualify for in-state tuition?” data shows that 56\% (n=5) qualified for in-state tuition attendance at this well-resourced Midwestern University and 44\% (n=4) were from other regions of the United States.
Financial Aid Eligibility.

Question 6 of the demographic screener indicated that all the respondents 100% (n=9) were Pell Grant Eligible and responses to question 7 revealed that 100% (n=9) were Federal Work Study eligible. This data was confirmed during the recruitment phase as well as during the one on one discussion with the principle investigator.

Local college prep graduate.

Participants were asked in question 8 if they were graduates of the local college prep high school program. Data representation shows 56% (n=5) of first-generation respondents attended and are graduates from the local college preparatory program. The remaining participants, 44% (n=4) were not graduates from the program.

Question 9 of the demographic screening questions asked first-generation graduates of the local high school college prep program respondents t(n=5), which cohort of the program they were part of. Results reported that 60% (n=3) graduated from cohort 2 and 40% (n=2) graduated from cohort 3.

As mentioned earlier, demographic information was not captured for current local high school college prep participants (n=3) in this study due to protecting identification of minors.

The Study

Phase 1 consisted of high school seniors (n=3) taking part of a local college prep high school program. Qualitative data was obtained from participants and used to inform development of survey instruments that measured pre and post levels of interests, access and agency involving campus technology resources. Respondents met with the researcher for an informal discussion focused about technology. Notes were collected manually and
no audio or video recording of the interview took place. Captured notes were reviewed and confirmed by participants to assure information gathered was depicted as accurately as possible. Analyzed data was used to create four instruments; the Pre and Post First-generation Technology Orientation - Campus Technology Resources Assessments as well as the Local High School College Prep Pre and Post Technical Orientation - Campus Technology Resources Assessments.

The local high school college prep participants attended separate technology workshop sessions. These sessions consisted of attending two 4-hour technology orientation workshops. Pre and post data results from the high school participants were compared with first-generation (n=9) participants at the end of the study to observe any similarities, or variances.

At the start of Phase 2, all first-generation participants (n=9) respondents completed a First-generation Pre-Technology Orientation - Campus Resources Assessment and a First-Generation Pre-Tech Orientation - Bio Statement and Questionnaire. These surveys were developed to find technology baseline statuses as well as to gather social integration insight of first-generation students. Data collected from the First-generation Pre-Technology Orientation - Campus Resources Assessment was used to refine existing Student-led technology workshops. Workshops relative to the three primary technologies discovered through qualitative discovery were modified by Student technical leads in terms of timing, content, coverage and learning objectives. Data from the first-generation bio statements and surveys were used to help students introduce one another and gauge areas of social strengths and concerns noted by participants. The latter
The impact of structural supports in education.

Data discovery was helpful with designing the First-generation Pre and Post Technology Orientation- Social Adjustment Assessments.

Pre and Post First-Generation Technology-Campus Assessment instruments measured and compared technology capacity of respondents before and after attending Student-led intensive workshops over a seven-week period and were developed to specifically gain insight on Student familiarity, interests, use and confidence with leading others relative to high-end Student technology resources available throughout the residential community. Baseline technical survey results were compared with post technical survey results by way of Paired Two Sample T-Test analysis.

Aspects of first-generation social integration discovery involved multiple survey sources. Triangulating data for this domain required application of different surveys with efforts of assisting discoveries and impact experienced by participants after attending technology orientation workshops.

The tools primarily gauged respondents’ sense of community cohesion as a member of the university community and level of engagement and support experiences with university support staff, outside of advisors and faculty, before and after attending technology workshops. Pre and post data related to social adjustment and support were compared and analyzed using a Paired Two Sample T-Test at the start and end of the study.

All respondents completed informed consent forms and were made aware that data that could identify them or any of the research documentation would be stored in an offsite secure cloud service for no more than five years and only available to the researcher.
**Study Methodology.**

An exploratory sequential mixed method research framework was selected for this study. This particular method was chosen due to Creswell's explanation of gathering qualitative information from a particular group, in this case the local high school college prep participants (n=3) through initial informal interviews then building quantitative tools based on gathered qualitative data. For this study, the second group consisting of first-generation college students (n=9) was selected to complete pre and post quantitative instruments developed to gauge respondents' technical agency. Results were compared at the end of study to gauge or reveal potential changes or variances from pre and post participation states.

Figure 4. Illustrates the exploratory sequential mixed method design provided by Creswell that was implemented to develop the design model chosen for this study.

![Figure 4. Exploratory Sequential Mixed Method Design (Creswell, 2011)](image)

This design method allowed the researcher to gather data about experiences that could then be quantified and applied to a separate group. This method also allowed the researcher to analyze baseline levels of technology engagement and social adjustment at
the start of the research and then examine change in variances through data analysis from results.

**Phase 1 Study Design**

Group 1 respondents (n=3) that participated in Phase 1 of this study consisted of current college prep high school students. These students were interviewed about aptitude, access and interests about Student campus technology resources. Qualitative data that was gathered from this informal discussion and was used to design the First-generation Pre and Post-Technology Orientation-Campus Technology Assessment instruments. Phase 1 respondents attended training workshops that mirrored technical training sessions attended by first-generation college students in Phase 2 of study. Local college prep high school participants were asked the same quantitative questions administered in the First-generation Pre and Post Technical Orientation- Campus Technology surveys. The surveys administered for Phase 1 respondents were titled Local College Prep High School Pre and Post Technology Orientation- Campus Resources Assessments. At the end of attending the two 4-hour technology intensive and hands-on workshops, pre and post Technical agency data from the college prep students were compared for any changes in reported technical agency and confidence levels.

**Phase 2 Study Design**

Group 2 participants (n=9) consisting of first-generation college students attending an elite university were administered the following surveys; First-Generation Pre and Post-Biography Statement and Questionnaires, First-Generation Pre and Post-Technology Orientation-Campus Technology Assessments, and First-Generation Pre and Post-Technology Orientation - Social Adjustment Assessments.
First-Generation Pre-Technology Orientation - Biography Statement and Questionnaires and the First-Generation Pre and Post Technology Orientation -Campus Technology Assessments were designed based on qualitative analysis data gathered in Phase 1. Existing Student-led technology workshops were modified to align with areas of technical interests that surfaced during analysis.

The First-Generation Pre and Post Technology Orientation -Social Adjustment Assessments were developed based on thematic elements that surfaced from data analysis and coding provided by participants during the administration of the First-Generation Biography Statements and Questionnaire. Permission to use the Your First Year Survey provided by the Higher Education Research Institute at UCLA was requested by the researcher and granted. This tool along with themes discovered through careful coding analysis informed the structure and content of The First-Generation Pre and Post Technology Orientation -Social Adjustment Assessment instruments which focused on gauging social integration levels throughout this study.

First-generation students attended existing Student-led technology workshops and shadowing sessions that were refined and tailored for the interests of first-generation participants. Existing technology modules, coursework content and timing were adjusted to focus on areas of interest indicated by participant feedback. First-generation students attended these intensive technology workshops over a seven-week period providing hands on training and exposure to programming, hardware and 3D printing resources. The goal of these intensive workshops was to increase demonstrative technical agency. Prototypes were created by each by the end of each Student-led workshop.
At the close of the study, first-generation students were administered post assessment surveys asking the exact same questions from the First-Generation Pre- Technology Orientation -Campus Technology Resources and the First-Generation Pre- Technology Orientation -Social Adjustment tools distributed at the start of the study. Only quantitative questions from the First-Generation Post-Technology Orientation- Biography Statements and Questionnaires were used to measure potential improvement and impact on respondents’ technology leadership skills and reported social integration and confidence levels. Participants were also asked to provide a statement about the impact if any, experienced by attending this seven-week workshop. pre and post data results were then analyzed for findings.

**Triangulation**

Data from First-Generation Pre and Post-Technology Orientation- Biography Statements and First-Generation Pre-Technology Orientation- Social Adjustment Assessments were created to observe and measure changes involving social integration. Using more than one method to collect data on relative to social integration discoveries was incorporated as a way of assuring the validity of research and findings.

**Study Design Concerns**

Creswell notes that with all mixed methods studies, the researcher needs to establish the validity of the scores from the quantitative measures and to discuss the validity of the qualitative findings--in this case, the results from the qualitative phase were coded and measured to create quantitative survey instruments. Creswell notes:

There are design method considerations with this approach. The accuracy of the overall findings may be compromised because the researcher does not
consider and weigh all of the options for following up on the quantitative results. Attention may focus only on personal demographics and overlook important explanations that need further understanding. The researcher may also contribute to invalidating results by drawing on different samples for each phase of the study. This minimizes the importance of one phase building on the other. The sample size may also be inadequate on either the quantitative side of the study or the qualitative side (Creswell, 2009, pg.51).

Study Design Mitigations

This study incorporated and considered these guidelines and potential limitations into the planning, design, and execution process of this study.

To ensure validity and reliability throughout this study, four primary forms were used in the qualitative phase:

(1) triangulation of information amongst different sources of data
(2) member checking – feedback from informants – getting the feedback from the participants on the accuracy of the identified categories and themes;
(3) providing rich, thick description to convey the findings; and
(4) external audit – using a person outside of the project to conduct a thorough review of the entire study and report back (2009)

To reiterate, local high school college prep participants that provided valuable qualitative data during Phase 1 of the study, were requested to only complete Local College Prep High School Pre and Post Technology Orientation-Campus Technology Resources. As such, no data was triangulated with this particular group.
Timeline of Phases

A timeline of data collection processes and analysis from both groups of this study is shown in Figure 5.

Procedure Phase 1

Phase 1 consisted only of current high school college preparatory students (n=3). Out of approaching nine students for the study, three arrived for the qualitative data gathering session. After receipt of parental informed consent (see Appendix A), the informal interview was held with the three respondents from the Local College High School Preparatory Program. These students will be identified throughout this study as Student 1, Student 2 and Student 3. These students were asked about their technology
engagement, what type of technology would be helpful to know about for their college and future aspirations and general time spent on and use of computers and technologies. The primary focus of this discussion was to get an idea of the trends, interests and use cases involving technology with a group of students that were demographically similar to currently enrolled first-generation low-wealth college students. The conversation consisted of open-ended technology related questions (see Appendix B), and self-reported interests involving technology spanning from programming to sewing to dancing.

Investigation of the data began the development of codes. Categories of codes were then produced, and patterns and themes emerged which were then grouped to applicable themes. Using this thematic analysis approach, the researcher delineated codes to assist with seeking particular trend. The researcher was specifically interested in the following areas; the benefits of knowing about technology, the specific types of technology of interest and past and present engagement with technology. The codes identified and selected by the researcher were, Type, Benefit and Engagement. The researcher took careful notes throughout the informal interview session, and kept track of specific phrases throughout this discussion with the local college prep high school students.

Questions involving what are the benefits of computer use and access elicited discussion associating technology knowledge as a means to develop or increase intelligence. Computer and use of technology associated to cognitive improvement was repeatedly mentioned throughout discussion. For instance, Student 1 was adamant that if one were to learn about programming or creating applications, they could make a lot of
money and help family members. (Interview Session with Phase 1 Participant, August, 2019).

A major point that was brought up by Student 3 was that one would have to learn programming first “but computers at the library are tired and the ones at school are a mess” (Interview Session with Phase 1 Participant, August, 2019). The students indicated that they had little to no exposure to coding or programming studies in the past. Student 2 and Student 3 stated that they would like to learn about technology to help focus more. Student 2 stated that they would like to polish public speaking skills by “learning how to talk in front of people without blanking out. If I knew how to program, I’d make an app that would talk for me when I can’t” (Interview Session with Phase 1 Participant, August, 2019). Student 3 reiterated the desire to focus more saying “I’d make an app that would help me focus. Like something that would come on and calm me down sometimes” (Interview Session with Phase 1 Participants, August, 2019).

The connection of programming in relation to the arts was mentioned repeatedly as well. Talk of creating music applications to make music was referenced. Student 1 stated that they would “love to own a studio one day and make music for kids” (Interview Session with Phase 1 Participants, August, 2019). It was also inferred that mental focus would occur and time management skills would get better if the opportunity to learn programming languages was an option.

Video production was mentioned but a small debate ensued about whether or not if video production was considered programming. The researcher probed about different software platforms that allow editing and video development and Student 3 confirmed that video editing requires software skills. The technology gap that emerged during this
part of the discussion was the cognitive ability to see and use programming as a language. These students understood that programming was a language that helps with communicating ideas and that they did not have access to learning this language in their current academic or social environment.

Another theme that emerged was the idea of monetary gains occurring with learning and mastering technology resources. Students associated technology such as Mac computers and 3D printing as means and tools to start businesses. Student 1 and Student 2 stated that they did not know what 3D printing was but Student 3 stated, “Yo! You can make like whatever you want with them. Like whatever” (Interview Session with Phase 1 Participant, August, 2019). Student 3 also mentioned entrepreneurial ways to utilize 3D Printing by creating “phone cases, jewelry, you can probably make shoes.” The discussion grew quite animated and it was expressed that all 3 students wanted to know and have access to this innovative technology. Student 1 mentioned that one Student would “make enough money to buy a house” (Interview Session with Phase 1 Participant, August, 2019) and Student 3 responded, “Girl, you could make your family a house!” (Interview Session with Phase 1 Participant, August, 2019). The final theme that developed throughout the interview session that associated the types of technology respondents would want to gain access to was 3D printing. The question of “what type of technology do you know about, but haven’t been exposed to or ever used” Student 1, Student 2 and Student 3 collectively said 3D Printing. When asked why you think you haven’t had 3D Printing experience, Student 2 stated, “because of money, I guess. I don’t really even know what it is but…it it sounds expensive” (Interview Session with Phase 1 Participant, August, 2019). When the researcher stated
that a major online store sells 3D Printers, Student 2 stated “for rich kids” (Interview Session with Phase 1 Participant, August, 2019). When asked what type of technology did they wish you had at school? Student 1 and Student 3 stated “more computers” (Interview Session with Phase 1 Participant, August, 2019). Student 1 added, “Good computers…better computers” (Interview Session with Phase 1 Participant, August, 2019). Student 3 stated that they have a heavy afterschool work schedule and mentioned that they were “working to help out at home but I’m going to get a computer for college. Like a MacBook or something” (Interview Session with Phase 1 Participant, August, 2019).

Figure 6 illustrates one of the word clouds created expressing some of the terms that were mentioned throughout the Phase 1 interview. It highlights some of the words that were mentioned in the qualitative phase.

![Figure 6. Phase 1 Word Cloud. Word clouds created using frequently mentioned terms throughout the Phase 1 interview.](image)
Phase 1 Data Coding

After collection, data was uploaded into Taguette Open Source software to assist with data management, mining and coding association. After transcribing interview responses, analysis of the text was performed to delve into interview responses. Responses contained the description of the informants' views related to technology interests, opportunities, and barriers as well as past and present exposure to high-end technology resources. Phrases were highlighted and words were tagged and grouped. The researcher sought repetition of words and phrases as well as connectors (i.e. if I have a computer, then I will be ready for college etc.). There were three prominent areas that were revealed from the Phase 1 interview that surfaced throughout analysis. The codes and corresponding words and phrases synthesized a theme associating technology with the following gains; Benefit= improvement of cognitive abilities and confidence, Engagement= financial security and access and Technical Type/ Interests = 3D printing, coding and videography. These themes identified through the qualitative portion of this study were used to help develop the quantitative instrument used in Phase 2 referenced as the First-generation Pre/Post Technology Orientation- Campus Technology Resources Assessments. See Appendix C and Appendix D.

Based on analysis of qualitative data, future first-generation college students which were also the Phase 1 local college prep high school students that based on discussion have ambitions of someday attending a midsized, Midwestern, well-resourced institution did not have a wealth of transferable computer skills. These students also did not have consistent or reliable hands on exposure to high-end technology resources or
training. These students expressed interest in wanting to learn about different elements of technology but did not have the access or opportunity to expand their interests. When asked about thoughts on attending a technology workshop, Student 1 expressed concerns about “being able to learn all of that though” (Interview Session with Phase 1 Participant, August, 2019) and raised concerns about confidence of attending a technology workshop.

The participants (n=3) from the local college prep program attended two 4 hour-long technology orientation sessions that gave introductory overviews on programming, hardware components and a deep dive 3D print course as well. Prior to attending the first orientation session, the 3 participants completed the Local College Prep High School Pre-Technical Orientation- Campus Technology Resources survey (see appendix E). At the close of the last session participants completed the Local College Prep High School Post Technical Orientation- Campus Technology Resources survey (see Appendix F).

As mentioned earlier, the pre and post technical surveys were identical to the technical surveys distributed to participants in Phase 2. Data was compared from pre to post states.

**Procedure Phase 2**

Based on analysis of the qualitative data acquired in Phase 1, the First-generation Pre and Post Technology Orientation- Campus Technology Resources instruments were created. As a reminder, these two instruments were also used to test change or variance in skills and agency levels for the college prep participants (n=3).

Participants of Phase 2 (n=9) were administered a First-generation Bio Statement to complete after researcher was in receipt of informed consent. This instrument asked
four open-ended questions focused on Student background information, perspectives on technology and Student success, perception of being a first-generation Student and key interests in technology. An in-depth overview of the survey tool will be discussed in chapter 4.

Once completed, all First-generation Bio Statement forms were sent to the principle investigator (see Appendix G for a redacted yet completed example). All statements provided by pre statement bio forms were segregated and entered into Taguette open source software for grouping and coding. The researcher analyzed the pre bio statement data several times to uncover particular areas of interest (positive emotions, negative tones, resources, strengths, etc.). Data was then transferred to an excel file for further and deeper interpretation. After running and analyzing the First-generation Bio Statement Data using excel, three key areas related to social integration emerged. A review of the data populated code themes related to Wealth, Social Alienation and Self Assurance. Themes that surfaced aligned with predetermined codes defined for observation by the investigator relative to social adjustment and social integration.

**Social Adjustment Survey Design Validation**

To ensure proper development of survey instruments that specifically involved gauging and assessing current and post social adjustment states of students, in depth research and review of existing survey tools was carefully undertaken. The researcher reviewed several available research resources developed to gauge social adjustment and social integration levels of college students. Although these surveys did not focus on first-generation students solely, they focused on first year students’ adjustment perspectives as well as technical and social comfort levels of college students.
Frameworks for analysis tools were informed from several existing surveys in order to assist the cadence and development of psychosocial aimed questioning involving social adjustment levels of students at an affluent university.

Elements of the survey instrument titled the Internet Comfort Tool (Kaya, Weber 2003) were borrowed to incorporate logic patterns related to gauging Student computer use and social integration levels. This tool was found to be a rich reference (see Appendix F) that covered specific areas of focus relevant to the investigators’ study. Areas of comfort that were examined included aspects involving social integration as well as computer use behaviors of first-year college students.

The 2015 Student Online Readiness Instrument created and used by Yu and Richardson (2015) was created for dual purposes. The instrument was developed to measure Student readiness in online learning as well as the impact of Student success after incorporating Tinto’s social integration model into online learning arenas (Yu and Richardson 2015). This tool also assisted with the tailoring of the researchers’ social adjustment survey tools.

The Student Online Readiness Instrument examined four factors to determine Student readiness related to competency of participating and completing online courses. The confidence intervals examined were; Technical Competencies, Social Competencies with instructor, Social Competencies with classmates and Communication Competencies (Yu & Richardson, 2015). The questions used a 1-5 Likert scale and gauged respondents ‘confidence levels. This was a very useful resource used to assist with the development of the First-Generation Pre and Post Technology Orientation-Social Adjustment surveys.
administered to the first-generation participants in Phase 2 of the study. See Appendix H for example of questions used in the Student Online Readiness Instrument.

Research that was helpful with influencing the design and cadence of the First-generation Pre/Post Technology Orientation- Social Adjustment survey was Daniel Jean’s The Academic and Social Adjustment of First-Generation College Students study (2010). This quantitative study covered a wide range of areas of adjustment involving first-generation students. This study included data from a large sample (N=545) and covered an in depth look into topics of concern including, parental education, pre college separation and social perception. The logic and fixed response questionnaire assisted the researcher’s investigation. Jean’s survey was influenced by the, 2005 Your First College Year (YFCY) survey launched by Higher Education Research Institute based at UCLA to examine the first-year experience of students. The research suggests that pre-entry attributes and experiences of first-year students impacts a students’ capacity to assimilate to academic and social requirements needed when entering a college arena. Jean’s research strongly supports the fundamental elements provided in Tinto’s (2008) Student Departure theory and addresses students as holistic entities that require critical thought and assessment to improve pedagogy strategies and social integration needs that lead to achieving Student success.

Based on Jean’s research and integration of the, Your First College Year Survey, the researcher requested specific use and access to the 2019 Your First College Year Survey administered by the Higher Education Research Institute of UCLA (see Appendix I). Access and use were granted to the investigator. (See Appendix J for request and Appendix K for approval)
Phase 2 Data Coding

Informed consent was collected by all first-generation students (see appendix L). Participants in Phase 2 completed the First-generation Pre and Post Technology Orientation-Campus Technology Resources survey (see appendix M) as well as the First-Generation Pre and Post Technology Orientation-Social Adjustment Survey (see appendix N). Data from the First-generation Pre and Post Technology Orientation-Campus Technology Resources survey was entered into Excel. Technology gaps and interests populated throughout quantitative analysis. Based on technology interests provided by the first-generation students, three existing technology workshops (Basic Programming, Hardware Overview and 3D Printing) were modified by current Student technicians to accommodate respondents’ interests and technical proficiencies. Prior use and exposure results ranged from little to no exposure to high levels of exposure. For instance, the group of first-generation students ranged from having no (1) experience with programming to high (5) levels of experience with programming languages. This was likely due in part to the stratification of study areas ranging from engineering to arts and sciences that was mentioned earlier in this study. The area experts eventually assisted with training and tutoring fellow cohort members.

Even with the range of experience, collectively all students attended the 3 intensive workshops offered over the course of seven-weeks. Post assessment surveys were completed at the end of the program, mirroring the same questions asked at the beginning of the workshop (see appendix N for pre and post technical assessments). First-generation students also completed the First-Generation Post Technology Orientation-Biography Statement and Questionnaire, however students were asked to respond to the
quantitative questions to maintain data integrity. Comparisons were made between both pre and post assessment results.

Lastly, pre and post technology assessments were compared between group 1 (high school college prep students) and group 2 participants (enrolled first-generation students). Although there were less participants in Phase 1 (n=3) compared to Phase 2 participants (n=9) triangulation and interpretation of data occurred revealing progressive findings.

**Data Analysis**

Data for the First-Generation Pre/Post Technology Orientation- Campus Resource surveys and the First-Generation Pre/Post Technology Orientation- Social Adjustment Assessments were entered into excel and compared using a Paired Two Sample T-Test to address the researcher’s hypothesis. A description of exact results and testing measures will be expressed thoroughly in chapter 4. Data was also compared and analyzed using the same methodology of testing examining pre and post assessments of the college prep high school students. Data was also examined between the high school college prep students and first-generation college students to examine potential variances or similarities throughout pre and post assessments specifically with the campus technology resources surveys.
Analysis and Findings

The purpose of this study was to assess and address potential technology and exposure barriers first-generation low wealth students encounter when surrounded by emerging, high-end technology resources available at an affluent university. The study was designed to see if interaction with a Student-led technology workshop improved first-generation students’ technology skills and improved one’s sense of agency in order to use available campus technology resources. On a broader level, additional goals were to assess and address the sense of community of first-generation students by encouraging underrepresented students to collectively learn, utilize and potentially lead future training sessions involving high-end technology resources that surround students on campus. By removing potential use barriers through hands on Student-led exposure opportunities and ensuring that training design was responsive yet intensive, measures were created to see if first-generation students’ confidence levels related to support, sense of belonging and technical agency increased throughout the study.

Primary Research Question

To revisit, the primary question requiring a response within this study was: Does a Student-led two-month Technology Orientation Program developed for first-generation, Pell Grant eligible students, increase one’s ability to use available high-end Student technology resources at a midsized, Midwestern well-resourced school? To answer this question, results from the First-generation Pre-Technical Orientation- Campus Resources survey were carefully analyzed. These two surveys measured group 2 baseline scales of current use, aptitude and interest on available campus Student technology resources reported by first-generation students. A Likert scale ranging from 1 to 5 (with 1
indicating strongly disagree and 5 indicating strongly agree) was used to assess Basic Programming, 3D Printing and Hardware maintenance knowledge and exposure. The three areas of technology focus were identified by qualitative analysis from Phase 1 interview data provided by the high school college prep students.

Although the first-generation cohort baseline technical skill sets varied, likely due to a mixed level of awareness and proficiency based on area of university studies, the mean score of the pre-technical orientation results were 2.8. Data was not normalized due to the small sample population. Table 12 represents the raw scores gathered from the First-generation Pre-Technical Orientation -Campus Resources survey.

Table 12

<table>
<thead>
<tr>
<th>N=9</th>
<th>First Gen PRE TECH Orientation - Campus Technology Resources (1=Strongly Disagree--5=Strongly Agree)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Q1</td>
</tr>
<tr>
<td>R#1</td>
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<tr>
<td>Mean</td>
<td>3</td>
</tr>
</tbody>
</table>

The First-Generation Technology Orientation Post Assessment- Campus

Technology Resources was performed at the end of the seven-week intensive workshop. The mean of technical confidence and knowledge scores increased to 7. Table 13 displays the raw data used for analysis.
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Table 13

Raw Data of First-generation Post Technical Orientation Survey

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Q11</th>
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</table>

A Paired Two Sample T-Test was selected as the best testing method of analyzing results since data was examined from two different time frames. The goal was to see if there was a difference in the mean by the end of the study. The pre assessment data gathered at the beginning of the seven-week workshop was compared to results from the post assessment survey of technical skills. Results showed participants scored significantly higher on the Baseline Technical Skills scale after the seven-week workshop than before. This can be illustrated as M-before = 3, M-after 5  t = 4.47 p is 0.002. The result of this analysis is significant at p < .05.

Due to the technical aptitude variance between Group 2 respondents, the researcher did not expect a report indicating such low technical skills from this group with a mean average of 3 at the start of the study. During workshops students with engineering and computer science backgrounds reported higher levels of technical abilities than what was initially reported at the start of this survey. According to Student technical leaders, several of the participants specifically assisted fellow first-generation students throughout programming and hardware component courses. These students
clearly had a higher level of technology exposure compared to students that represented disciplines from non-engineering schools but according to the post technical data felt their aptitude had expanded after completing the workshop. This leads the researcher to believe that confidence levels not necessarily technical levels improved for this portion of the group. This increase in technical confidence is likely due to experienced programmers that are first-generation students gaining exposure to leadership and teaching opportunities to fellow students. By engaging in a technology orientation program, first-generation students reported improvement with their technical agency to use campus technology resources. See Table 14 for Paired Two Sample T-Test First Generation Pre and Post Technology Orientation-Campus Resources results.
Table 14

Paired Two Sample - First-Generation Pre and Post Technology Orientation- Campus Technology Resources Survey

<table>
<thead>
<tr>
<th>Paired Two Sample T-Test for Means</th>
<th>Pre</th>
<th>Post</th>
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</thead>
<tbody>
<tr>
<td>First Generation Campus Technology Resources results</td>
<td>2.77</td>
<td>4.56</td>
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<tr>
<td>Variance</td>
<td>1.11</td>
<td>0.27</td>
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<tr>
<td>Observations</td>
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<td>9</td>
</tr>
<tr>
<td>Pearson Correlation</td>
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<tr>
<td>Hypothesized Mean Difference</td>
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<tr>
<td>df</td>
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<td></td>
</tr>
<tr>
<td>t Stat</td>
<td>-4.47</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
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<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.86</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.31</td>
<td></td>
</tr>
</tbody>
</table>

H1) Attending a two-month Student lead technology workshop program might increase first-generation students' levels of confidence and sense of support at a well-resourced university.
The null hypothesis of no change or transition of technology skills and agency for first-generation students after attending a technology workshop is rejected.

Two of the sub-questions approached in this study involved social elements and self-assurance perspectives experienced by first-generation low wealth students at an elite university. The first subset question asked:

H2) Can engagement from attending a technology orientation workshop improve First-Generation Pell grant eligible students' sense of social integration at an elite well-resourced university?

The second question asked:

H3) Can attending a high-end technology orientation program increase first-generation students’ levels of self-assurance or social support levels at an affluent university?

To help answer these two questions, the First-generation Pre and Post-Technology Orientation- Social Adjustment surveys were distributed to Phase 2 participants. These questions were developed based on intensive research of existing social integration surveys as well as informed by data retrieved from the First-generation Bio Statements. A five-point agreement scale ranging from 1= strongly disagree to 5=strongly agree was used for the first seven social adjustment survey questions. These questions focused on the Social Alienation domain identified by coding during earlier analysis. Questions focused on current levels of worry and isolation with regards to campus life, study habits and engaging with new technology in front of peers. The nine questions that followed focused on the Self Assurance and Access to Wealth domains. First-generation students were asked about their existing levels of belonging to the community at the university, sense of inclusive opportunities to gain exposure to high-end technology, confidence to
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lead first-generation students in technology workshops as well as thoughts on high-end technology access equitability. These questions were gauged using the same five-point agreement scale used in the previous social adjustment survey questions.

The baseline mean score of the First-generation Pre-Technical orientation- Social Adjustment survey was 2.895. An increase in social adjustment levels surfaced during the social adjustment post technical assessment analysis completed at the end of the seven-week study. The reported mean for social adjustment post-technical orientation assessment was 3.854. Students had an overall increase of feeling as if they were part of a cohesive community and expressed increased confidence with leading other students in technology related activities than what was initially reported at the start of the study. Students also reported an increase in the level of access to high -end technology. Lastly general agreement that use of high-end technology was primarily accessible for wealthy students decreased. Table 15 and Table 16 detail the raw data used for analysis.

Table 15

First Generation Pre Technology Orientation - Social Adjustment Raw Data

<table>
<thead>
<tr>
<th>Respondent #</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Q11</th>
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</table>
The impact of structural supports in education.

Table 16

First Generation Post Technology Orientation - Social Adjustment Raw Data

<table>
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<tr>
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<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
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</table>

A Paired Two Sample T-Test was performed to test significance of change by comparing the pre and post social adjustment data sets. Results indicated first-generation students scored significantly higher on the Post Social Adjustment Survey scale at the conclusion of the study. This can be illustrated as M-before=3.22, M-after=4.67 \( t = 4.3, p \) is 0.002. The result of this analysis is significant at \( p < .05 \). The value of \( t \) is 4.3. The value of \( p \) is 0.002.
Table 17 also illustrates the statistical analysis, hypothesis and results for these subset questions.

Table 17

Paired Two Sample T-Test- First Generation Technology Orientation Pre and Post Social Adjustment Survey Results

<table>
<thead>
<tr>
<th>First Generation Social Adjustment Results</th>
<th>Pre-Tech</th>
<th>Post-Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.22</td>
<td>4.67</td>
</tr>
<tr>
<td>Variance</td>
<td>0.44</td>
<td>0.25</td>
</tr>
<tr>
<td>Observations</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-0.5</td>
<td></td>
</tr>
<tr>
<td>Hypothesized Mean Difference</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Df</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>t Stat</td>
<td>-4.27</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.86</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.31</td>
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</table>
H3. Attending a two-month Student lead technology workshop, might positively impact first-generation students' sense of social acclimation and community cohesion at a well-resourced university.

The result is significant at p < .05 and the both null hypothesis of no increase in social integration and community cohesion for first generation students after attending a technology orientation workshop is rejected.

Additional instruments were used and measured to assist with discovery related to social and technical confidence in this study. As mentioned earlier, first-generation students completed a Pre First-generation Bio statement survey at the start of the study and completed a Post Bio statement survey. Although qualitative questions by way of narratives were not requested in the post bio, quantitative questions were revisited. These questions centered on teaching and mentoring fellow students on technology resources, holistic sense of support at the university, and confidence of using available technology resources. Using a 10-point Likert scale of 1 being not at all and 10 being extremely confident respondents completed both pre and post assessments after the seven-week technology orientation. The mean of the pre bio survey was 4.185. Table 18 illustrates the raw data collected for the pre bio survey.
Table 18

First-Generation Pre- Bio Assessment (quantitative raw data only)

<table>
<thead>
<tr>
<th>Respondent #</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>AVG</th>
</tr>
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<tbody>
<tr>
<td>R1</td>
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<td>R2</td>
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<tr>
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<td>6</td>
<td>5</td>
<td>5</td>
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<tr>
<td>R6</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>6</td>
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<td>6</td>
</tr>
<tr>
<td>R8</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>R9</td>
<td>4</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

Mean        | 4  | 3  | 5  | 4   |

The post bio assessment showed an increase in levels of support, technical agency as well as increased sense of leadership and mentoring abilities for first-generation peers. Leadership skills were gained and demonstrated by participants when respondents volunteered to assist fellow students with learning programming languages. Students that perhaps did not have prior leadership responsibilities, helped students create digital projects that created time efficiency strategies. Instead of being spectators, these students
actively participated in guiding and leading fellow first-generation students with an area of technology that was familiar to developers. This increase in leading and mentoring others was demonstrated in the classroom setting as well as in the post bio survey data. The mean of the post bio quantitative data that specifically asked about ability to lead and mentor students by way of technology was 7.33. Table 19 shows the results of the post bio statement analysis.
Table 19

First-Generation Pre- Bio Assessment (quantitative raw data only)

<table>
<thead>
<tr>
<th>N=9</th>
<th>First Gen Post Bio Results Scale of 1 10 1= lowest 10=highest</th>
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</thead>
<tbody>
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<td>Respondent #</td>
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<td>R1</td>
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<td>R2</td>
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<td>R9</td>
<td>8</td>
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<tr>
<td>Mean</td>
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</tbody>
</table>

When results of the pre and post bio quantitative data were compared using a Paired Two Sample T-Test, data showed a significant increase in confidence levels, leadership and sense of university support. Table 20 shows the analysis results and significance. See Table 20 for hypothesis and results.
Table 20

Paired Two Sample T-Test First Generation Pre and Post Biography Statement Results (quantitative)

<table>
<thead>
<tr>
<th>First Gen Pre-Tech</th>
<th>First Gen Post-Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation Biography Statement</td>
<td>Orientation Biography Statement</td>
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<tr>
<td>Mean</td>
<td>4.2</td>
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<td>Variance</td>
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<td>Observations</td>
<td>9</td>
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<tr>
<td>Pearson Correlation</td>
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<td>Df</td>
<td>8</td>
</tr>
<tr>
<td>t Stat</td>
<td>-10.0</td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>4E-06</td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.9</td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>8E-06</td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.3</td>
</tr>
</tbody>
</table>
The results for the pre and post bio comparison can be illustrated as $M_{\text{before}} = 4.2$, $M_{\text{after}} = 7.3$, $t = 10$, $p = .0008$ due to the $E$ value. The result of this analysis is significant at $p < .05$. The value of $t$ is 10. The value of $p$ is $< .00001$.

(H1) First-generation students that attend a Student-led high-end technology workshop will experience an increase of levels of community cohesion.

The result is significant at $p < .05$, and all null hypotheses of no increase in social integration, technology agency and support for first-generation students after attending a technology orientation program are rejected.

This finding shows the largest variance over time and exposure experienced by the first-generation students. According to these results, students had a great sense of confidence with leadership and technical agency with using available high-end technology resources at the end of the study. They also had a greater sense of being a part of a supportive community at the end of the first-generation technology orientation workshop. This analysis was quite interesting since all the two social integration areas in this study were embedded into this evaluation tool. Further and more expansive research is needed to help thread reasoning as to why this very significant outcome occurred for this particular question. Perhaps the results had a correlation with the biography information that was submitted during the pre-assessment stages of this tool lending participants to personalize their responses more. There are strong socio-cultural impacts and implications that drive agency and confidence with technology. Further investigation involving community cohesion and technology confidence needs to occur.
College Prep Cohort 5 Findings

Although Group 1 participants did not take part in social adjustment assessments, the college prep students \((n=3)\) were invited to participate in the pre and post technical orientation surveys. These underserved students attended separate workshops that consisted of two 4-hour hands on training sessions that mirrored the technical training courses attended by Phase 2 participants. This training arrangement was created to address the technology gaps expressed by local college prep high school students that surfaced throughout the qualitative interview session of the study. As mentioned earlier, three high school college prep students were interviewed and gathered data was interpreted to create the pre and post technical survey tools. Overall, nine local college prep high school students attended both half-day workshop sessions, but only the three participants that were interviewed completed pre and post assessment tools. As a reminder, no biographical or demographic information was gathered from these students, but there are specific socioeconomic factors and limitations that allow local high school students to participate in the college prep program sponsored by a well -resourced mid-sized Midwestern university. In short, families need to experience an economic hardship to qualify for enrollment into the local college prep program. In short, similar if not the same sociocultural and race related disadvantages experienced by the first-generation students are shared by the local college prep high school students.

The local college prep high school students were asked the same questions that appeared on the First-generation Pre and Post Technical Orientation Survey- Campus Resources. These students all seniors have ambitions of attending an elite university upon graduating high school. The researcher found it appropriate to gauge this populations’
agency, technical abilities and present and past exposure to high-end technological resources available throughout the living and learning community at an elite university.

The surveys for the college prep students were titled High School Pre and Post Technical Orientation- Campus Technology Resources surveys. The purpose of administering this survey was to gauge baseline use, aptitude and interest in available campus technology resources. The pre assessment showed the following results seen below in Table 21.

Table 21
Local High School College Prep Pre Tech Raw Data

<table>
<thead>
<tr>
<th>Respondent #</th>
<th>Local College Prep High School PRE-TECH Orientation- Campus Tech (1=Strongly Disagree--5=Strongly Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=3</td>
<td>Q1  Q2  Q3  Q4  Q5  Q6  Q7  Q8  Q9  Q10  Q11  Q12  AVG</td>
</tr>
<tr>
<td>R#1</td>
<td>3   2   1   2   1   1   1   3   3   5   5   3   3</td>
</tr>
<tr>
<td>R#2</td>
<td>3   3   1   3   1   2   3   1   2   3   5   5   3</td>
</tr>
<tr>
<td>R#3</td>
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</tr>
<tr>
<td>Mean</td>
<td>3   3   1   3   1   2   2   2   3   4   5   4   3</td>
</tr>
</tbody>
</table>

The reported mean of 2.78 for pre technical assessment is slightly higher than the mean identified for the first-generation current college students, which was 2.72. This result was not true for the post technical assessment analysis of the college prep high school students. The post technical orientation analysis revealed a mean of 3.72 (see Table 22) compared to the 4.53 mean reported by first-generation college students. Based
on this difference, it appears that first-generation students gain scores were higher relative to the high school college prep students.

Table 22
Local College Prep Post Tech Raw Data

<table>
<thead>
<tr>
<th>Respondent #</th>
<th>Local College Prep High School PRE-TECH Orientation-Campus Tech (1=Strongly Disagree--5=Strongly Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=3</td>
<td>Q1   Q2   Q3   Q4   Q5   Q6   Q7   Q8   Q9   Q10  Q11  Q12  AVG</td>
</tr>
<tr>
<td>R#1</td>
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<tr>
<td>R#2</td>
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<tr>
<td>R#3</td>
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</tr>
<tr>
<td>Mean</td>
<td>3    3    2    2    4    4    4    5    5    5    4    4</td>
</tr>
</tbody>
</table>

A Paired Two Sample T-Test was selected to compare pre and post technical results of the college prep students. Results in Table 23 show to not be significant.
Table 23

Paired Two Sample T-Test Pre and Post College Prep High School Technology Orientation- Campus Technology Resources

<table>
<thead>
<tr>
<th>Paired Two Sample T-Test for Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.S College Prep Campus Technology Resources</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>H.S College Prep Pre</th>
<th>H.S College Prep Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Variance</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Observations</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Hypothesized Mean Difference</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>DF</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>t Stat</td>
<td>-1.73205081</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.112701665</td>
<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>2.91998558</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.225403331</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>4.30265273</td>
<td></td>
</tr>
</tbody>
</table>

(Ho4) Local College Prep High School students that attend a Student-led technology orientation workshop will not experience an increase in ability of using high-end campus technology resources. Although improvement was noted, it was not significant at the p<.05 level.
Results for the pre and post high school technical comparison can be illustrated as $M_{before}=3$, $M_{after} = 4$, $t = 1.8$, $p = 0.225$. The result of this analysis is not significant at $p > .05$. The value of $t$ is 2.9. The value of $p$ is $< .025$. The result is not significant at $p > .05$. The null hypothesis was proven correct in this instance.

The researcher found the variance reported for pre and post technical scores between first-generation college students and the college prep students to be an area of interests. The college prep students indicated higher fairly equal levels of confidence with exposure, aptitude and technical agency during the pre-assessment phase with comparison to the first-generation students. However, in comparison, first-generation students appeared to gain more knowledge although nearly half of the first-generation students were engineering and computer science students. This leads the researcher to wonder if the sense of being a part of living and learning community is a catalyst for this difference in learning outcome. The college prep students ($n=3$) were in different orientation courses with were taught in similar manners. The sense of community was larger with the first-generation students since they all were consistently involved in the study and live in the same community. It is possible that students that commute could fare different results as well. There are many possible reasons for this variance and even with such small sample numbers, this is a significant difference that garners further research and exploration.

Findings Summary

There was a significant interaction between attending the technology orientation workshop and increase with technical skills and social adjustment levels experienced by first-generation respondents. High School College prep students did not experience a
significant change in technical skills but did show similar improvements and interest levels as the first-generation students.

This finding is important as the data demonstrates that a technology orientation workshop can assist first-generation students with increasing technical agency as well as improve disadvantaged students’ sense of belonging at an elite university. A technology workshop can assist with mitigating some of the social and technical adjustments required of first-generation students at an elite university that negatively impact the potential of achieving Student success.

First-generation students took the lead in their learning and found ways to connect with one another as well as the college community all while learning how to utilize and navigate digital infrastructure. These skills enhance the Student experience and make a living, learning environment more engaging. An overview of all results for pre and post technology orientation campus resources findings for each group is displayed in Figures 7 and 8.
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2.3333 2.0000 1.0000 2.0000 1.6667 1.6667 3.0000 2.6667 3.3333 4.3333 5.0000 4.3333 2.7778 2.8889 1.4444 4.0000 1.7778 1.8889 1.4444 5.0000 2.8889 2.7778 1.5556 4.2222

Pre Tech Orientation Campus Resources: Average Response/Question

Post Tech Orientation Campus Resources: Average Response/Question

Figure 7. Cumulative Pre Technical Orientation Responses- Campus Technology Resources.

Figure 8. Cumulative Post Technical Orientation Responses- Campus Technology Resources.
Discussion and Summary

This chapter summarizes the impact on technology agency of first-generation low wealth students that attended a topflight technology orientation program. The subsequent findings and conclusions are discussed as well as the strengths and weaknesses of this study. The researcher also highlights the relevance of this study to current literature regarding first-generation disadvantaged students that attend elite universities and the recommendations for future practice and research.

This chapter also contains discussion and future research possibilities to help answer the Researcher’s primary and subset questions:

1) Does attending a Student-led two-month Technology Orientation Program developed for first-generation, Pell Grant eligible students increase one’s ability to use available high-end Student technology resources at a midsized, Midwestern well-resourced school?

The two-sub questions derived are as follows:

1a) Can engagement from attending a technology orientation workshop improve First-Generation Pell grant eligible students' sense of social integration at an elite well-resourced university?

1b) Can attending a two-month Student-led technology workshop program increase First-generation, Pell Grant eligible students' levels of confidence and sense of support at a well-resourced university?

The purpose of this study was to find a programmatic means to bridge technology resource gaps first-generation low-wealth students encounter once they arrive onto an affluent college campus. By assessing baseline technology proficiency and
capacity to use available high-end technology resources, as well as addressing these potential gaps by implementing a technology orientation program using a Student-led, learning communities model, first-generation students gain a sense of belonging and improve technical agency.

Research for this study was approached The Learning Communities model demonstrates the actual mechanics and environment needed to provide Student support and illustrates the activities needed in order for engagement to occur. In other words, Model of Institutional Departure could be considered as the structure of who should be involved or considered in order to create Student engagement. Learning Community models are the components needed to execute and support Student success, such as faculty buy in, the linking of courses, fostering and creating opportunities for students to take individual responsibility for their own learning by encouraging Student-led courses.

**Study Outcomes**

**Cohort Effect.**

The researcher was expecting to see improvements in technical agency throughout this study and according to pre and post assessment data, technology skills were enhanced and refined. What was most informing in the analysis of data was the group support and development of leadership skills that occurred throughout the first-generation students. According to the post social adjustment survey, first-generation students felt more integrated with the community, reported less tendencies of studying alone and an increase in mentoring relationships from staff. First-generation students were committed to demonstrating technical gains obtained throughout the workshops. As mentioned earlier in the study, all participants (n-9) attended each session all while adjusting to
demanding academic schedules and for some learning completely new environments and tools. Trust was created between the participants and technical trainers and learning outcomes for each domain were met collectively.

Treisman’s work notes the importance of having the students lead and teach one another. His research involving studying calculus students studying calculus states notes:

We were able to convince the students in our orientation that success in college would require them to work with their peers, to create for themselves a community based on shared intellectual interests and common professional aims. However, it took some doing to teach them how to work together. After that, it was really rather elementary pedagogy (Treisman, 1992, pg. 368).

Assuring that the workshop remained Student led was essential from the beginning. At the kickoff of the study, participants appeared to be very reserved and cautious when providing questions and answers. The researcher observed while the Student technical trainers struggled through stilted icebreakers. After taking note of this exchange, the researcher interjected by suggesting that each Student introduce their neighbor by creating a digital document with only 10 minutes to do so. The researcher ad-libbed an introduction of one of the technical trainers, providing an idea of the task to be performed by the students. After giving this modeling experience, the Student trainers took the lead and the ice-breaker exercise began. That was the first and last session that the researcher took charge or navigated any element of the workshops.

After the first half hour of session 1 the researcher observed first-generation students exchanging information and providing campus related advice to younger students. The organic arrangement of having a cross sectional representation of ages and
areas of studies coupled with students sharing similar demographic backgrounds encouraged the flow and exchange of ideas that occur throughout a critical phase of creating Stephen Johnson’s concept of a liquid network. The area of focus of this model involves the need to have diverse mindsets available in order to progress innovative ideas. As Johnson notes in his book Where Good Ideas Come From, “When you work alone in an office, peering into a microscope, your ideas can get trapped in place, stuck in your own initial biases. The social flow of the group conversation turns that private solid state into a liquid network” (Johnson, 2010, pg. 51). The organizational structure of this Student-led workshop allowed first-generation students with different interests, viewpoints and ideas create a shared environment that allowed for the flow of ideas and support. According to learning outcome assessments provided by Student technical leads, knowledge was shared amongst the group willingly. Leading occurred due to necessity of wanting to collectively learn about a specific subject matter. Students that had not necessarily defined themselves as capable of leading and mentoring took lead in order to collectively progress the group toward a primary point of interest expressed by the group; 3D printing exposure and hands on training.

By engaging in a Student-led technology orientation program, first-generation students that had near expert knowledge about one facet of technology were able to support and assist fellow first-generation students while contemporaneously learning about new and emerging technology resources. For instance, two seniors that are considered well adept programmers assisted fellow students during a gaming design session involving java script. The majority of first-generation students in this study had limited to some programming experience but expressed a willingness and eagerness to
learn about basic software development. The remainder of the students were computer science majors with strong prior exposure to programming languages and development. Due to the varying levels of experience, the researcher was concerned that technically strong students would become bored and disinterested throughout the programming workshops. In contrast, the more technically adept students volunteered to help non-proficient students during the programming courses. Assistance was effective and efficient to the point that programming courses (game design, web development and application development) were trimmed down from 3 workshop sessions to just two standalone programming workshop sessions.

With the technical support and guidance of two first-generation senior students, the final programming session ended early allowing availability of time for an in-depth 3D printing discussion. The researcher observed this interaction and watched as the two senior programmers went from not being able to identify a valid or useful reason to learn 3D printing, to articulating a way to incorporate the subject into their future employment aspirations. The shift from not being able to conceive how a technology resource could be personally beneficial to students creating entrepreneurial ways to implement this resource as a complementary means of creating money opportunities was an intriguing and insightful discovery in this study. To illustrate this partnership and build of a community see below qualitative statements received by two participants noting connectedness gained from attending the first-generation technical orientation workshop:
Post Workshop Statement #1

This workshop and team have been so influential to me. I have been struggling so much since I came into college, but every time I came and talked with the group, I left with another tool in my tool box to fight back and come back stronger. This gave me motivation to work, and strive for my dreams. It’s had such a great impact on me and I couldn’t imagine how my development would be if I hadn’t come to these workshops. Since the workshops ended we don’t talk or meet up as often, but when we do I always feel a support system. (participant personal communication, 10/25/19)

Post Workshop Statement #2

The technical workshop helped me tremendously in so ways I couldn’t have imagined. First of all, I got a job that I had little experience for before the workshop. The team helped me whenever I needed help figuring out what to do. They had so much confidence in my abilities and took me under their wing. As a first-generation Student, I didn’t really have a starting place. The team took me in and made me feel like I was finally a part of a caring community. I have people I can laugh with, ask for help, and give my support in return. This group was so helpful for me this semester, even in my second year of college, when I felt like my grades were slipping, my motivation was low, and my mental health was on the decline. I knew that if I didn’t feel comfortable talking with anyone else, I could talk to (name intentionally removed by researcher) and the rest of the team. I hope they do this again next year. (personal communication, 10/8/19)
Responsive Instruction.

Call and response support and behavior occurred several times throughout the technology orientation workshops. Trainers and participants communicated with one another and adjustments were made as needed. As the workshops progressed it became more apparent to Student technical trainers that students wanted to learn more about 3D printing participants inquired about the possibility of adding a deep dive 3D printing course that was not yet scheduled. The Student-led technician brought this suggestion to the researchers’ attention in what appeared to be a request for approval to change the cadence and flow of the workshop structure. After stating that the pace of the course should change to include advance stages of 3D printing, the Student technical lead made the decision to change the course of workshops to address the interests of the cohort. Inherent with this change, was the additional update and refinement of the existing 3D Technology course. Without guidance or suggestions from the researcher, the Student-led technician updated the courses to allow a deep dive session into the realm of 3D printing.

The Student-led technician responded to the needs and requests of the group. No participant was left behind in terms of gaining information on materials or engagement activities of leadership. The needs and interests drove the pace of the workshops and ideas and voices were encouraged from all. The following personal statement from post technical orientation activities is as follows:

Post Workshop Statement #3

Coming to (name intentionally removed by researcher) as a first-generation Student, I found it difficult to create a community within the school that was outside of academics. There were a number or organizations and people that I
tried to connect with, however, I felt like there was a lack of authenticity and connection with those groups of people.

When I first joined this program I remember feeling incredibly welcomed by everyone, starting with (name intentionally removed). The positive energy was evident from the start, and the authenticity of the people around me was clear from the questions we were asking to get to know one another! What solidified this point even further was when I noticed how others connected with (name intentionally removed by researcher) as well. As an extrovert, I find myself making connections rather quickly, and noticing that everyone in the room, especially as the program continued throughout the semester, was able to express their full personality made me want to continue engaging with the program. It didn’t take long for me to decide that I wanted to be a part of this community, and since then I have always felt like there’s always a community for me at (name intentionally removed by researcher). (personal participant statement, 10/10/19)

Response and adaptation is essential throughout the educational models created by Treisman and Tinto that encourage Student success. These factors were embedded and implemented into the teaching and learning environment of the technology orientation workshop.

**Intensive Workshop Effects.**

Uri Treisann’s (1992) intensive calculus workshop created in the late 1970’s to encourage Black and Hispanic Berkeley students to enter the field of mathematics served as a major framework in the design of this study. As mentioned, the elements of Vince
Tinto’s (2008) Learning Communities model as well as Tinto’s Institutional Departure Theory discussed earlier in chapter 3 were embedded into the practical application of the technology orientation workshop, Treisman’s work assisted by providing three key components that were instilled at the start of this studies’ design. These factors are:

- The focus on helping minority students to excel at the University, rather than merely to avoid failure;
- The emphasis on collaborative learning and the use of small-group teaching methods; and
- The faculty sponsorship, which has both nourished the program and enabled it to survive. (Treisman, 1985, pp. 30-31)

The researchers’ approach to incorporate these three facets included:

- Ensuring that courses were Student-led and not remedial. Material had to be stimulating, focused on emerging technology and built on assessment of interests determined by participants.
- Responsiveness and adaptability of Student-led workshops fostering collaboration and emergence of leaders. Researcher also recruited from a lean and underrepresented population ensuring small group small group learning sessions.
- The advocating and provision of hands on high-end technology tools and resources with support at the department and administrative level.

Incorporating these factors encouraged students to focus on learning from one another and leading each other. Highly technically skilled students were not concerned about being underestimated or bored during these workshop sessions as
they had a voice in the direction and flow of areas covered. Leadership capacities emerged and students gained practical and useful technical experience with using available resources. First-generation students that would not have naturally engaged with high-end available campus technology resources gained first hand training. The encouragement to engage with these resources was driven and fostered by departmental administration. Active engagement and support from administration is essential for intensive workshop success according to Treisman.

Recruitment efforts need to be authentic and well thought out to increase engagement opportunities related to Student success with first-generation students. The following personal statement highlights this type of interaction from administration:

**Post Workshop Statement #4**

(Name intentionally removed by researcher) has had an impact on me because if she wasn’t in touch with me then the resources at (name intentionally removed by researcher) would have gone unused. I don't think I would know how to use the resources at (name intentionally removed by researcher) properly or feel encouraged to use them without support from the workshops, especially in regards to the 3D printing at (name intentionally removed by researcher). I hope to use 3D printing and possible other (name intentionally removed by researcher) resources in future class projects. (personal statement, 10/15/19)

First-generation students also had a shared responsibility of learning together in order to progress to another or higher-level topic (including 3D print deep dive). In contrast to getting annoyed with one another, students used a
“reach while you climb” approach with progressing into new technology areas and topics. The courses would not advance to a new topic until it was crystalized that the cohort could demonstrate technical gains by creating a functional program or prototype. From simple two-dimensional game design, to learning how to windows boot camp a Mac computer, students were responsible for learning and moving forward as a collective. This was an aspect of the workshop that was not negotiable according to preplanned learning outcomes (see appendix O).

**Strengths**

**Learning Opportunities.**

By improving one’s sense of community cohesion and informing students through engaging Student-led technology orientation opportunities, anxiety and isolation that occurs that likely impacts retention rates could decrease. Despite the small sample size, the preliminary results of this study indicate substantial benefit could be gleaned through technology orientation workshops and further research of Student-led workshops. Due to the inherent socialization, exposure to unfamiliar technology, and learning opportunities that peer-led technology workshops provide, this study adds to the evidence that solutions exist for low-income first-generation students--they need only be implemented. Though sample population was small throughout this study, the findings report that participants have a greater sense of community integration and technical skills. These reported benefits should not be dismissed easily without further and future research. This time limited workshop has had an impact on expanding interest and career goals related to technology. The following is a response from a participant.
Post Workshop Statement #5

I was born in (removed intentionally by researcher) and have lived here all my life. I hope in the future, I can have a career that allows me the opportunity to provide for my family as well as explore a wide range of interests. Since the workshop, I gravitate more towards software engineering now, but I have a feeling that the next four years at college will me get a better sense of what I want to do with my life. (Personal Statement, 10/5/19).

First-generation Pride.

This study has collectively reminded students of the strength and character that is innate to first-generation students. In contrast to talk of disadvantages, students spoke of pride, determination and persistence when asked about thoughts of being a first-generation Student. These thoughts were echoed in personal statements as well:

My parents immigrated to the United States in the 1990s, so being here is a huge step for my family. I was worried that being a first-generation Student would put me behind everyone else, but I realized that my upbringing has given me a strong work ethic, determination, and resourcefulness that define my identity and help me to build my academic career. Most importantly, it helps me through any obstacles that I may face in the future and being a part of this workshop is nice because I know others feel the same way that I do. (Personal statement, 10/5/19)

Limitations

Sample Size.

Sample size of this study is of serious concern. The figures were too small to be considered statistically valid even though all pre and post results show p < .05. This is a
consideration the researcher needs to take into account when investigating an
underrepresented group. However, the sample can only be representative of the
population it is selected from. First-generation disenfranchised students attending a
Midwestern well-resourced university are a limited resource to recruit and pool from.

**Participant Time Constraints.**

Timing and scheduling of workshops was of a concern. Working around
extremely busy and rigorous academic schedules was quite difficult for the investigator,
and there was a concern of study drop out of what was already determined to be a lean
group of participants, however attendance maintained at 100% throughout each workshop
session of the study.

**Data Method Fit.**

The researcher struggled with narrowing down the exact methodology fit for this
study. There were either constraints or updated theories that weighed heavy on choice.
Due to size of the study the exploratory mixed method sequential method was selected as
a means to further progress research on the topic of first-generation students at an elite
university. With a larger group and a normal comparison, many other design methods
including transformative could assist with future state discovery.

**Researcher Proximity.**

The researcher is a first-generation Student that struggled with academic and social
capital pitfalls as a Student. Although the investigator did not attend an elite university
directly after graduating high school, the struggles of poverty and opportunity of deficits
surrounded them. The researcher attempted to not be present during training workshops,
but students wanted to showcase work and gains. It is very possible that the researchers’ availability impacted results as participants expressed connection with the researcher.

**Self-Reported Data & Scope.**

Another concern is relying on self-reported data. Although the researcher attempted to provide a space to answer honestly by keeping surveys anonymous, false positive and identifiers do occur when utilizing self-report as a form of metrics gathering. The scope of the data collection was limited to participants and did not include trainer perspectives in quantitative measures. Future research should broaden the scope to incorporate Student-leader perspectives and collected quantitative data.

**Normal Comparison.**

Lastly, normal value comparison is difficult. Although there is plentiful and varied research about the first-generation Student experience, due to the population limitation of first-generation students attending an elite university results’ of taking a pre and post survey after attending a technical training orientation is at best limited and to the researcher’s knowledge, unavailable data. Future research should broaden the scope to incorporate Student leader perspectives and adjustments.
Conclusion

There are more layers to explore relative to enhancing the first-generation student experience at elite universities. This study was a means of adding value to closing and bridging existing gaps underserved students face at top tier universities from a social and academic perspective from a technological programmatic perspective. Subsequent findings and conclusions have been discussed as well as the strengths and weaknesses of this study. The researcher also highlights the relevance of this study to current literature regarding first-generation students and the recommendations for future practice and research.

First-generation students created a cohort of change by the end of this study and reported improved outcomes from the baseline Campus Technical Resource and Student Adjustment response scales. Students also identified higher levels of confidence with leading and reported less accounts of feeling as if they had no support from support staff. Students attended each session and were eager to learn and demonstrated gains by completing functioning digital products.

The most ambitious learners were those of the high school students. Although the sample size was extremely small, the impact of the training sessions spoke volumes through survey results as well as their commitment to attend weekend training sessions. These future first-generation students will be entering a university a little more prepared and exposed for the high-end technologies elite universities own. Also of note, the college prep cohort scored a higher mean during their pre technical orientation assessment. It is possible that younger students are becoming more adept to technology or are more adept on powering through imposter syndrome to look and act the part, relative
to having technology knowledge and skills. Further research could help with teasing out
discovery of this result.

There are multiple societal, racial and economic layers that influences the
existence of this research topic. This research by no means claims to resolve the social
capital and economic problems first-generation students experience when attending an
affluent university. This research highlights specific theoretical frameworks that have
been reported to assist with persistence, Student success and proven demonstrated gains
that assist ones’ academic and social development that occurs throughout higher
educational pursuits. Low wealth students from racially and economically disadvantaged
backgrounds require intentional, faculty and administrative supportive programs to be put
into place prior to their arrival. Figure 9 expresses an initial concept map developed by
the researcher detailing the social and systemic economic constraints that contribute to
the digital divide that underserved and disadvantaged students contend with.
The goal of this study was to engage low wealth first-generation students to increase agency and access to the high-end technology to encourage self-assurance and mastery that could be impacted by the potentially alienating wealth first-generation low wealth students are subject to once they arrive on campus at an affluent university. By improving one’s sense of community cohesion and informing students through engaging Student-led opportunities, anxiety and isolation that occurs impacting retention rates could decrease. Despite the small sample size, the preliminary results of this study indicate substantial benefit could be gleaned through technology workshops. Due to the inherent socialization, exposure to unfamiliar technology, and learning opportunities that
peer-led workshops provide, this study adds to the evidence that solutions exist for low-income first-generation students—they need only be implemented.

As universities of great wealth compete for the best and brightest students in efforts of closing the diversity divide, administration needs to make conscious efforts of ensuring students feel welcome and able to expand and explore horizons. This population has very unique issues to contend with such as dealing with stereotype threats, being considered a sellout for leaving home, to being asked on a regular basis to send money back home to help with bills. With all of these circumstances, using facilities that have been purchased for Student use should not be an arduous event.

The primary research question of focus for this study was: Does attending a Student-led two-month Technology Orientation Program developed for first-generation, Pell Grant eligible students increase one’s ability to use available high-end Student technology resources at a midsized, Midwestern well-resourced school?

The two-sub questions that derived from this question were:

1a) Can engagement from attending a technology orientation workshop improve First-Generation Pell grant eligible students' sense of social integration at an elite well-resourced university?

1b) Can attending a two-month Student-led technology workshop program increase First Generation, Pell Grant eligible students' levels of confidence and sense of support at a well-resourced university?

The researcher contends that these questions were addressed and analyzed and results show promising potential with the application of further research and funding. The small sample population did show improvements from baseline technical and social
reports at the close of the study. Data results showed that engagement in a First-generation Technology Orientation program, with students that represented different cultural backgrounds, academic interests and technical abilities yields reports of improved perspectives on technical agency and connectedness. Accounts of apprehension decreased as well. Social integration and technical abilities levels were increased from the start of the program to the end of the workshop sessions hosted for this study, showing the skill-based learning advantages of workshops.

High school students currently attending a local college preparatory program for low wealth students, aimed at Student placement into elite universities, parallel the improvement of technical abilities and awareness experienced by first-generation low wealth students attending an affluent university. College prep cores were higher from baseline assessment scores gathered from analysis of quantitative survey tools. This exploratory sequential mixed method design study produced promising results to further future research involving disadvantaged students.

**Future State**

What the researcher would have liked to capture was the expressed difference of the social and technical improvements that occurred throughout this study with a comparison group that assisted with crystalizing and establishing relationships with people from similar experiences as well as different socioeconomic experiences. There were bonds that were developed that were not captured by the researcher that could support the studies’ calculated results. Further research would be helpful for qualifying and demonstrating variable change. This research fills a gap in the need for further research first-generation technology orientation programs that support Student academic
and social integration in well-resourced universities. Based on supporting data and research studies evidenced in this study. While this study offers insight on the importance of incorporating a technology workshop to assist with the social and technical agency of first-generation students in support of students' success, further study is needed on technology orientation programs and impact long term, sustainable impact of first-generation students at elite universities.
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References


c (9).


THE IMPACT OF STRUCTURAL SUPPORTS IN EDUCATION.


THE IMPACT OF STRUCTURAL SUPPORTS IN EDUCATION.


https://doi.org/10.1016/j.compedu.2006.07.005


students: Additional evidence on college experiences and outcomes. The Journal
Pascarella, Ernest T., et al. (2004). First-generation college students: additional evidence
on college experiences and outcomes. The Journal of Higher Education, 3, doi:
10.1353/jhe.2004.0016
persistence/withdrawal behavior in a residential university: A path analytic

an assessment of the first-year college year: Results from the 1999-2000 YFCY
pilot study a report for the policy center on the first-year of college. Brevard
College Higher Education Research Institute Graduate School of Education and
Information. Studies University of California, Los Angeles

Schoenbrger, S. (2015). Regulating the race to the bottom. Washington University
Political Review, 14-17.

Sharkey, P. (2010, June 29). The acute effect of local homicides on children's cognitive
https://www.pnas.org/content/107/26/11733.short.


https://doi.org/10.3102/00346543045001089


https://doi.org/10.1080/07468342.1992.11973486

validation of Tinto's model. *Journal of Educational Psychology. 75*(2), 215-226.

Wang, S.K., Hsu, H.Y., Campbell, T., Coster, D.C. & Longhurst, M. (2014). An investigation of middle school science teachers and students use of technology inside and outside of classrooms: considering whether digital natives are more


https://doi.org/10.1177/0894439303021002001

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THE IMPACT OF STRUCTURAL SUPPORTS IN EDUCATION.

APPENDIX A

Date: 8/1/19

Dear Parent or Guardian:

I am a doctoral student in the Education department at University of Missouri, St. Louis. I am conducting a research project on the impact of the digital use divide and agency with first generation students. I request permission for your child to participate.

The study consists of technology workshops at Washington University in St. Louis and the completion of pre and post assessment surveys. Surveys are anonymous and your child will not write their name on the surveys. No one will be able to identify your child’s answers, and no one will know whether or not your child participated in this study. Individuals from the Institutional Review Board may inspect these records. Should the data be published, no individual information will be disclosed.

The project will be explained in terms that your child can understand, and your child will participate only if he or she is willing to do so. Only I, and members of the research staff will have access to data completed by your child. At the conclusion of the study, children’s responses will be reported as group results only. At the conclusion of the study a summary of group results will be made available to all interested parents. Please contact me after January 1, 2020 at sholmes@wustl.edu if you would like to obtain a copy of the group summary.

Participation in this study is voluntary. Your decision whether or not to allow your child to participate will not affect the services normally provided to your child by Washington University in St. Louis or the College Prep Program. Your child’s participation in this study will not lead to the loss of any benefits to which he or she is otherwise entitled. Even if you give your permission for your child to participate, your child is free to refuse to participate. If your child agrees to participate, he or she is free to end participation at any time. You and your child are not waiving any legal claims, rights, or remedies because of your child’s participation in this research study.

Information that is obtained in connection with this study that can be identified with your child will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by ensuring all records and data are stored in a secure and password protected cloud account for no less than 3 years after completion of research project.

Should you have any questions or desire further information, please call me or email me at 314-935-3353 and sholmes@wustl.edu. The faculty sponsor from University of Missouri-St. Louis is Dr. Phyllis Bakerzak and she is reachable at 314- 516-5944 or bakerzakph@umsl.edu.

If you have questions about the rights of research participants, please contact the College of Education at University of Missouri-St. Louis by mail at 1 University Blvd. 201 Education Admin Bldg St. Louis, MO 63121-4400 or by phone at 314-516-4970

Sincerely,
Sherry Holmes, Doctoral Candidate Fall 2019
COE- University of Missouri- St. Louis

Please see and review consent form on Page 2
APPENDIX A (cont.)

Digital Divide and Agency Consent Form

Please indicate whether or not you wish to allow your child to participate in this project by checking one of the statements below, signing your name and state how the parent is to return the letter. Sign both copies and keep one for your records.

___ I grant permission for my child to participate in Sherry Holmes’ study on Digital Divide & First Gen Students.

___ I do not grant permission for my child to participate in Sherry Holmes’ study on Digital Divide & First Gen Students.

______________________________  ________________________________
Signature of Parent/Guardian      Printed Parent/Guardian Name

______________________________  ________________________________
Printed Name of Child            Date

DATE OF REAPPROVAL:  7/30/2019
REVIEW NUMBER:  188820
RUN NUMBER:  188870-3
PROJECT EXPIRATION DATE:  7/30/20
APPENDIX B

High School- College Prep Technical Interest Interview

What makes technology so cool to you? What makes it bad or hard?

What type of technology do you know about, but haven’t been exposed to or ever used

When did you have your first coding class?

What would you like to make using technology?

When did you get your first computer??

What type of technology do you like the most?

Tell me everything you know about 3D Printing and what you can do with it?

When you think of a programmer, who do you think of? Describe them for me? Tell me about your computers at school?

Why do people call computer programming a language?

What technology do you need to know to do your future career well? Why is that? Why not?

How do you think technology impacts a college student's life? What do they need to know and why?
APPENDIX C

First Generation Pre- Tech Orientation

Campus Technology Resources

This anonymous survey is being distributed to gauge your current use, aptitude and interest on technology resources available throughout the residential student community.

Circle the number that most closely indicates how much you disagree or agree with each statement listed below.

<table>
<thead>
<tr>
<th>Tech Resource</th>
<th>#</th>
<th>Statement</th>
<th>Circle the correct numeric response to each statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Programming</td>
<td>1</td>
<td>I have knowledge/skills on how to program/code using HTML</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I can develop a simple game or website by programming/coding using HTML</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I have confidence to be able to teach a basic HTML programming/coding workshop to students</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>I have interest in learning programming/coding languages</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>3D Printing</td>
<td>5</td>
<td>I have knowledge/skills on how to design and print a 3D prototype</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>I can articulate a way that 3D Printing could be applied to my future career</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>I have confidence to be able to lead/teach a workshop on how to design and print a 3D prototype to students</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>I have interest in 3D Printing technology</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td>Hardware</td>
<td>9</td>
<td>I am comfortable with using a Mac computer for my coursework</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>I have had exposure and training on how to use Mac computers</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>I have confidence to be able to lead or teach a basic workshop on how to use a Mac computer to students</td>
<td>1  2  3  4  5</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>I have interest in learning about Mac computer use</td>
<td>1  2  3  4  5</td>
</tr>
</tbody>
</table>
First Generation Post- Tech Orientation

Campus Technology Resources

This anonymous survey is being distributed to gauge your current use, aptitude and interest on technology resources available throughout the residential student community since attending the tech orientation workshop.

Circle the number that most closely indicates how much you disagree or agree with each statement listed below.

<table>
<thead>
<tr>
<th>Tech Resource</th>
<th>#</th>
<th>Statement</th>
<th>Circle the correct numeric response to each statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Programming</td>
<td>1</td>
<td>I have knowledge/skills on how to program/code using HTML</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I can develop a simple game or website by programming/coding using HTML</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I have confidence to be able to teach a basic HTML programming/coding workshop to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>I have interest in learning programming/coding languages</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3D Printing</td>
<td>5</td>
<td>I have knowledge/skills on how to design and print a 3D prototype</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>I can articulate a way that 3D Printing could be applied to my future career</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>I have confidence to be able to lead/teach a workshop on how to design and print a 3D prototype to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>I have interest in 3D Printing technology</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Hardware</td>
<td>9</td>
<td>I am comfortable with using a Mac computer for my coursework</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>I have had exposure and training on how to use Mac computers</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>I have confidence to be able to lead or teach a basic workshop on how to use a Mac computer to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>I have interest in learning about Mac computer use</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
APPENDIX E

High School- College Prep Technology Orientation Pre-Assessment
Campus Technology Resources

This anonymous survey is being distributed to gauge your current use, aptitude and interest on technology resources available to you as a student throughout the WashU residential community.

Circle the number that most closely indicates how much you currently disagree or agree with the following statements:

<table>
<thead>
<tr>
<th>Tech Resource</th>
<th>Q.#</th>
<th>Question</th>
<th>Circle the correct numeric response to each question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Programming</td>
<td>1</td>
<td>I am confident with my programming/coding skills</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I am able to teach a basic programming/coding workshop to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I know how to develop a simple game or website by programming/coding</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>I have interest in programming/coding</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3D Printing</td>
<td>5</td>
<td>I am confident that I can create and print a 3D prototype</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>I can lead or teach a basic 3D Print workshop to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>I believe that training in 3D Printing could be applied to my future career</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>I have interest in 3D Printing</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Hardware</td>
<td>9</td>
<td>I am confident with using a Mac for presentations</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>I believe that training in Mac use could be beneficial for my future career</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>I could lead a basic workshop on how to use a Mac computer to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>I have interest in learning how to troubleshoot a Mac</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
High School- College Prep Technology Orientation Post-Assessment
Campus Technology Resources

This anonymous survey is being distributed to gauge your current use, aptitude and interest on technology resources available to you as a student throughout the WashU residential community.

Circle the number that most closely indicates how much you currently disagree or agree with the following statements:

<table>
<thead>
<tr>
<th>Tech Resource</th>
<th>Q.#</th>
<th>Question</th>
<th>Circle the correct numeric response to each question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Programming</td>
<td>1</td>
<td>I am confident with my programming/coding skills</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I am able to teach a basic programming/coding workshop to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I know how to develop a simple game or website by programming/coding</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>I have interest in programming/coding</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3D Printing</td>
<td>5</td>
<td>I am confident that I can create and print a 3D prototype</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>I can lead or teach a basic 3D Print workshop to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>I believe that training in 3D Printing could be applied to my future career</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>I have interest in 3D Printing</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Hardware</td>
<td>9</td>
<td>I am confident with using a Mac for presentations</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>I believe that training in Mac use could be beneficial for my future career</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>I could lead a basic workshop on how to use a Mac computer to students</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>I have interest in learning how to troubleshoot a Mac</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
Pre-Tech Workshop Case Study Bio

Date: 8/18/19

Name: [redacted]
Age & School Year: 19, 1st Year
Major/Minor: Architecture

Background Bio: I am from the [redacted], specifically North County. I am currently studying architecture in the Sam Fox School of Architecture, and I’m thinking of studying either environmental science or landscaping as a minor. I want to pursue these areas of study because I want to help improve sustainability in the world and act to alleviate and reduce the affects of climate change.

First Gen Statement: Being a first gen student means that I must work harder to improve my odds of success in the modern economy. It means I have a duty to my family to make the most of this opportunity, especially in terms of finances. Money was the biggest factor in choosing a college. My biggest daily obstacles are related to money and money management.

Views on Technology and student success: Being exposed to new technology can help me with representing my architectural ideas. I will be able to create versions of my building/ sculptural ideas, and maybe even topography with the use of 3D printers. CAD will also help with 3D representation of my drawings and ideas. I think the ability to use these resources should be conveyed to first gen students. When I hear talk about 3D printers and CAD I assume there’s a learning curve that I needed to pass before coming to college, or at least pay in some respect. I think when first gen students learn that these resources are free and can learn how to use them they will have a more confident sense of how to use technological resources, and how to apply them to their studies and projects.

On a scale of 1 to 10, rate your current level of confidence using available Available Student Technology Resources: (1-Very Low confidence 10-Extremely High Confidence)
5

On a scale of 1-10, rate your confidence level of teaching and mentoring students
2

On a scale of 1 to 10, rate your current sense of being part of a supportive community at the university: (1-Very Low Sense 10-Extremely High Sense)
5
## APPENDIX H

**Student Online Learning Readiness (SOLR) Instrument**

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. Items</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1: Technical competencies</td>
<td>1</td>
<td>I have a sense of self-confidence in using computer technologies for specific tasks.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I am proficient in using a wide variety of computer technologies.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I feel comfortable using computers.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>I can explain the benefits of using computer technologies in learning.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>I am competent at integrating computer technologies into my learning activities.</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>I am motivated to get more involved in learning activities when using computer technologies.</td>
</tr>
<tr>
<td>Factor 2: Social competencies with instructor</td>
<td></td>
<td>How confident are you that you could do the following social interaction tasks with your INSTRUCTOR in the ONLINE course?</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Clearly ask my instructor questions.</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Initiate discussions with the instructor.</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Seek help from instructor when needed.</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Timely inform the instructor when unexpected situations arise.</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Express my opinions to instructor respectfully.</td>
</tr>
<tr>
<td>Factor 3: Social competencies with classmates</td>
<td></td>
<td>How confident are you that you could do the following social interaction tasks with your CLASSMATES in the ONLINE course?</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Develop friendships with my classmates.</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>Pay attention to other students’ social actions.</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Apply different social interaction skills depending on situations.</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Initiate social interaction with classmates.</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Socially interact with other students with respect.</td>
</tr>
<tr>
<td>Factor 4: Communication competencies</td>
<td>17</td>
<td>I am comfortable expressing my opinion in writing to others.</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>I am comfortable responding to other people’s ideas.</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>I am able to express my opinion in writing so that others understand what I mean.</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>I give constructive and proactive feedback to others even when I disagree.</td>
</tr>
</tbody>
</table>
Appendix A: Questions from the "Your First-semester" Survey (HERI, 2005)

### ACADEMIC ADJUSTMENT

**Since entering this college, how successful have you felt at:**

<table>
<thead>
<tr>
<th></th>
<th>Successful</th>
<th>Somewhat Successful</th>
<th>Unsuccessful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusting to the academic demands of college</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing effective study skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding what your professors expect of you academically</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ACADEMIC ADJUSTMENT

**Since entering College, how often have you felt:**

<table>
<thead>
<tr>
<th></th>
<th>Frequently</th>
<th>Occasionally</th>
<th>Rarely</th>
<th>Not at All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intimidated by your professors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOCIAL ADJUSTMENT

**Since entering College, how often have you felt:**

<table>
<thead>
<tr>
<th></th>
<th>Frequently</th>
<th>Occasionally</th>
<th>Rarely</th>
<th>Not at All</th>
</tr>
</thead>
<tbody>
<tr>
<td>That your social life interfered with your academic work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolated from campus life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worried about meeting new people</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lonely or Homesick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SOCIAL ADJUSTMENT

**Since entering College, how often have you felt:**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I see myself as part of the community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From: Holmes, Sherry <sholmes@wustl.edu>
Sent: Thursday, Aug 1, 2019 1:20 PM
To: heri@ucla.edu
Subject: Request: Time Sensitive for Research Paper

Importance: High

Hello,

I am a doctoral student from UMSL and would like to use the First Year Student survey to inform my survey development to gauge social adjustment levels before and after attending a First Gen-Tech Orientation Workshop at a midsized midwestern well-resourced university. Please see the attached version I created that I plan to use for my digital divide dissertation. Let me know if it is ok to proceed with using this instrument for my case study.

Many Thanks

Sherry Holmes

Sherry Holmes, Director
Student Technology Services
Washington University Information Technology
http://its.wustl.edu
phone: 314.935.3353
Hi Sherry,

Yes, you can use those two YFCY items for the purpose you stated in your email. Please note on the survey instrument that those items are being used with permission by HERI.

Please let us know if you have any questions or concerns.

Thank you,
Ellen

Ellen Bara Stolzenberg, PhD
Assistant Director for Research
Higher Education Research Institute
UCLA Graduate School of Education & Information Studies
Phone: 310.825.6991
Email: stolzenberg@gseis.ucla.edu
Addressing Digital Use Divide and Agency for First Generation Students

Digital Divide and Agency Study Consent Form

You are being invited to participate in a research study about the impact of technology orientation programs and the first generation student experience. This study is being conducted by Sherry Holmes and Dr. Phyllis Balcerzak, from the Educational Department at University of Missouri-St. Louis. The study is being conducted as part of a dissertation without funding.

You were selected as a possible participant in this study because you identify as a first generation student currently attending Washington University in St. Louis.

There are no known risks if you decide to participate in this research study. There are no costs to you for participating in the study. The information and participation you provide will be used to influence programmatic development of technology workshops for future first generation students. Participation in this research includes the following: One 30 minute onsite interview with the researcher (one on one), completion of a pre and post technology workshop student biography, attendance of two 4-hour long technology workshop sessions, attendance of two 2-hour-long technology shadowing sessions with a technology peer mentor and completion of pre and post participation questionnaires. Questionnaires will take about 10 minutes to complete. The study will take place over the course of 7 weeks for a total of no more than 15 hours of active participation. The information collected may not benefit you directly, but the information learned in this study should provide more general benefits.

Your participation in this study is voluntary and you are free to end participation at any time. By signing below, you are voluntarily agreeing to participate. You are free to decline to answer any particular questions that you do not wish to answer for any reason. You are also free to decline participation in workshops or any activities outlined.

Information that is obtained in connection with this study that can identify you will remain confidential. Confidentiality will be maintained by ensuring all records and data are stored in a secure and password protected cloud account for no less than 3 years after completion of this research project.

Should you have any questions or desire further information, please call me or email me at 314-935-3353 and sholmes@wustl.edu. The faculty sponsor from University of Missouri-St. Louis is Dr. Phyllis Balcerzak and she is reachable at 314-516-5944 or balcerzakph@umsl.edu.

If you have questions about the rights of research participants, please contact the College of Education at University of Missouri-St. Louis by mail at 1 University Blvd. 201 Education Admin Bldg, St. Louis, MO 63121-4400 or by phone at 314-516-4970.

Sincerely,

Sherry Holmes, Doctoral Candidate Fall 2019
COE–University of Missouri–St. Louis
DIGITAL DIVIDE AND AGENCY STUDY CONSENT FORM

PLEASE INDICATE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS PROJECT BY CHECKING ONE OF THE STATEMENTS BELOW, SIGNING YOUR NAME AND RETURNING FORM TO SHERRY HOLMES NO LATER THAN AUGUST 16, 2019.

_____ I AGREE TO PARTICIPATE IN SHERRY HOLMES’ STUDY ON DIGITAL USE DIVIDE & FIRST GEN STUDENTS.

_____ I DO NOT AGREE TO PARTICIPATE IN SHERRY HOLMES’ STUDY ON DIGITAL USE DIVIDE & FIRST GEN STUDENTS.

_____________________________ _______________________________
SIGNATURE OF STUDENT PRINTED NAME OF STUDENT

DATE: ________________________
**APPENDIX M**

First Generation Pre-Tech Orientation Social Adjustment Survey

This anonymous survey is being distributed to gauge your current sense of community integration and support at the university. Before attending the Tech Orientation Workshop, using a scale of 1-5, how much do you agree with the following statements relative to your current sense of community integration and belonging:

<table>
<thead>
<tr>
<th>Response Key: 1 = Strongly Disagree and 5 = Strongly Agree</th>
<th>Strongly Disagree 1</th>
<th>Disagree 2</th>
<th>Neither Agree or Disagree 3</th>
<th>Agree 4</th>
<th>Strongly Agree 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel invited to use high end technology resources at the university</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do not feel isolated from campus life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am not worried about meeting new people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am not lonely or homesick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I rarely study alone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I see myself as part of the community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am comfortable engaging with new technology in front of other students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Before attending the Tech Orientation Workshop, using a scale of 1-5, how much do you agree with the following statements relative to your current sense of social support and access:

<table>
<thead>
<tr>
<th>Response Key: 1 = Strongly Disagree and 5 = Strongly Agree</th>
<th>Strongly Disagree 1</th>
<th>Disagree 2</th>
<th>Neither Agree or Disagree 3</th>
<th>Agree 4</th>
<th>Strongly Agree 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel supported and mentored from university staff (exclude faculty and advisors from this response)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have confidence with using available student technology (i.e.: MAC computers, 3D Printers, 360 Software) resources in front of skilled users</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have exposure to university resources and spaces in an inclusive manner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a first gen, I have engaged with staff that share my story</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have access to mentors and advisors outside of an academic setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have confidence to lead a technology workshop designed for first generation students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A technology orientation program can expand my social and financial network</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engaging with emerging technology is not outside my current scope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX N

First Generation Post-Tech Orientation
Social Adjustment Survey

This anonymous survey is being distributed to gauge your current sense of community integration and support at the university. Since attending the Tech Orientation Workshop, using a scale of 1-5, how much do you agree with the following statements relative to your current sense of community integration and belonging:

<table>
<thead>
<tr>
<th>Statement</th>
<th>1 = Strongly Disagree and 5 = Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel invited to use high end technology resources at the university</td>
<td>Strongly Disagree 1</td>
</tr>
<tr>
<td>I do not feel isolated from campus life</td>
<td>Disagree 2</td>
</tr>
<tr>
<td>I am not worried about meeting new people</td>
<td>Neither Agree or Disagree 3</td>
</tr>
<tr>
<td>I am not lonely or homesick</td>
<td>Agree 4</td>
</tr>
<tr>
<td>I rarely study alone</td>
<td>Strongly Agree 5</td>
</tr>
<tr>
<td>I see myself as part of the community</td>
<td></td>
</tr>
<tr>
<td>I am comfortable engaging with new technology in front of other students</td>
<td></td>
</tr>
</tbody>
</table>

Since attending the Tech Orientation Workshop, using a scale of 1-5, how much do you agree with the following statements relative to your current sense of social support and access:

<table>
<thead>
<tr>
<th>Statement</th>
<th>1 = Strongly Disagree and 5 = Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel supported and mentored from university staff (exclude faculty and advisors from this response)</td>
<td>Strongly Disagree 1</td>
</tr>
<tr>
<td>I have confidence with using available student technology (i.e., MAC computers, 3D Printers, 360 Software) resources in front of skilled users</td>
<td>Disagree 2</td>
</tr>
<tr>
<td>I have exposure to university resources and spaces in an inclusive manner</td>
<td>Neither Agree or Disagree 3</td>
</tr>
<tr>
<td>As a first gen, I have engaged with staff that share my story</td>
<td>Agree 4</td>
</tr>
<tr>
<td>I have access to mentors and advisors outside of an academic setting</td>
<td>Strongly Agree 5</td>
</tr>
<tr>
<td>I have confidence to lead a technology workshop designed for first generation students</td>
<td></td>
</tr>
<tr>
<td>A technology orientation program can expand my social and financial network</td>
<td></td>
</tr>
<tr>
<td>Engaging with emerging technology is not outside my current scope</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX O

Introduction to Hardware Maintenance
Student Tech Lead – ZO

Course objective:
Provide students with basic and practical maintenance information for hardware repair and computer diagnosis.

Course overview:
- Data Backup from Mac/Windows to Backup Server (Both UltraCP and Filezilla)
- Remove virus/malware from Mac/Windows
- Bootcamp and versioning/system requirements
- Hard Drive diagnostics and Repair (how to remove, run scan, run possible repairs)
- Parted Magic (data erase/rescue/clone)
- Diagnose slow computers

Course Objective:
Provide students with practical hardware components introduction and computer maintenance training.

Session Overview:
- Data Backup from Mac/Windows to Backup Server (Both UltraCP and Filezilla)
- Remove virus/malware from Mac/Windows
- Bootcamp and versioning/system requirements
- Hard Drive diagnostics and Repair (how to remove, run scan, run possible repairs)
- Diagnose slow computers

Demonstrated Outcome:
By end of intensive session students were able to:
- Backup data through software
- Run malware detector and remove viruses
- Bootcamp a MAC for Windows access
- Run hardware diagnostics on MAC
- Troubleshoot slow machine

Trainer Notes:
- Students were able to successfully run diagnostics and overview of components was helpful. Visual board was helpful with crystallizing parts and purposes (i.e. motherboard, SSD card, power cable etc). Course could have used an additional 45 minutes to cover Parted Magic (data erase/rescue/clone), but overall successful course with demonstrated abilities.
Learning Outcome Status:
Course objectives met. Students were able to effectively run scans, learned components and backup data using UltraCP and Filezilla. Noted how useful this info is with maintaining personal computers.

Course Suggestions:
Cloud computing options provided by university. All students did not know about available options. Extended course that would allow for deeper dive based on interest with overview of network security and best practices.

PS mentioned something about snack machine? Are we getting a snack machine?
Collective Impact and Closing

As the American economy continues to become more knowledge-based, a college degree becomes more and more essential. “By 2020, about 65 percent of American jobs will require some form of college, compared with just 28 percent in 1973.” (ACT, 2012) The truth is, that many African-American and low-income graduate high school students unprepared for college and unprepared for a career. The reasons are complicated and complex.

Together, the researchers are group of educators that developed innovative programs that share a common goal: helping African-American and low-income students make a successful transition from elementary, middle school, high-school, college, career, and life beyond. Though both studies were situated in different settings, both researchers are committed to educational equity by ensuring high-quality programs that support long-term Student success between racial, ethnic, and socio-economic groups.

Collectively, the researchers sought solutions to inequities experienced by underrepresented groups in the educational system by investigating the impact of interventions in students' educational experience. Individually, both researchers began to analyze the inequities faced in their professional endeavors. Individually, they noticed that the pathway to academic success is unfairly biased against those who have been historically marginalized by society. The researchers identify points of access to assist students in navigating the route to academic success. The collective study is comprised of two phases: the transition to middle school with a focus on mathematics, and the second study
looked at the transition to a four-year university, with attention paid to technology. In each phase, the researchers identify challenges faced by students and each developed potential solutions with the goal of students successfully completing the transition.

In the study entitled, Front Seat Learning: Using a Student-Led Classroom Mathematics Model to Increase Mathematical Mastery and Student Ownership. The researcher believed that by increasing African American students’ mathematical mastery and ownership skills, students will improve their college and career readiness, thereby increasing long term career opportunities in order to improve their lives, their families’ lives and the lives of their community. The overarching research question for the study was: What are the effects of the Front Seat Learning program on math achievement and Student ownership? In comparing the math achievement of the experimental group and the control group, the experimental group saw substantially more growth in grade-level equivalency at the end of the study. In examining the effects of Front Seat Learning on Student ownership, students in the experimental group displayed increased self-efficacy, agency, and grit by the end of the study.

The researchers believe they have made an addition to education stakeholders and policymakers continue to seek academic achievement and attainment for all students. It is imperative that organizations at the state, district level enact policies and interventions that will enable disadvantaged populations to successfully navigate the educational journey from secondary to postsecondary all the way to a long-term career.