TOWSON UNIVERSITY
COLLEGE OF GRADUATE STUDIES

COMPARATIVE ANALYSIS OF STUDENT PERFORMANCE OUTCOMES OF DEVELOPMENTAL READING STUDENTS IN AN ACTIVE-LEARNING CLASSROOM VERSUS A TRADITIONAL CLASSROOM

By

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DISSERTATION APPROVAL PAGE

This is to certify that the dissertation prepared by Amy Chase Martin, entitled Comparative Analysis of Student Performance Outcomes of Developmental Reading Students In an Active-Learning Classroom versus a Traditional Classroom, has been approved by this committee as satisfactory completion of the requirement for the degree of Doctor of Education in Instructional Technology, in the Department of Educational Technology and Literacy.

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DEDICATION

To my children, who are the singular reasons for anything good on my journey.

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ABSTRACT

Amy Chase Martin

Active-learning classrooms (ALCs) are being implemented in higher education, as alternatives to traditional classrooms, in order to support a growing movement towards student-centered, active-learning pedagogies. Researchers have credited ALCs with contributing to positive student performance outcomes for students who are ranked as lower performing academically, but those studies have been limited to four-year institutions. The majority of undergraduate students in the United States attend community colleges and the majority of community college students require some type of developmental coursework in math or English. Given that students requiring developmental instruction are the most underprepared academically in a community college setting, this study will examine the implications for developmental reading students receiving instruction in an ALC. Using a quasi-experimental design, this quantitative study measured the impact of one type of ALC, the learning studio, on the student outcomes of performance, attendance, retention and persistence of developmental reading students receiving instruction in the learning studio ALC as compared to those receiving instruction in a traditional classroom. Additionally, the study examined student perceptions of their own learning and faculty performance, as well as detected differences in perceived social interactions between students and faculty in each of the learning spaces.

Keywords: active-learning classroom, developmental education, learning studio

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CHAPTER I

INTRODUCTION

College classrooms serve as the primary environments for formal learning experiences in higher education (Lei, 2010; Oblinger, 2006). The classroom, especially in the community college environment, is the physical hub for the instructional interactions among students and faculty (Tinto, 2000). It is the location for formal course work, as well as more informal student interaction. The layout, furnishings and flow of a classroom can facilitate or impede these formal and informal experiences (Brooks, 2012; Oblinger, 2006).

Traditional classrooms, with rows of student seating and a fixed front orientation, have limited flexibility, encourage teacher-led instruction (Lasry, Charles, & Whittaker, 2014; Whiteside, Brooks, & Walker, 2010) and have been identified as a barrier to effective student learning behaviors associated with active learning (Beichner & Saul, 1999; Brooks, 2011; Park & Choi, 2014). Active or student-centered learning is a broad spectrum of learning activities that involve the student doing tasks and reflecting on what they are doing (Bonwell & Eison, 1991). There is no singular definition of the term but the primary tenet of active-learning is that it situates the student to continuously and intentionally reflect and test their own understanding of a new concept (Meltzer & Manivannan, 2002); places them at center of the instructional event, and positions the teacher as a facilitator for student learning (Baeten, Kyndt, Struyven, & Dochy, 2010).

Research investigating the power of the classroom to influence pedagogy and support active-learning has led to new models of classrooms being designed to replace the traditional model (Oblinger, 2006); these include SCALE-UP (Beichner & Saul,

1999), TILE (Van Horne, Murniati, Gaffney, & Jesse, 2012), TEAL (Dori & Belcher, 2005), and Learning Studios (Lee, Morrone, & Siering, 2018). Multiple studies have explored student and faculty responses to the aesthetics of these new room designs (Morrone, Ouimet, Siering, & Arthur, 2014; Whiteside, Jorn, Duin, & Fitzgerald, 2009), collectively referred to as "active-learning classrooms" or ALCs. These studies were primarily qualitative in nature and inquired as to faculty and student enjoyment of the ALC environment (Granito & Santana, 2016). Additional studies have examined the influence of these types of spaces on student performance behaviors such as attendance (Beichner, et al., 2007), student engagement with their peers and faculty (Baepler & Walker, 2015; Brooks, 2012) and final grades (Baepler & Walker, 2015; Benson, et al., 2010; Brooks, 2011).

In the preponderance of the studies, student final grades were not significantly improved for all learners but, for students who were identified as being ranked lower academically, learning in an ALC resulted in measurable academic gains (Benson, et al., 2010; Brooks, 2011; Cotner, Loper, Walker, & Brooks, 2013). These study implications are limited in scope because the research focused exclusively on students at four-year institutions in college-level courses. Additional research is needed on ALCs with student populations who are determined to be at-risk for academic failure or withdrawal. The highest population of these unprepared, at-risk students attend community colleges (Bailey & Cho, 2010) where up to 68% is identified as needing some type of academic remediation (CAPR, 2018).

Almost 50% of all undergraduates in the United States attend a community college at some point in their academic career (Community College Research Center,

2018). Community college missions include an open-door policy which welcomes all students, regardless of their academic skills and preparation (Liao, Edlin, & Ferdenzi, 2014). Most colleges require incoming students to be evaluated through required placement testing designed to determine their current proficiency in math and English (CAPR, 2018). Students placed in developmental courses, as a result of their performance on these screening assessments, are arguably the lowest performing students academically in math and/or English and represent the majority of the community college population (Bailey & Cho, 2010; Education, 2017). Students not considered college ready are required to take courses to develop necessary skills in reading, writing and mathematics and, in the literature, are referred to as developmental students (Bailey, Jeong, & Cho, 2010). The term "developmental" does not refer to the students' capacity to learn but is focused on their current skill levels in math and English (Boylan, 2002). The reported numbers of students being referred to developmental instruction at community colleges vary from less than half to more than two-thirds of all students. The National Center of Educational Statistics, in 2016, reported the number as 41.4% of all public community college students (Snyder, de Brey, & Dillow, 2016). Bailey and Cho (2010) claim 40-60% of all students attending community colleges while Chen (2016) reported numbers as high as 68% of all community college students. In any case, these numbers are significantly higher than their counterparts at 4-year institutions and represent a population that is insufficiently prepared for college-level coursework (Snyder, et al., 2016). With the majority of all community college learners needing some form of remediation (Community College Research Center, 2018), their performance and retention are of increasing importance to stakeholders at all levels of education to respond

to calls for improved completion rates (American Association of Community Colleges (AACC), 2015) and increased accountability in performance and costs in higher education. The specific costs of remediation remain an open question as many colleges do not report the direct and indirect financial costs (Belfield, 2015) associated with interventions for students. Efforts to provide remediation external to the classroom environment such as tutoring (Pruett & Absher, 2015), mentorship and additional online programs are additional costs to the institution and do not leverage the students' primary learning space, the college classroom.

The college classroom may be changing to an ALC, based on predictions in the Horizon report (Freeman, Becker, & Cummins, 2017) which projects that ALCs will be the norm by 2020. ALCs are technology-rich classrooms with moveable seating, untethered teacher stations, expansive whiteboard space, and designed with a focus on student-centered instruction (Brooks, 2011; Lasry et al., 2014). While there are variations of ALC models, one example of ALCs, known as TILE, at the University of Iowa are described by the university as:

> "equipped with circular tables, laptops, flat screen monitors, multiple projectors, and whiteboards to encourage and support collaborative and engaged active learning. The faculty workstation is not at the front of the room. as with a traditional lecture-based classroom, but instead in the middle creating a free-flowing learning environment where the lines between instructor and student are shared and blurred" (University of Iowa, 2010, p. para. 1).

ALCs are designed to encourage student collaboration and allow the teacher to serve as a facilitator of student learning. Based on research at four-year institutions, ALCs may well be the student-centered, positive intervention that has been missing in previous attempts to support developmental students.

To investigate the implications of ALCs with this demographic of students, the study presented within this manuscript examined the student performance outcomes for a student population taking a developmental reading course at a mid-Atlantic community college. The outcomes of attendance, retention, persistence and performance were selected because each of these are related to a student's successful completion of a developmental course and acceptance into credit-bearing coursework (Crisp & Delgado, 2014; Engstrom, 2008). Two different learning environments (an active-learning classroom and a traditional classroom) were studied with five sections of students in each environment. This quasi-experimental, non-equivalent group research design was implemented to determine if the active-learning classroom had an impact on developmental student grades, attendance, retention, and persistence. Additionally, the study investigated student social interactions in the classroom, and perceptions of student learning and faculty performance. This chapter is composed of the following sections: Background, Statement of the Problem, Purpose of the Research, Research Design, Research Questions, Limitations, and Definition of Terms.

Background

Over the last 20 years, the impact of classroom design on student performance at four-year universities has been studied extensively (Baepler & Walker, 2015; Beichner & Saul, 1999; Belcher, 2003; Brooks, 2011; Oblinger, 2006). Research acknowledging the

potential for learning environments to positively impact student outcomes such as increased student engagement (Baepler, Walker, & Driessen, 2014), final grades (Benson, et al., 2010; Cotner, Loper, Walker, & Brooks, 2013), interactions with peers and faculty (Brooks, 2012; Walker & Baepler, 2017), and attendance has led to the creation of active-learning classrooms (ALCs). These flexibly-furnished rooms, with various mobile and embedded technologies, have been implemented as an alternative to the traditional, fixed front, instructor-centric model that has been the common design for decades (Lasry et al., 2014; Park & Choi, 2014). The implications for ALCs have been examined in a variety of contexts. One area of study was on student perceptions of the room, including the impact seating arrangements have on the student experience (Espey, 2008; Fisher, 2010; Harvey & Kenyon, 2013; Park & Choi, 2014). Several studies focused on student retention (Hakimzadeh, Adaikkalavan, & Batzinger, 2011; Yourstone & Tepper, 2014); others examined the impact of ALCs on teacher evaluations (Hill & Epps, 2010; Lei, 2010) and teacher instructional behaviors (Brooks & Solheim, 2014; Lasry et al., 2014; Taylor, 2009; Whiteside et al., 2010). Further studies examined the mechanics of the room to encourage positive student interactions with peers and the teacher (Baepler & Walker, 2015; Brooks, 2012).

The predominant research on ALCs has focused on changes in teaching and learning behaviors and student performance (Brooks, 2012; Cotner et al., 2013; Horne, et al., 2014; Lasry, Charles, Whittaker, Dedic, & Rosenfield, 2013; Taylor, 2009). Each study examined slightly different sample, class sizes and academic disciplines, yet each found positive gains in student outcomes as a result of employing ALCs and active-learning techniques in the classroom. Additionally, Dori and Belcher (2005), Brooks

(2011) and Cotner, Loper, Walker and Brooks (2013) found that students, who had scored in the lower quartile of a standardized test administered prior to instruction in the ALC, outperformed their peers receiving comparable instruction in a traditional classroom. These findings from research performed at four-year universities may also have positive implications for developmental students at community colleges as well.

Students who take developmental classes represent 40-70% (Bailey & Cho, 2010; CAPR, 2018; Chen, 2016) of the 5.5 million students nationally who were enrolled in community colleges in the Spring of 2016 (Fain, 2017). Community college developmental students represent an at-risk population of learners. The term at-risk implies that the student has a tenuous academic position in the higher education community (Mulvey, 2009). These students are often first-generation college students, disproportionately minority students, academically underprepared, have learning disabilities, or students for whom English is a second language (Bettinger, Boatman, & Long, 2013). There is no common set of criteria for what constitutes developmental education (McCann & English, 2017), but the intention of developmental education is to provide increased academic support and targeted skill instruction to promote learning the cognitive behaviors (metacognitive) for students who have been evaluated by some measure as lacking college-readiness (Bailey & Cho, 2010).

Developmental Math and English are offered as single courses or as a sequence of courses to address varying levels of student academic performance. Developmental reading courses are reading-intensive, non-credit courses which typically meet four hours each week (Hayes & Williams, 2016) and include both a lecture and computer lab component. The intention of the developmental reading course, or sequence of courses,

is to equip students with the skills to read and critically interpret college-level texts (Holschuh & Paulson, 2013). Studies have determined that active, student-centered instruction benefits developmental students (Bettinger et al., 2013; Engstrom, 2008) academically, socially and emotionally (Osterholt & Barratt, 2012) but this type of instruction is often limited by the affordances of the classroom.

In the current instructional landscape for these underprepared students, coursework alone is often not sufficient to address the instructional goals of developmental instruction and is frequently supplemented with additional interventions. These include tutoring (Pruett & Absher, 2015), self-paced online programs, cohorts, learning communities (Bailey & Cho, 2010) and mentorship (Gallard, Albritton, & Morgan, 2010). While well-intended, these interventions place additional expectations on students, already enrolled in non-credit bearing coursework, rather than being embedded in their primary learning environment – the classroom. Because most community colleges serve a commuter population (Karp, 2011), students rely on the classroom as their central hub (Tinto, 2000) for all academic engagement and interaction with their peers and their instructor. External intervention strategies ignore the growing body of research that has identified the critical importance of the physical environment of the classroom and the implementation of student-centered instruction on student success (Brooks, 2011; Lomas & Oblinger, 2006; Morrone et al., 2014; Oblinger, 2006).

Recognizing that classroom design and environment has a direct impact on the student instructional experience and academic performance, especially on students who are identified as lower performing, has led many institutions to build and outfit different types of learning environments such as active-learning classrooms (ALCs) (Beichner &

Saul, 1999; Belcher, 2003; Brooks, 2011; Brown & Long, 2006). These technology-rich, multiple display spaces (Lasry et al., 2014) situate students in collaborative groupings in order to increase student engagement and support active-learning strategies (Beichner & Saul, 1999; Cotner et al., 2013; Dori & Belcher, 2005).

ALCs bear little resemblance to the traditional college classrooms they were designed to replace (Oblinger, 2006). Prior to the advent of active-learning environments, most classrooms had the same physical design (Baker, 2012), which was described in the literature as a traditional classroom (Park & Choi, 2014). Traditional classrooms, in the context of this review, are instructional spaces outfitted in neutral colors with a fixed front orientation, limited instructional technology and immovable or difficult to move furnishings. The seating orientation —rows and columns— faces the teacher whose large desk is in the front and center of the room (Parks & Choi, 2014). Traditional or conventional (Lasry et al., 2014) college classrooms have often been described as "ugly, stark, cold, grim, spiritless and colorless" (Niemeyer, 2003, p. 2) with nothing that denotes them as connected to learning or knowledge creation (Orr, 1997) while active-learning classrooms have been described as colorful, flexible (Oblinger, 2006) "socio-technological spaces" (Lasry et al., p. 219) which support the creation of "new patterns of social and intellectual interaction" (Oblinger, 2006, p. 15).

Environmental (Boys, 2010) and sociological (Espey, 2008) studies have correlated the mood, productivity and behaviors of a room's inhabitants with the appearance and affordances of the room itself. In a study by Obediat and Al-Share (2012), 94 design and architecture educators ranked environmental features of a learning space such as lighting, temperature and furnishings. Participants in the study ranked the

quality of lighting and flexibility of furniture as the most important features for a quality learning environment. Thoughtfully-designed classrooms, which have been developed in conjunction with faculty and students (Harvey & Kenyon, 2013; Oblinger, 2006), promote collaboration and engagement among learners, and also encourage active class participation (Niemeyer, 2003). While collaboration and active class participation can improve student engagement and performance outcomes (Engstrom, 2008; Hayes & Williams, 2016), they are often difficult to enact in the traditional classroom environment (Belcher, 2001; Brooks, 2012; Lasry et al., 2014; Whiteside et al., 2010). These difficulties often relate to furniture selections that are fixed or too heavy/awkward to be moved; and, in some cases, school policy prevents room furnishings from being rearranged (Jamieson, Fisher, Gilding, Taylor, & Trevitt, 2000); single projection points or whiteboard placement that makes it difficult for all students to view them if their seating is reoriented (Harvey & Kenyon, 2013); a teacher's station that has a fixed desk at the front of the room (Johnson, Adams Becker, Estrada, & Freeman, 2015) with a wired computer which then mandates that the teacher be positioned near the computer in order to share digital content; and the common practice of rooms being designated as computer labs or lecture rooms – but not supporting both purposes. Seating that is fixed can discourage learning activities such as small group discussion (Obeidat & Al-Share, 2012); rows of seating encourage student attention to the instructor at the front, who is in control of the pace, content and pedagogy of the course (Cornell, 2002) and limits student interaction and activities with their classmates (Haghighi & Jusan, 2012).

Beichner and Saul (1999) initiated a classroom model to challenge the traditional classroom limitations. Their Student-Centered, Active-Learning for Undergraduate

Physics (SCALE-UP) model has been credited with being the first classroom intentionally designed to support active-learning. Other models have followed but existing research on the potential impact of learning space on student academic performance has been limited to four-year universities. Students at four-year institutions are of different demographics and pre-requisite skill levels making them a poor comparative sample with the community college population (Ma & Baum, 2016). Conducting instruction for developmental students in an active-learning classroom may contribute to increased student engagement and performance for this population, but current research has not investigated the use of ALCs with developmental students.

Statement of the Problem

Developmental students represent more than half of the community college population, but only 22% complete their degree within six years (Education, 2017). A myriad of unsuccessful interventions have been employed to address their dismal rates of persistence and completion with the majority of them focused on approaches external to the classroom (Monaghan, Kolbe, & Goldrick-Rab, 2018). Active-learning classrooms have demonstrated positive impact on student performance and directly impact the classroom learning environment (Dori & Belcher, 2005), but currently no research has examined the impact of ALCs on developmental student success.

Purpose of the Research

The purpose of this research is to determine if there is a difference in student performance outcomes including attendance, retention, final grade, and persistence when a developmental reading course is taught in an active-learning classroom as compared to a traditional classroom. These findings will complement existing research in the area of learning spaces and provide data to inform future decision making regarding the design

of spaces to support developmental instruction.

Significance of the Study

Developmental students represent up to 68% of community college learners (CAPR, 2018) and the lowest percentage of students who complete a college credential. Various interventions have been employed to address their high attrition and poor completion numbers, but these interventions have had limited success and been external to the student's primary learning environment – the college classroom. Active-learning classrooms have demonstrated impact on student performance outcomes in studies of four-year undergraduates, especially those whose initial academic performance was poor. Research concerning the impact of developmental students receiving instruction in an ALC may determine its efficacy as an in-situ intervention for this population.

Research Design

The research study presented through this manuscript used quantitative methodologies in a quasi-experimental, non-equivalent group research design with a sample of convenience. Quasi-experimental design implements a treatment to determine its effect; it is similar to traditional experimental design but without random assignment of individuals to conditions (Campbell & Riecken, 1968). In this study, 142 community college students enrolled across 10 sections of ENG096, a developmental reading course. One hundred and thirty-five of the 142 students who self-enrolled in one of these ten sections participated in this study. As with any experimental design, there are treatment and control groups. The treatment group in this study were those students receiving instruction in a type of active-learning classroom known as the learning studio. Learning studios are ALCs that do not have tethered student computing or fixed furniture and

allow greater flexibility to rearrange the learning space, and reflect the movement to blend lecture and lab components of a course into a single space (Beichner, 2014). The control group received instruction in both a traditional classroom with tablet armchairs organized in rows and columns for the lecture portion of the course, and a computer lab with hard-wired computers – one for each student. The study investigated the possible relationships between the physical learning environment (independent variable) and the academic performance, attendance, retention, persistence and perceptions of the students (dependent variables).

Four instruments were used to collect data for this study: the Approaches to Teaching Inventory (Trigwell & Prosser, 2004); the University of Minnesota Social Context and Learning Environments v.6 (Walker & Baepler, 2017) ; the IDEA Diagnostic Feedback course evaluation (IDEA, n.d.); and the Accuplacer Reading Comprehension exam (College Board, 2016). Additional data were collected from student records of attendance, final grades and subsequent enrollments.

The collected data from each data source were used to determine whether there were differences among the learning environments. Institutional Review Board approval was granted by both Towson University and Howard Community College. Towson University's Institutional Review Board (IRB) for Research Involving the Use of Human Participants approval # 1705019591 was secured on August 9, 2017 (Appendix A). Howard Community College's IRB approved the study on November 15, 2016 (Appendix B).

Research Questions

In order to assess student performance outcomes, as defined by the parameters of this research, this quantitative study was guided by the following questions:

1. How does learning in an ALC impact student performance outcomes as defined by attendance, retention, final grade and persistence compare to learning in a traditional classroom?
    a. How does the attendance of developmental students taught in an ALC compare to the attendance of those students taking the same course taught in a traditional classroom?
    b. How do the final grades of developmental students taught in an ALC compare to final grades of developmental students taking the same course taught in a traditional classroom?
    c. How do the retention rates of developmental students taught in an ALC compare to the retention rates of those students taking the same course taught in a traditional classroom?
    d. How does the persistence (as measured by enrollment in a subsequent course the following semester) of developmental students taught in an ALC compare to the persistence of those students taking the same course taught in a traditional classroom?
2. How did student ratings of their own learning and the teaching behaviors of the faculty compare between the treatment and control groups?

3. How did the student perceptions of their learning and their social interactions in the classroom as defined by the SCALE learning spaces survey compare between the treatment and control groups?

Limitations

This study was designed to reduce as many limitations as possible. The same syllabus, textbook, assignments, activities, lessons, tests, and final exam were employed across all sections of the course ensure consistency in experiences between the control and treatment groups, yet the researcher does acknowledge the following limitations:

- Ten class sections were evaluated. There was variability between days of the week, time of the class and number of students per section. This is a limitation because students may perform differently at different times of day and their performance can be impacted by class size. In order to minimize the variability associated with this limitation, both groups included sections taught at different times of day which had similar class sizes.
- Faculty members teaching the developmental reading course each brought their unique personality, teaching style and behaviors to teaching the course. This limitation was addressed by the application of the ATI (Trigwell & Prosser, 2004) to gather information on the teaching approaches of assigned faculty. The ATI reported that all faculty were equivalent in application of student-focused/conceptual-changed focused instruction for their preferred approach in teaching the selected course.

This measured homogeneity of the teaching approach limits the potential variability of teaching styles for this course.

- Lesson variability was a potential limitation because of the number of sections and faculty in the study. Lessons and classroom activities were not scripted so there was potential for variability among lesson delivery, faculty behavior and use of class time. In order to minimize the variability associated with this limitation, the faculty met regularly and designed the course together to create and maintain a similar instructional approach.
- Data on classroom activities were only collected through anonymous self-reported student surveys – SCALE Learning Spaces Survey and IDEA Course Evaluation Survey. These data cannot be directly correlated to individual students. This limits the ability to create comprehensive profiles of individual student experiences in a specific classroom. Because students were enrolled in specific course sections and those sections could be identified as being taught in either the active learning or traditional classroom, the collected SCALE and IDEA surveys were associated with the class sections and room assignments. The resulting data was aggregated and the means for each measured objective were attributed to its associated course section.
- An evaluation of the demographics of the two groups found that they were equivalent in composition except for age. There were a greater number of students in the ALC treatment group who were older than the mean age of the control group. This limitation cannot be controlled but is reflective of

the age variability of 18 years to over 40 that is inherent among the community college student population (Amro, Mundy, & Kupczynski, 2015; Ma & Baum, 2016). This means that any findings related to this dimension must acknowledge that this difference makes the groups non-equivalent.

Older students may also possess additional confounding characteristics that contribute to difficulties with their educational performance such as number of years out of formal schooling, caretaking and financial responsibilities (Fragoso, 2013). With more than 35% of all undergraduate community college students being over 25 years old as of 2015, (Chronicle of Higher Education, 2017) the sample in this study reflects a characteristic that is present nationally in the community college population and should be noted in any evaluation of a learning environment.

Summary

Active-learning environments are designed to be aesthetically pleasing, and technology-rich, but they were primarily created to address the physical limitations of the classroom when faculty try to employ various student-centered, active-learning pedagogies. Active pedagogies, which include a variety of teaching strategies that connect students to each other, to the content and to the instructor, have demonstrated significant gains in learning and student engagement, especially with under-prepared developmental students (Engstrom, 2008). The use of active-learning classrooms (ALCs) in various contexts, with and without active pedagogies, has resulted in gains in various performance outcomes such as improved engagement and grades, especially among lower ranked students (Belcher, 2003; Brooks, 2011). Research on the positive influence

of the classroom design on student performance has been limited to students at four-year institutions, despite the fact that more than half of all undergraduates attend community college at some point in their college career. Developmental students represent the majority of students at community colleges, yet they are the least likely to receive an associates or bachelor's degree after six years. Situating developmental students in an active-learning classroom may generate positive performance gains similar to those found in the research of four-year populations.

Definition of Terms

Active-learning – Active-learning is a pedagogical approach, grounded in constructivism (Pundir & Surana, 2016), that requires the students to learn through participation in individual, paired, or collaborative actions to engage with the course content (Beichner & Saul, 1999).

Active-learning Classroom (ALC)- The active-learning classrooms are outfitted with tables that seat 4-9 students each, laptop connections and/or laptop carts with laptops for students, multiple fixed flat-panel displays or interactive projectors, and an instructor station, often centered in the room or on the room's perimeter, that allows for the selection and display of specific information (Park & Choi, 2014). The intention of the active-learning classroom is to support pedagogical models that encourage students in investigative and discovery processes (Brooks, 2011).

At-risk students – Students who are "socially, financially, or academically underprepared or under supported" (Vivian, 2005, p. 336) as higher education students and whose lives include circumstances that could threaten their ability to achieve a credential or degree (Horton, 2015).

Developmental Reading - The non-credit courses offered at the college level to students who have demonstrated difficulty with college level reading. It is often a prerequisite for credit-bearing English courses.

Developmental Student – A student who is under-prepared to successfully complete college level coursework. The term does not denote a student's academic potential but references their current preparation for college-level math or English. The student will often be directed to complete additional, preparatory coursework prior to being permitted to enroll in credit-bearing college courses (Bailey & Cho, 2010).

Flexible Classroom - A type of classroom that is designed to allow mobility and changes to the arrangement of furnishings and technology and which support student-centered pedagogy (Brooks, 2011) Some models of ALCs are also flexible classrooms.

Learning Environment - The diverse, physical locations, contexts, and cultures in which students learn and how teachers may organize an educational setting to facilitate learning (https://www.edglossary.org/learning-environment/, *para 1-2).*

Learning Studio – A type of flexible, active-learning classroom that has colorful chairs and tables with wheels, multiple projectors or flat panel displays, whiteboards, and support for myriad technology – some carted; a small instructor station that is on the perimeter of the room and includes the controls for the displays as well as a computing device; walls that may vary in color and include at least one accent wall of a different shade (Morrone et al., 2014; Taylor, 2009).

Persistence- The state of continuing enrollment in higher education coursework towards a degree or certificate (Bergman, Gross, Berry, & Shuck, 2014)

Retention – In the context of this study, retention refers to the continuous enrollment of the student in the examined course.

Success – Students who achieve a C or better in a course are considered to have successfully passed that course. Students who achieve an A, B or C in Developmental Reading -ENG096 are considered successful and permitted to enroll in the credit-bearing English 121.

Successful developmental student - Refers to a student who completes a developmental course with a passing grade and subsequently enrolls in a credit-bearing college course.

Traditional Classroom – Refers to a common classroom model where students are seated in rows and columns of fixed chairs or other seating facing a single direction in the room where the instructor has both a fixed lectern (Park & Choi, 2014) and often a whiteboard and projection screen.

Withdrawal – A term used to describe the status of the student who is no longer attending a course or an institution. It is one of the five types of leaving behavior identified by Tinto (1975).

CHAPTER II

LITERATURE REVIEW

> Everyone knows what is meant when we speak of a 'room' in an apartment, the 'corner' of the street, a 'marketplace',[…]and so on. These terms of everyday discourse serve to distinguish, but not to isolate, particular spaces, and […] correspond to a specific use of that space[...] Their interrelationships- are ordered in a specific way. Might it not be a good idea, […] to try and ascertain what paradigm gives them their meaning, what syntax governs their organization? (Lefebvre, 1991, p. 16)

Space, its attributes and organization, directly influence "a specific use of that space" (Lefebvre, 1991, p. 16). People enter physical spaces and make immediate judgments about the level of formality, comfort, safety and other attributes about that space (Orr, 1997). They then claim that space as their own by their behaviors and interactions or find that the space imposes upon and constrains them to common behaviors found in similar contexts. In an architectural assessment of space, they are also moved to infer the expected behaviors of themselves and others in that space (Boys, 2010) – does it require hushed voices such as in a library or a place of worship; does it require specific attire such as a formal ballroom or an ice skating rink; does it allow for a mix of activities and discourse such as at a coffee shop or nightclub? The social constructs that align the use of space can be just as significant and often confining as the walls of the space themselves (Lefebvre, 1991). Spaces for work, spaces for relaxation and spaces for learning all have prescribed characteristics that can facilitate or undermine personal interaction and engagement (Oldenburg & Brissett, 1982; Chism, 2006).

College classrooms serve as the primary spaces for formal learning experiences in higher education (Lei, 2010; Oblinger, 2006). The classroom, especially in the

community college environment, is the physical hub for the instructional interactions among students and faculty (Engstrom, 2008; Tinto, 2000). It is the location for formal course work as well as more informal student interaction. The layout, furnishings and flow of a classroom can contribute to or detract from both these formal and informal experiences (Oblinger, 2006). College classrooms tend to follow the same physical design, leading to them earning the moniker of traditional classrooms (Parks & Choi, 2014) in the literature. While the actions that take place in a traditional classroom can vary, the design of the room and its resources may also constrain faculty and limit their ability to enact certain types of learning activities (Veltri, Banning, & Davies, 2006).

The layout of the traditional college classroom places a singular faculty member at the front of an unremarkable room (Jamieson et al., 2000) facing the students. The fixed rows and columns of student seats create an environment more in common with a movie theatre, and its passive, silent, immobile audience, than a dynamic learning space for collaboration and intellectual discourse (Bonwell & Eison, 1991; Parks & Choi, 2014; Pearce & Okwuashi, 2013). This lack of alignment between the design of the space, and the instructional needs of faculty and students has encouraged campus stakeholders, architects and facilities planners to discard the traditional model and create learning spaces driven by teaching and learning and not dictated by historical continuance (Harvey & Kenyon, 2013; Orr, 1997; Oblinger, 2006; Parks & Choi, 2014).

Learning Environments

> *"The one experience that all college students share in common is that of the classroom" (Tinto, 2000, p. 81).*

Designed to provide seating and note-taking space for the students and a presentation space for the instructor, the traditional community college classroom conveys an expectation of a singular person (the instructor) (Cotner et al., 2013; Perks, Orr, & Alomari, 2016) speaking to a captive, seated audience of students (Finkelstein, Ferris, Weston, & Winer, 2016). In this traditional model, the instructor desk or lectern is usually positioned at the front of the room (Johnson et al., 2015) facing the students (Wulsin, 2013) who are typically seated in rows and columns of tablet arm chairs, cemetery-style (Sheninger & Murray, 2017) or at fixed tables oriented to face the front of the room (Taylor, 2009). The student desk is often confining by design (Akanegbu, 2012), and affords only a small amount of writing space. A projection screen and single whiteboard are often mounted at the front of the room as well. This arrangement communicates a clear message of the organization, hierarchy and responsibilities of the inhabitants – both teacher and student - in this common space (Chism, 2006; Orr, 1997).

Most college classrooms are similar (Brown & Long, 2006), outfitted with tablet armchair seating for students and with a physical design that is dictated by the location of heating systems, lighting controls and other infrastructure needs and decades of precedent, rather than thoughtfully designed with a focus on faculty needs and student learning (Jamieson et al., 2000; Orr, 1997; Tom, Voss, & Scheetz, 2008). The result is often a physical space that is uncomfortable, inflexible (Veltri, Banning, & Davies, 2006) and that hinders learning (Harvey & Kenyon, 2013; Whiteside et al., 2010).

Aside from technology affordances, the college classrooms of today (Figure 1) often look and function very similarly to the classroom of the 1920s (Figure 2). In each of these images, students can be seen sitting oriented to face the front of the classroom, in seats that are not intended to be moved. The layout of the room and the orientation of the furniture are typically dictated by the facilities department of the college (Jamieson et al., 2000) or the room capacity (Johnson & Lomas, 2005) but the result of this orientation is impactful on the behaviors of the occupants. Jamieson, et al. (2000) observed that "the size and form of a lecture theatre governs much of the teaching that happens within it" (p. 221). These traditional classrooms are spaces that suggest a pedagogical approach (Lei, 2010) that is singularly teacher-led lectures and discussions (Finkelstein et al., 2016; Martin, 1967). While the room does not dictate practice, the layout, design and furnishings are designed to support lectures (Prince, 2004).

Figure 1. Community college classroom with students seated in rows and columns of tablet armchairs (circa 2017).

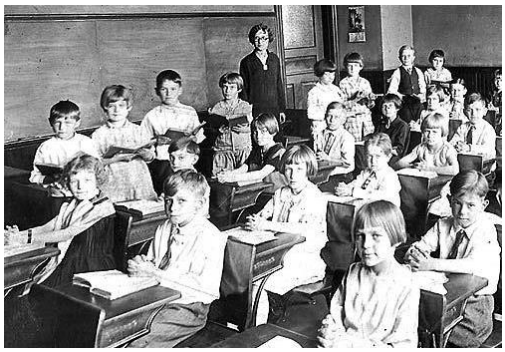

Figure 2. Public school classroom with students circa 1920 (Slosson, 1931).

Historically, learning in higher education has not been perceived as having any connection to the physical classroom space (Parks & Choi, 2014; Temple, 2008). Instead, learning has been examined from theoretical perspectives such as behaviorism, constructivism and other well-researched and documented perspectives that were then enacted in spaces that rarely evolved to reflect the new attitudes about learning (JISC, 2009). The traditional classroom (and associated pedagogies) were initially designed to support the needs of the industrial era (Park & Choi, 2014), when students were preparing for factory or industry jobs in which "a worker would spend hours a day performing the same routine task, often even spending his or her entire career at the same company. In the one-size-fits-all, sit-and-get instructional model, an ability to regurgitate information was the key to success and a sufficient paradigm for that world of work" (Sheninger & Murray, 2017, p. 109). This classroom design reflected what Monahan (2002) refers to as the "built pedagogy" or an architectural embodiment of an educational philosophy – teacher-led and passive students. The educational philosophies at the time reflected the theoretical tenets of behaviorism, as espoused by John Watson, B.F. Skinner and others who would argue that the optimal function of the teacher is to break information and

skills into small increments and provide regular reinforcement at the mastery of each successive step. In this way, Skinner argued that learning is the shaping of behaviors through instruction and the resulting change in student behavior demonstrates that learning has occurred (Skinner & Epstein, 1982). Skinner does not account for individual reflection or problem-solving as a contributor to the student's learning, but more that the student has followed some expressed rules or instructional contingencies at the direction of others (Stabler, 1988) . This approach to instruction is best suited to a physical arrangement that supports the teacher as transmitter and students as receptors for knowledge and is reflected in the design and furnishings of the traditional classroom (Adedokun, Parker, Henke, & Burgess, 2017; Whiteside et. al, 2010).

Bates (2015) observed that the structure of an institution imposes an expectation on how its faculty teach. Thus a traditional classroom encourages teacher-led pedagogies, despite the growing evidence that these pedagogies are not as powerful for student learning (Adedokun et al., 2017; Baepler, Walker, & Driessen, 2014; Bean & Eaton, 2001; Biggs, 2011; Chickering & Gamson, 1987; Lasry et al., 2013). The traditional classroom and teacher-led lecture has been the norm for hundreds of years and still enjoys a great deal of support from college teachers who may never have considered there was an alternative to the room or lesson design they regularly use (Chism, 2006).

Evolution of Learning Environments

> *"In any learning environment students are awash in environmental information, only a small fraction of which constitutes the sights and sounds of instruction"* (Graetz, 2006, pp. 6-1).

Unwilling to accept the status quo of learning spaces, the design of instructional spaces has been gaining increased scrutiny and advocacy by architects and educators

alike as it has become clear that the traditional classroom model is “insufficient to accommodate what has become more varied teaching and learning practices” (Perks, Orr, & Alomari, 2016, p. 53). Professional organizations and websites such as the Association for Learning Environments (2017), EDUCAUSE (Kobza, 2017), Learning Spaces Collaboratory (Narum, 2017) and FLEXSPACE (2017) all champion the need for designing spaces with learning and evolving pedagogies in mind. These organizations advocate for the creation of active learning spaces, while providing supportive results of global research and resources on the topic of learning environments. These redefined spaces challenge the traditional classroom design and are touted as being more comfortable, vibrant and contributing to positive learning outcomes (Oblinger, 2006; Perks et al., 2016).

Research associated with these active-learning environments has demonstrated that they directly influence student engagement (Brown & Long, 2006; Lei, 2010; Oblinger, 2006) student attendance (Belcher, 2001) and student achievement (Belcher, 2001; Brooks, 2011). Additional studies have examined the influence of learning spaces on instructor behavior, classroom activities, and levels of on-task student behavior (Brooks, 2012); pedagogies (Taylor, 2009; Lasry et al., 2013; Tom, et al., 2008); teacher evaluations (Hill & Epps, 2010) and collaborative learning (Morrone A. S., Ouimet, Siering, & Arthur, 2014). These studies have noted that there are measurable differences between student outcomes and teacher pedagogy when instruction is conducted in different types of classrooms. In each of these studies, the positive outcomes favored the active-learning classroom.

While changes to the design of the physical classroom space are not always tied to changes in pedagogy, the advent of new pedagogies, technologies and the need to create spaces that allow for their implementation are also encouraging educational leaders to reimagine the traditional classroom model (Johnson et al., 2015; Oblinger, 2006; Bligh & Pearshouse, 2011). The 2015 Horizon Report for Higher Education noted that "As higher education continues to move away from traditional lecture-based programming and to more hands-on scenarios, university classrooms will start to resemble real-world work and social environments that facilitate organic interactions and cross disciplinary problem solving" (Johnson, et al, 2015, p.18). These newly imagined spaces are referred to collectively as active-learning classrooms (ALCs) (Brooks, 2011; Brown & Long, 2006; Lasry et al., 2013; Lei, 2010). The moniker of ALC is assigned to learning spaces who share common characteristics, and common application to allow both faculty and students to manipulate and use the space to address a variety of instructional needs. ALCs evolved from the higher education STEM laboratories and studio designs of art and architecture classes where students "gather together and […] learn from each other in small groups" (Akinciturk, Erbil, & Yucel, 2011, p. 37).

ALCs are technology-rich, flexibly furnished and organized in a more collaborative and democratic layout than a traditional classroom and have been installed in many four-year institutions such as MIT, Minnesota State, Virginia Tech, University of Iowa, and North Carolina State University. At MIT, Dori and Belcher (Dori & Belcher, 2005) introduced the TEAL (Technology-Enabled Active-Learning) classroom design to address a perceived misalignment between what Belcher characterized as traditional teaching methods and how students actually learn (MIT, 2005). Traditional

lectures by renowned scholars were not translating to strong attendance in MIT freshman physics courses, which had attrition rates of 40% and a 10% failure rate prior to implementing TEAL.

The University of Iowa TILE website chronicles the history, impetus and research associated with its ALCs which are referred to as TILE (Transform, Interact, Learn and Engage). They claim that the TILE program supports student success by:

> "transforming teaching practices, lively interaction, enhanced learning, and increased faculty/student engagement. TILE instructors utilize a foundation of a student-centered, active learning for a classroom built around the issues of pedagogy, practice, and technology" (University of Iowa, 2010, p. para. 1).

Background on Active-Learning Classrooms

One of the first documented ALCs, and a significant contender to the traditional classroom model, was introduced in 1999 by faculty members at North Carolina State University. Beichner and Saul (1999) investigated methods to combine active, collaborative, task-oriented instruction with teacher-led lectures, all in the same physical environment to encourage students' deeper learning of the content (McNeil, Borg, Kennedy, Cui, & Puntha, 2015). This approach reflected North Carolina State's belief that active-learning leads to greater student gains in understanding, critical thinking and engagement. The original study was a multi-year pilot of an introductory physics course which involved redesigning the course content, and assessments to integrate collaborative learning from what had previously been exclusively instructor-led lectures. Beichner and

Saul (1999) reported that, in order to support their instructional goals of active, student-centered learning, the existing physics classroom needed a complete redesign as well. Implicit in this redesign of the physical environment was an expectation that such changes would lead to better student success indicators (Perks,et al., 2016). The resulting design is referred to as the SCALE-UP (Student-centered Activities for Large Enrollment University Physics) project (Beichner & Saul, 1999), later known as Student-Centered Active Learning Environment with Upside-down Pedagogies. The physical environment of a SCALE-UP classroom (Figure 3) was intended to leverage the power of collaborative, social learning that is more constructivist in design (Vygotsky, 1978). The space supported the hands-on affordances and small group seating of a laboratory with the general functionality of a common classroom. The SCALE-UP classroom includes circular tables that seat 8-10 where students may face each other to collaborate; the tables themselves incorporate power to support the use of laptops or other electronic devices (North Carolina State University, 2016); a smaller profile teaching desk or podium that is in the physical center of the room and multiple whiteboards (Miller-Cochran & Gierdowski, 2013) with projection devices on all classroom walls to allow students and instructors to display their work (McNeil, et al., 2015). The fixed tables are positioned such that the instructor may move easily between all groups (Van Horne et al., 2012) but the tables themselves cannot be moved. After the first year of the pilot, reported results included reducing female failure rates by half, reducing minority failure rates by a factor of four, student performance gains of nearly four times on many conceptual exams and student self-reporting of greater satisfaction with their instruction (Beichner, Saul, Allain, Deardorff, & Abbott, 2000). The researchers credited the infusion of active instructional

techniques, intentional design of student collaboration opportunities and the reduction in faculty time spent delivering instruction via lecture. These all represent a very different pedagogical design that the researchers claim to have only been able to enact as a result of the physical design and affordances of the ALC.

Figure 3. SCALE-UP classroom North Carolina State University (http://scaleup.ncsu.edu/FAQs.html)

The SCALE-UP design has been replicated on other campuses and evaluated in several studies. Brooks (2011) measured the final grades of 84 students assigned to two sections of an undergraduate biology course in 2008. One section was taught in a traditional classroom, and one was taught in an ALC modeled after the SCALE-UP design. The same instructor taught both sections of the course, which were offered at the same time of day but different days of the week. Students' ACT placement scores were used as a predictive measure for students' final grades. Brooks reported that "the students who took [the course] in the ALC and who had significantly lower ACT scores,

learned at a higher rate than their traditional classroom counterparts as a result of factors associated with the environment of the ALC" (p. 724).

Keiner (2015) measured the final grades of 581 students in an undergraduate Physical Oceanography course, each assigned to one of three learning environments – a traditional room using lecture methods of instruction; a traditional classroom using interactive, student-centered methods of instruction; and an ALC classroom based on the SCALE-UP model. The students' ACT placement scores were used as a predictive measure for students' final grades. Keiner found that students in the interactive and lecture methods classrooms had "virtually identical results on the posttest (61.5% and 61.7% respectively). This suggests that active-learning strategies employed in a traditional classroom design had little impact on student assessment scores. However, the SCALE-UP sections scored higher (71%) on the posttest." (p. 75). Researchers credited the design of the instruction where a scientific concept was simultaneously introduced and integrated into practice; groupwork was standard and included use of whiteboards for students to work out solutions to higher order problems; and a reduction in lecture to allow for increased student interactions with the content, peers and their instructor as all contributing to the higher scores on the post-test. While these pedagogical approaches were also used to varying degrees in the interactive model of the course, the SCALE-UP room design and affordances were noted as contributing to the differences in student performance between the learning environments (Keiner, 2015).

A classroom model similar to the SCALE-UP design was adopted by physics instructors at Massachusetts Institute of Technology who introduced a design they refer to as TEAL – Technology-enhanced Active-learning (Belcher, 2001). The physical

design of a TEAL classroom mirrors that of the SCALE-UP model but the instructional content includes active and passive visualizations of various scientific phenomena (Belcher, 2003) resulting in a heavier reliance on computer use in class. Prior to the TEAL designed classroom, students registered for a single lecture section with no laboratory component. The proposed synthesis of the lecture with hands-on laboratory activities was intended to both engage students and strengthen their understanding of the concepts that were currently being taught through theory-driven lecture alone (Belcher, 2001). The change was credited with reducing failure rates (previously measured from 7% to 13%) to less than 7% and for increasing student grades with normalized gains on the posttest of 0.52 ± 0.22 (n = 514) in the TEAL environment compared to the non-TEAL traditional model of 0.27 ± 0.31 (n =121). The researchers did note that students should have been given better preparation for learning in the TEAL environment (Belcher, 2003) because of its radical departure in design from the traditional, instructor-led model and traditional classroom. While student performance gains were significant, some student criticism of the learning environment and teaching strategies were also noted.

Learning Studios. From the SCALE-UP and TEAL models, other types of active learning classrooms have emerged, though the terminology used to describe these environments is varied and inconsistent in the literature (Baepler, Walker, & Driessen, 2014; Brown, et al., 2014). Learning studios are one particular model of ALCs. The moniker of *studio* is associated with active, social spaces of creation (Temple, 2008) such as an art, photography or architectural studios. Learning studios are unique ALCs in that the furniture and the technology in the room are untethered and may be reconfigured as needed (Fisher & Newton, 2014; Tom et al., 2008). They also differ from the SCALE-

UP, TEAL and other ALC models in that the computing devices are not networked or tethered to the tables and the student tables, like the student chairs, may be moved. This modular, flexible nature of the learning studio reflects an evolution of the concept of what is meant by an active-learning classroom (Fisher & Newton, 2014; Tom et al., 2008). As with other ALCs, learning studios have multiple display points; a large number of whiteboards (Gatch, 2010) or other wall mounted writing spaces; computing technology embedded in the classroom (laptop or tablet cart); and a panoply of additional technologies (Tom, et al., 2008) which may include interactive projectors, web conferencing tools, document cameras, and microphones. Seating options are varied, often soft seating mixed with café height seating, as well as student chairs with wheels; and tables on wheels. The instructor's desk is smaller and positioned at the perimeter of the room (Johnson, et al, 2015; Perks, et al, 2016) or is a compact, mobile lectern. The color palette of the walls and furnishings differs from the traditional neutral classroom palette to include bright colors (Lei, 2010; Oblinger, 2006; Perks, at al. 2016). The deliberate physical design of active-learning classrooms, such as the learning studio, reflects research that has correlated the impacts of color, light and furnishing selections and arrangement in the classroom on student attentiveness and mood (Lei, 2010).

Tom, et al. (2008) writes that spaces identified as learning studios must include the following:

- Be flexible to accommodate differences in teaching and learning styles, activities, and content.
- Be social spaces that enable collaboration and interactivity during class time.

- Address creature comforts and ambiance because these can enable learning in significant ways.
- Ensure that equipment, facilities, and furniture are accessible to students and teachers and comply with regulations derived from the Americans with Disabilities Act (ADA) (p. 42).

These identified characteristics mirror the UK's Joint Information Committee's 2009 report on the design of 21st Century Learning Spaces. Their projections for future classroom design called for more technologies and furnishings that are untethered and mobile in order to accommodate a variety of instructional needs. The Committee concluded that in most cases in higher education, there was not a need for additional space, just more *flexible* space (JISC, 2009).

Studies of the Learning Studio Environment. The learning studio is arguably the most flexible of all ALC designs. Indiana University's "Collaboration Café" is a learning studio that was designed in response to the call for more active, flexible learning spaces on their campus (Morrone, et al., 2014). The space was originally a computer classroom retrofitted with brightly-colored flexible furniture, multiple projection points, and both natural light and supplemental zoned lighting. Researchers solicited feedback from 10 instructors and 372 students on their perception of the room's flexibility, their physical comfort, ease of collaboration and other factors that might influence student participation and performance in the space. The observational, mixed-methods study collected faculty interviews, study survey data and room surveillance video to evaluate faculty use of the room, as well as student to student and student to faculty interactions.

A daily room use checklist was also employed to collect faculty self-reported behaviors and technology use in the room.

In addition to an overall positive response to the classroom aesthetics, students in the Morrone et al. (2014) study reported high levels of interaction with instructors with 70% of students reporting interaction with their instructor in-class at least once a week; 86 % of students strongly agreed or agreed that the classroom furnishings and design made it easier to collaborate with classmates than in traditional classrooms; and 93% of all responders (faculty and students) strongly agreed or agreed that the space facilitated multiple types of learning activities. These findings are consistent with other research that has noted that the flexibility of furnishings in a learning studio removes a common obstacle of students not being able to reconfigure their seating to face each other or other classroom resources (Lomas & Oblinger, 2006). In previous studies concerning classroom seating arrangements, students drew a direct correlation between seating options and the students' ability and willingness to communicate with each other (Harvey & Kenyon, 2013). Seating that allows for student interaction can increase student engagement in learning, improve their chances at completing a course (Engstrom, 2008) and are best facilitated in classrooms, like learning studios, that can be reconfigured.

Increased interactions among students are reported in most studies that investigate active learning classrooms of all types. In a qualitative study of two sections of undergraduate science students, Taylor (2009) reported that students in the learning studio section communicated with each other more in class than those in the traditional classroom and that communication continued outside of class. Yourstone and Tepper (2014) compared measures of student interactions in an undergraduate accounting class

taught in either a traditional classroom (M = 3.74) or a learning studio (M = 4.755; $t(65)$ = 5.266, $p < .000$) with the results favoring the learning studio for increased student interactions. These interactions were also credited with students have a stronger connection to the course and to each other.

Studies by Lasry et al. (2014); Whiteside et al. (2010) and Taylor (2009), found that the physical environment of the ALC also had an effect on faculty teaching behaviors. Whiteside et al. (2010) investigated the behaviors and outcomes for two undergraduate biology courses taught by the same instructor. One section of the course was taught in a traditional classroom and one in an ALC. In the traditional classroom, the faculty member was observed lecturing more frequently (M = .774, SD = 0.419) in each of the observation intervals as compared to the ALC (M = 0.545, SD= 0.499). This significant difference ($t(386)$ = 4.786, $p < .000$) in more lecture in the traditional classroom reduced student opportunities for group discussion and interaction. An interesting finding in this same study was that students in the traditional room were reported to be "on-task" with greater frequency (M =.993, SD = 0.251) than the students in the ALC (M = .772, SD = .420). This difference was identified as significant between the two environments ($t(386)$ = 4.357, $p < .000$). However, the students in the ALC outperformed their peers in the course. This led the researchers to posit that their own measurement approach to "on task" was wrong and that the more informal student interactions they observed were actually connected to student learning.

Constraints in faculty behaviors were also reported from that same study (Whiteside et al., 2010). The individual instructor tried explicitly to teach all content in the same way in both learning environments, but researchers reported that "given the

physical constraints of the traditional classroom, the professor remained at or near the instructor's podium [in the traditional classroom] significantly more than he did in the ALC" (para. 24). Researchers credited the lack of physical limitations in the ALC as a factor in the higher frequency (27.5%) of consultations between the instructor and students. Interactions with faculty can measurably contribute to positive student learning behaviors (Wilson, Ryan, & Pugh, 2010) so this finding favors the ALC as a more conducive environment for student-faculty interactions.

Finally, Lasry, et al (2014) examined the professed teaching approaches of six instructors assigned to different learning environments. Their quasi-experimental 2 × 2 factorial design compared faculty who favored either a student-centered, or teacher-centered approach to teaching an undergraduate introductory mechanics course, in either a traditional classroom or an ALC. Using the Approaches to Teaching Inventory (Trigwell & Prosser, 2004), faculty were identified as being more student-centered or teacher-focused. Faculty were interviewed three times during the study semester to evaluate their preference and comfort with their assigned learning environment. While not all teacher-focused faculty responded positively to teaching in an ALC, several reported that they had modified their teaching to engage students in multiple ways of thinking instead of their previous approach of designing lectures and presentations for them to view. If, as Strange and Banning (2001) suggest, "space exerts a cumulative effect as those designed to promote inclusion…and engagement are instrumental in effecting the ultimate experience of community" (p. 26) then it is clear from the aforementioned studies that ALCs shape behaviors of both faculty and students. These

behaviors may be both cognitive, such as student performance gains, and non-cognitive in nature.

Attendance. Student attendance is a critical, non-cognitive contributor to student performance in higher education (Credé, Roch, & Kieszczynka, 2010; Gump, 2005). Regular attendance allows for increased socialization and community building which has been correlated with strengthening learning and professional behaviors, attitudes and skills (Persky, et al., 2014). In this way, attendance plays an immediate role in helping or hurting a student's sense of connection to the course, classmates and instructor, and also correlates to their academic success in the course. Developmental students often have poor attendance in college courses, which has been correlated with their poor academic preparation (Lutz, 2012).

Academic difficulty is only one of a multitude of factors that negatively impact regular student attendance, most notably, lack of student engagement with peers or faculty (Stripling, Roberts, & Israel, 2013). Students who miss class are less connected to their learning community and being less connected to the learning community may influence students missing class (White, 1992). Studies of ALCs have detected increased attendance when classes are taught in this type of learning environment. Beichner (2008) reviewed data for five years of course sections taught in the SCALE-UP ALC at North Carolina State University and found that class attendance rates were consistently above 90% for all courses in that period. Studies of active-learning classrooms (Beichner, 2008; Brooks, 2012; Dori & Belcher, 2005; Taylor, 2009) have all noted the enhanced faculty and student interaction that occurs in these types of spaces, and several studies (Belcher, 2001; Brooks, 2012; Pellathy & Leibovich, 2008) have reported increased

student attendance in ALC sections. Existing research suggests that ALCs, and the interactions they support, contribute positively to student attendance, decrease absenteeism, increase student success and encourage retention.

***Retention*.** Retention is an extension of positive student attendance. Increased retention is the seminal goal for higher education – at the classroom and institutional level. Retention refers to the continued active enrollment of a student in a specific course or semester (Barnes & Piland, 2010), and is the product of myriad factors. Factors that positively influence student retention include active learning pedagogies and student and faculty interaction (Braxton, Milem, & Sullivan, 2000; Brooks, 2012; Park & Choi, 2014). As noted earlier, these classroom behaviors have been reported as common when instruction is provided in an ALC (Braxton et al., 2000; Brooks, 2012) and are credited with improving student retention.

In examining retention of college students, Tinto (1975) offered a model for student departure and identified the personal and institutional factors that lead to retention. Among these are the students' sense that they are part of the classroom and institutional community. Tinto places responsibility on the institution to create a positive setting for a students' social and intellectual integration. The classroom, he argues, plays a pivotal role in that integration because the classroom experience can encourage or discourage a student feeling a sense of membership in a community of learning. As noted previously, ALCs contribute to a strong sense of community among the students (Belcher, 2003; Brooks, 2012; Cotner et al., 2013; Lasry et al., 2013).

Bean and Eaton (2000) extended Tinto's work on student departure theory with the development of their Psychological Model of Student Retention. They attribute four

constructs that can influence student retention – past student behavior, initial student self-efficacy, student's initial locus of control, and student's initial coping strategies. "Becoming integrated requires attitudinal and behavioral energy from the student that moves him/her in a positive direction " (Bean & Eaton, 2000, p. 53). They note the power of faculty interactions as directly impacting self-efficacy, locus of control and coping strategies. They also emphasize that working and socializing with peer groups provide students context and perspective on coping with their own academic and social challenges (Bean & Eaton, 2001) which positively correlates with increased retention and student success.

Braxton, Milem and Sullivan (2000) also revisited Tinto's theory by examining the influence of active learning on the student departure process. They argue that active-learning is the antecedent to academic integration and emphasize research that experiences in the classroom directly influence student withdrawal decisions. More importantly, they distinguish between the academic integration behaviors Tinto (1975) espouses as encouraging students to persist, with active-learning tasks that can facilitate those academic integration behaviors. Braxton, et al (2000). argued that students who are afforded the opportunity to participate in active-learning in the classroom: a) perceive themselves as better understanding their coursework; b) gain a more positive sense of the collegiate experience; c) gain additional time outside of class that is no longer spent trying to master concepts and d) develop social relationships within the classroom. Research that supports these claims was through a longitudinal study conducted with 718 first-year students at a selective four-year university. Using a composite survey instrument, researchers examined active-learning behaviors that were positively

correlated with student persistence. Class discussions ($p < 0.001$) and higher order thinking activities ($p < 0.001$) both were determined to highly influence social integration. The study was limited in that persistence was measured by asking the students if they intended to return the following year, not through actual enrollment data. In the current study, enrollment data was collected to gain further insight into the role ALCs may play in student persistence.

Existing research concerning retention in ALCs has been scarce however Yourstone and Tepper (2014), in their study of a learning studio, did examine this construct. They reported that student retention in an undergraduate accounting course was higher for students who took the course in the learning studio. They also noted increased interaction among students in the course. Student interaction, such as that which is facilitated by the design of ALCs, contributes directly to increased student academic performance.

Student Performance. Student demonstration of content or performance mastery, among other data points, is measured by assessments and the final grade for a course. While student academic performance is an ongoing process of learning and the demonstration of learning throughout a course, the final grade is common measure used in the literature for gauging overall student academic performance and success (Hepworth, Littlepage, & Hancock, 2018).

Baepler, Walker and Driessen (2014) directly connected the use of an active-learning classroom and the instructor's use of student-centered instruction as contributing to gains in student performance. Over a three-semester period, they studied 1100 general chemistry students in either a traditional classroom or ALC. The research used the

students' ACT scores as a predictor of final grades, and a common final exam (ACS) as a measure of student academic performance. The initial study of students who received instruction in a traditional classroom (n = 304) and students who received instruction in an ALC (n = 275) found that students in the ALC (M = 68.87, SD = 12.73) outperformed students in the traditional classroom (M = 65.80, SD = 14.10; $t(578) = 2.74$, $p < .01$) (Table 1).

Table 1

Initial Study: Differences Between Traditional Classroom and ALC on Final Exam (ACS).

	Traditional Spring 2012	ALC Spring 2012	Difference	*t* statistic
Final Exam (ACS)	65.80 (14.10) 304	68.87 (12.73) 275	3.07	2.744**

Note. Reprinted from It's not about seat time: Blending, flipping, and efficiency in active learning classrooms., by Baepler, P., Walker, J.D., Driessen, M., 2014, *Computers & Education*, 78, *p*.227-236. Cell entries are means, and standard deviation (in parentheses).
**$p < .01$

They also collected student feedback related to the role of the classroom for several measures including promoting engagement, allowing flexibility, and engendering confidence in academic tasks (Table 2). These measures, evaluated by students on a 4-point scale, were thought to correlate with enhancing student performance. In all measures, except one identified as "room course fit", the ALC was viewed more positively than the traditional classroom.

Table 2

Initial study: Differences between traditional classroom and ALC on student perception of the learning space.

	Traditional	ALC	Difference	Cohen's *d*	*t* score
Engagement	2.42 (.52) 203	3.06 (.50) 212	.64	1.25	12.94***
Enrichment	2.81 (.54) 203	2.91 (.54) 216	.10	.19	2.01*
Flexibility	2.74 (.59) 204	3.11 (.59) 218	.37	.63	6.39***
Effective Use	3.64 (.46) 207	3.55 (.51) 218	-.09	.19	-1.85
Student learning outcomes	2.64 (.42) 194	2.86 (.43) 213	.22	.52	5.26***
Room course fit	3.23 (.59) 208	3.33 (.63) 215	.10	.16	1.80
Confidence	2.28 (.49) 201	2.75 (.47) 213	.47	.98	10.13***

Note. Cell entries are means, standard deviations (in parentheses), and *N*. *$p < .05$, ***$p < .001$.

Reprinted from It's not about seat time: Blending, flipping, and efficiency in active learning classrooms., by Baepler, P., Walker, J.D., Driessen, M., 2014, *Computers & Education,* 78, *p.*227-236.

Most notably was the impact that learning in an ALC has had on students initially ranked as lowest performing. Brooks (2011) noted that "the formal physical environment in which students take their courses has a significant impact on measurable student success indicators" (p. 719). In the Dori and Belcher (2005) study of the TEAL (Technology-Enable Active Learning) ALC noted earlier in this chapter, students initially ranked as lower performers exhibited the greatest performance gains when taught in an ALC. The study, over three semesters, examined performance outcomes for 811

electro-magnetism undergraduates. One control group (n = 121) received instructor-led instruction in a traditional classroom. One experimental group (n = 176), identified as representing a small-scale version of the TEAL project, and one experimental group (n = 514) representing a larger scale implementation of the TEAL project. Students were administered a pre-test at the beginning of the semester and their resulting scores were ranked in segments of high, intermediate and low performers. At the end of each semester, students were administered a final exam. Data in Table 3 outlines the mean performance gains for students in each of the three segments. In each environment, the students who were initially ranked as lowest demonstrated the greatest gains. The low ranked students in the control group had gains of 0.33, however the lowest ranked students in the ALC groups outperformed the control group with demonstrated gains of 0.43 and 0.51.

Table 3

Relative Improvement of Conceptual Understanding of Experimental ALC Group (2001, 2003) and Control Group Students (2002)

	Experimental Fall 2001		Experimental Spring 2003		Control Spring 2002	
Group	*n*	<*g*>	*n*	<*g*>	*n*	<*g*>
Total (N = 811)	176	0.46*	514	0.52*	121	0.27
High	58	0.56	40	0.46	19	0.13
Intermediate	48	0.39	176	0.55	50	0.26
Low	70	0.43	298	0.51	52	0.33

Note. Reprinted from How does technology-enabled active learning affect undergraduate students' understanding of electromagnetism concepts?, by Dori, Y. J.; Belcher, J., 2005, *The Journal of the Learning Sciences, 14, p.*269.
*p < .01

The comparison results illustrate that, for each of the three levels - high, intermediate, and low, the difference in relative improvement (Table 3) was significant (p < .01) in favor of the group receiving instruction in the TEAL ALC.

Brooks and Solheim (2014) reported similar results in their study of 111 undergraduate students in a personal finance course. The course, taught in a traditional room in the Fall of 2008, was repeated in an ALC the following Fall 2009. While they reported an overall difference of 3.70 percentage points in student final grades that favored students in the ALC, the most significant finding related to students who were identified as lower performing, based on their quartile ranking in the overall mean course grade for that section. In the case of the students in the lowest quartile, students in the ALC experienced a normalized gain of 23.66% (Table 4).

Table 4

Difference of Means Tests for Aggregated Student Grades. Traditional (Fall 2008) vs ALC (Fall 2009).

Variable	Fall 2008†	Fall 2009 †	df	*t*-score	Normalized Gains††
All students	81.801 (7.943)	85.497 (5.962)	194	-3.653***	20.31%
First quartile	70.989 (4.848)	77.854 (4.515)	48	-5.170****	23.66%
Second quartile	80.123 (1.873)	84.364 (1.486)	51	-9.110****	21.33%
Third quartile	85.587 (1.270)	88.514 (1.322)	44	-7.641****	20.31%
Fourth quartile	91.073 (1.993)	92.295 (1.796)	45	-2.196*	12.71%

Note. Reprinted from Pedagogy matters too: The impact of adapting teaching approaches to formal learning environments on student learning, by Brooks, D.C. & Solheim, C.A., 2014, *New Directions for Teaching and Learning, 137, p.*53-61.
†Cell entries are means with standard deviations in parentheses.
†† The normalized differences are calculated as follows: [(fall 2009 grade) – (fall 2008 grade)]/ [100 – (fall 2008 grade)] x 100.
* $p < .05$, *** $p < .001$, and ****$p < .001$.

These findings for the lowest performing students demonstrating significant performance gains in an ALC are further supported by studies by Beichner and Saul (1999) and Cotner et al. (2013) and should encourage educators to leverage the ability to employ student-centered methods (Biggs, 2011) in active-learning classrooms. While teaching in an active-learning classroom does not guarantee that faculty will employ student-centered learning techniques, the room's design, furnishings and technology allow them options for instruction that requires movement and flexibility of furnishings and technology and which are almost impossible in a traditional classroom design. If, as Boys (2010) noted, space plays a primary role in how we think about the world and our subsequent actions are directly influenced by the space we inhabit, then the active learning classroom conveys the opportunity to conceptualize learning as an active construct.

While positive outcomes have been measured when employing ALCs for courses at four-year institutions, the demonstrated academic gains they may provide should be propagated in other settings. What is missing from the existing literature is a deliberate examination of the students who are not enrolled in credit-bearing courses at four-year institutions. This research examines the impact of ALCs on the lowest academic strata of the undergraduate population, community college developmental students.

Community College Students

Community colleges can be defined as any institution accredited to award the associate of arts or science as its highest degree (Cohen & Brawer, 2003; Vaughan, 2006). Community colleges are a decidedly American institution, having no true corollary in the European nations and reflect a democratic supposition that all people

should have access to educational environments that help them develop skills and succeed (Cohen & Brawer, 2003). This democratization of educational opportunities encourages many to see a community college education as a viable path, regardless of finances or academic preparation (Mullin, 2012). Most credit-seeking students attend community colleges with either the hopes of transferring to a four-year university, graduating with a two-year associates degree or securing some type of certification (Mellow & Heelan, 2014). These students comprise almost half of the total undergraduate population (Mellow & Heelan, 2014) and they are vastly different from their four-year counterparts in terms of age, socioeconomic status, race, educational goals, and academic ability (Goldrick-Rab, 2010). Unlike four-year institutions, community colleges are significantly less costly, and have an open-door policy described or defined as admittance of all students regardless of their prior academic performance (Liao et al., 2014). This open-door policy leads to many academically challenged students choosing to attend community colleges to begin or complete their higher education.

Racially, community college students are primarily minority students, with a large percentage for whom English is a second language (American Association of Community Colleges, 2015). In fact, half of the community college student body is comprised of African American, Latino and lower income students (Bettinger & Long, 2007; Mellow & Heelan, 2014; Porchea, Allen, Robbins, & Phelps, 2010). Students at community colleges have diverse educational goals, are diverse socio-economically and are of diverse academic ability (Cohen & Brawer, 2003; Goldrick-Rab, 2010; Hoachlander, Sikora, Horn, & Carroll, 2003; Mullin, 2012; Vaughan, 2006). Community college

populations, comprised of students who are typically commuters, tend to reflect the racial makeup and the socio-economic characteristics of the college's surrounding area. Community college students also range in age from newly graduated high school teenagers to older adults who are returning to college after being in the workforce (Mullin, 2012).

While their academic skills might be measured by placement exams or high school GPA's, this population of learners also includes those who are faced with any number of non-academic difficulties such as poverty, possessing a learning or behavioral disability, low academic interest, or competing family and work obligations (Bailey & Cho, 2010; Education, 2017; Mullin, 2012). Compounding those challenges for many are a lack of preparation or the necessary skills to succeed in credit bearing college courses (Bailey, et al., 2016; Russell, 2008). Community colleges have devised a number of interventions to try and support learners who are unprepared for college-level coursework, but wide-scale implementation of active-learning classrooms is not one of them.

Developmental students

Developmental students are those students who are identified as underprepared or who lack the necessary skills to succeed in credit bearing college courses. These students may struggle with reading, writing and/or math skills that they will need to succeed in college level course work (Bailey et al., 2010). The reported numbers of developmental students at community colleges vary from less than half to more than two-thirds of all students. The National Center of Educational Statistics, in 2016, reported the number as 41.4% of all public community college students (Snyder et al., 2016). This may be due,

in part, to community college open enrollment policies that require that every student, regardless of academic abilities, be admitted to the college (Mellow & Heelan, 2014; Goldrick-Rab, 2010).

Developmental Instruction

One way community colleges do try to address the academic needs of under-prepared students is through developmental instruction (Bailey, 2009; Bailey, et al., 2016). Developmental instruction, sometimes referred to as remedial instruction, is intended to address inequities in student academic preparation and help students prepare to succeed in college-level course work (Bettinger & Long, 2007). The moniker "developmental instruction" refers to a multitude of models and services. It can be centralized, with both coursework and supportive resources hosted under one departmental umbrella, or distributed with various areas of an institution providing an "ala carte" set of services and instruction to students (Boylan, 2001). The developmental course or sequence of courses includes material that may not have been explicitly addressed or mastered in the high school curriculum, but which is essential for success at the college level (Boylan & Bonham, 2007). On average, more than 60% of all community college students enroll in at least one developmental course to prepare them for credit bearing coursework (Bettinger & Long, 2005).

Community colleges use a number of measures to determine if a student should be placed into developmental instruction (Pretlow III & Wathington, 2012; Rikoon, Liebtag, Olivera-Aguilar, M., & Jackson, 2014). Students who achieve the requisite mastery score on college screening exams such as the SAT or ACT are not typically required to take additional evaluations in order to enroll in college level course work at a

community college. Students who do not score the college minimum on those exams are directed and, in some states, required to take placement exams for foundational disciplines such as English and Math (Bailey & Cho, 2010; Secolsky & Judd, 2013). Of the population of students who do take screening placement exams for community college courses, many score so low that they are deemed to lack college readiness (Crisp & Delgado, 2014; Hoachlander, et al., 2003). These students, identified as developmental students, are encouraged to enroll in courses that are specifically designed to help students develop foundational reading, writing or math skills prior to being allowed to take college level math or English (Bailey et al., 2010; Gallard et al., 2010; Martorell & McFarlin, 2010).

While developmental courses are intended to raise student abilities and remediate students to gain skills of their academic peers, there is little evidence that the majority of developmental programs have measurable impact on the success of the target population. In some instances, participation in developmental coursework imposes a barrier to completion as it increases the costs and time for a student to obtain an academic credential (Kosiewicz, Ngo, & Fong, 2016). In January 2014, the Community College Research Center (CCRC) summarized the findings of eight studies of the impact of developmental instruction for students who scored just below the cutoff for assignment into a developmental course with those who scored at or just above the cutoff. The findings for all groups, regardless of type or length of developmental instruction, was that developmental instruction did not have positive effects on students. The CCRC concluded that the current system of developmental education is not achieving the

expressed purpose of improving outcomes for students deemed not yet “college-ready” (Jaggars & Stacey, 2014).

Crisp and Delgado (2014), examined data for 2,7801 students in the BPS Longitudinal Data Study who enrolled in community college in 2003-2004 to evaluate the role that participating in developmental education had on the student’s vertical transfer. The term “vertical transfer” refers to a degree-seeking student’s move from a community college to a four-year institution (NSC Research Center, 2018). The Crisp and Delgado (2014) study population included 940 students who were enrolled in at least one developmental course who expressed a desire to transfer to a four-year university and 1,830 students who were pursuing a transfer but who were not enrolled in a developmental course. Researchers found that 44% of non-developmental students transferred to a four-year institution as compared to only 35% of developmental students. More specifically, they discovered a significant negative relationship ($p < .05$) between students enrolling in English developmental courses and the odds that a student would transfer to a 4-year institution. This was true even after controlling for variables that have been correlated previously to community college success, such as first-generation status, pre-college experience and institutional variables.

One longitudinal study followed first-time, degree-seeking community college developmental students at six community colleges for three years. In this study, Scott-Clayton and Rodriguez (2012) examined the outcomes for 100,000 students who were just below or near the cutoff scores for developmental placement for English (Reading and Writing), and Math. In addition to pre and post-test scores, they evaluated students using models of development, discouragement or diversion. They reported that students

who enrolled in developmental reading were 5% less likely to earn an associate's degree, and 8% more likely to drop out; and students in developmental math were 5% less likely to pass college-level math. In aggregate, they reported that remediation does not sufficiently develop students' skills in order to improve their chances of college-level success and can negatively impact the student's self-perception.

Despite these grim statistics, developmental instruction remains a requirement for a majority of community college students in order to pursue a degree. Degree attainment is not possible without successfully completing credit-bearing coursework and enrollment in credit-bearing coursework is often dependent on successful completion of a developmental course or sequence (Schak, Metzger, Bass, McCann, & English, 2017). The required course or developmental course sequence can be costly and require extensive time and financial resources for academically-challenged, potentially low interest students who must complete classes that do not concretely contribute to their attainment of a degree (Bailey et al., 2010; Gallard et al., 2010; Jenkins, Speroni, Belfield, Jaggars, & Edgecombe, 2012; Martorell & McFarlin, 2010).

Interventions for Developmental Students

The dismal completion numbers of community college students have caught the attention of policymakers (Ganga, 2017) and national leaders (Mellow & Heelan, 2014; Shapiro, Dundar, Wakhungu, Yuan, & Hwang, 2015) who are evaluating changes to funding models for community colleges and other public institutions. The proposed models would shift funding to one based on performance outcomes (Dougherty & Reddy, 2013; Executive Office of the President, 2014; Pruett & Absher, 2015). This increased

pressure, on what is deemed the college completion agenda, has highlighted the need to evaluate and improve interventions that target developmental students (Mullin, 2012).

Interventions that have been proposed or enacted include comprehensive and integrated support programs (Bailey, et al., 2016); summer bridge programs (Barnett, et al., 2012); early assessment programs for at-risk high school students (Schak et al., 2017) enhanced (Kadar, 2001) and early-alert advising; changes to practices in placement decisions (Scott-Clayton J. , 2012); learning communities (Bailey & Cho, 2010; Wilmer, 2009); mentoring (Bailey, et al., 2016); tutoring (Gallard et al., 2010) and practices to accelerate, compress, or mainstream developmental education (Jenkins et al., 2012). Unfortunately, many interventions employed for developmental students have seen limited success (Jenkins et al., 2012) and those which have claimed success have come under attack for either not being studied in appropriately controlled and sampled environments (Crisp & Delgado, 2014; Martorell & McFarlin, 2010) or not being scalable. Additionally, the majority of all developmental support is provided as additional requirements for the student. What is missing among the host of interventions are supports that target the classroom itself. Given the requirement that most students must complete designated developmental coursework in order to proceed to college level instruction (Bettinger et al., 2013; Engstrom, 2008), and that the retention of these students is critical to their academic success, the characteristics, content, delivery and physical environment of the classroom has a role in the academic performance of developmental students.

Scholars who have investigated the developmental population for years came close to connecting the impact of the classroom on developmental outcomes when they

stated that “Students are more likely to take advantage of and profit from support services if they are located in close proximity to classrooms” (Boylan, 2001, p. 22). This claim encourages stakeholders to bring service in “close proximity” to the classroom but again does not recognize the impact of the classroom space itself. Tinto (2000) noted that, despite the breadth of studies examining factors that contribute or detract from college student persistence and retention, the majority have not examined, or even acknowledged, the influence of the classroom.

This lack of connection to the classroom persisted more than a decade after Tinto made that observation. As recently as 2014, the state of Texas Higher Education Coordinating Board, released their vision statement to improve developmental education in their state:

> “By fall 2017, Texas will significantly improve the success of under-prepared students by addressing their individualized needs through reliable diagnostic assessment, comprehensive support services and non-traditional interventions, to include modular, mainstreaming, non-course competency- based, technologically-based, and integrated instructional models” (THECB, 2014, para. 2).

What is striking about this statement and the corresponding efforts made to support it, is the absence of any mention of the classroom or learning environment. While academic advisors, tutors, mentors and other services might have a role in supporting a developmental student, the classroom environment itself is the most accessible and impactful location to address the “comprehensive process that focuses on the intellectual, social and, educational growth and development of all students” (NADE, 2018, p. 8) .

Learning Spaces and Active Pedagogy and Developmental Students

The classroom design can encourage teacher-led instruction often dominated by lectures, drills, worksheets, silent reading and other activities (Engstrom, 2008; Lasry, Charles, & Whittaker, 2014). The academic and non-cognitive needs of developmental students may not be met with this modality (Kosiewicz et al., 2016) and could negatively impact their persistence with the course (Engstrom, 2008). Engstrom (2008) observed, in her research on developmental students and effective pedagogy, that while colleges have created a number of developmental course options for students, those courses do not typically reflect a student-centered, active learning approach. She cited the work of Grubb (1999), "Unfortunately, these courses have been delivered in traditional, non-engaging, even alienating ways. In typical basic skills courses, students are in classes requiring monotonous "sentence completion exercise, arithmetic drills, and three paragraph essays on contrived topics" (Grubb, 1999, p. 204 in Engstrom, 2008) and do not incorporate collaborative, active methods of instruction. Holsuch and Paulson (2013) also noted that "much of the instruction in developmental reading courses has centered on a transmission model, despite calls for a more strategic, or process-based approach" (p. 6). Underprepared, developmental students have likely received this type of drill and practice, lecture-centric instruction in the past and have demonstrated that such approaches do not work for their learning (Boylan, 2002).

An alternative to the traditional faculty delivered, student-as-audience instruction is active-learning (Prince, 2004). Using the work of Engstrom and others as a guide, the Community College of Baltimore, faculty and instructional designers enacted student-centered, active instruction when they redesigned their integrated reading and writing

developmental English course in 2015. The intention of the redesign was to improve what had historically been poor completion numbers of students, to create a curriculum that reflected best practices in pedagogy, and to increase the numbers of students who pass the subsequent credit-bearing English course (Hayes & Williams, 2016). They asserted several guiding principles that the developmental course must reflect to support the success of this population of learners. These included:

- pedagogy focused on "growth mindset" towards students and their progress;
- pedagogy that helps grow students' sense of responsibility;
- pedagogy that relies heavily on active learning techniques (Hayes & Williams, 2016, p. 16).

The results were impressive, for this three-semester study of over 340 developmental students. Students in the two semesters that received the active-learning treatment, 28% in Fall 2012 and 27% in Fall 2013 passed the credit-bearing English course within two semesters. Conversely, only 17% in the lecture-based, control group passed the same course within four semesters. The implementation of student-centered, active-learning practices was credited with directly improving student outcomes (Hayes & Williams, 2016). These active-learning practices may be implemented in traditional classrooms but embedding them in active-learning environments may amplify their impact on learners (Lasry, Charles, Whittaker, Dedic, & Rosenfield, 2013).

Advocacy for student-centered, active-learning is not new (Perks, et al. 2016). John Dewey (1916), Paulo Freire (1968), and Seymour Papert (1991) all championed more active, student-centered instructional approaches counter to the teacher- as-arbiter of all knowledge model. While not specifically noting the need to address the physical design of the formal classroom, these scholars called for greater levels of student responsibility and opportunities to participate in the learning process. John Dewey

(2004) argued against the existing "traditional" authoritarian teaching model of a teacher-centric content delivery system and advocated for a more democratic method of instruction where students are allowed to interact with the content and are afforded related experiences. While his theories ascribed to a more pragmatic philosophy of instruction, his work set the stage for others to reconsider teacher-led, didactic instruction (Ultanir, 2012). Vygotsky encouraged a social constructivist approach to learning that leveraged the student's environment and collaboration with others as the basis for creating knowledge (Churcher, Downs, & Tewksbury, 2014; Vygotsky, 1978). Papert and Harel (1991) noted that learners benefit from communicating and reflecting with others on their learning. In each case, the student's learning and conceptual-change is a greater focus of the instructional design than teacher-led behaviors.

The design of student-centered instruction can take many different forms – each intended to encourage active engagement of the learner with the content, the instructor and, frequently, with peers (Stefaniak & Tracey, 2015). Because the term 'student-centered instruction' refers to the role of the learner and is not a descriptor of specific learning tasks, studies on its efficacy for learners of all academic levels have taken many forms.

Stefaniak and Tracey (2015) studied the impact of student-centered instruction on the students' learning experience and motivation when compared to lecture-driven instruction for 109 students in an undergraduate public speaking course at a four-year, public university. The researchers found that both student satisfaction and student performance were improved in the course sections that were conducted using a variety of student-centered learning activities as opposed to lecture exclusively. While the activities

and instructional approaches varied among the faculty members in the experimental group, each faculty member taught with a focus on student-centered and little or no lecture instruction.

Several studies have illustrated that student-centered tasks can be included in courses that also include some lecture delivered instruction. Enacting an approach developed by Mazur in the 1990s, Lasry, Charles and Whitaker (2016), studied the effects of peer discussion on student learning. Their examination involved three groups of first-semester introductory physics students and their responses to nine-conceptual multiple-choice questions. In the first group, the students were polled individually and then given the opportunity to speak to another student seated nearby who had initially given a different answer. After two minutes of discussion, students were allowed to answer the question a second time. The second group were given two separate tasks to do in order to answer the questions. The first was to answer the question and then reflect individually for sixty seconds before responding to the question a second time. This condition was repeated for the first five questions. For the final four questions, the students were distracted during their reflective period. The third group was a reverse of the second group design in that the students were distracted during their initial four questions and allowed to reflect during the final five. The findings were that the group that had been allowed to engage in peer discussion prior to answering for the second time demonstrated the greatest positive change in scores (Lasry et al., 2016). This type of student-to-student peer interaction has positive implications for instruction and is often difficult to enact in a traditional classroom layout due to constraints of the student seating arrangements (Harvey & Kenyon, 2013; Veltri, Banning, & Davies, 2006).

Student performance is not the only metric that is impacted by instruction in an ALC. Johnson (2011) studied faculty course evaluations for five sections of faculty teaching a graduate level human growth and development course in an ALC. Three of the sections were taught using teacher-led lecture and the remaining two sections were taught using active, student-centered pedagogies. The average composite student evaluation score for the two active-learning sections was 4.85 while the average composite score for all faculty teaching the same course was 4.51. Results of an independent means *t*-test indicated that students taking the active learning based human growth and development course rated it higher (M = 4.85, SD =.153) than did those taking the traditional lecture/textbook human growth and development (M = 4.28, SD = .0832), t (3) = -7.78, p = .0004).

These studies highlight the potential for positive student performance outcomes and perceptions of faculty performance when students are active participants in their learning process, regardless of what student-centered instructional strategy is employed by the faculty member. What is consistent in the design of these approaches is a significant reduction in the use of a lecture-style delivery of information and an increase in peer interaction as students were tasked to learn in active ways and generate their own knowledge of the subject matter (Attard, et al., 2010). Additionally, there was evidence of increased academic gains through the interaction between the students and the teacher. This type of supportive, student-centered interaction is critical for at-risk students such as developmental students (Holschuh & Paulson, 2013). These students, who are often struggling with academic deficiencies, poor self-concept and low academic interest can benefit from the increased engagement that can result from student-centered active

learning (Holschuh & Paulson, 2013). Research also supports that these strategies can increase the academic and social investment of at-risk student populations (Reschly & Christenson, 2012) and yet that instructional approach is not always implemented.

Research illustrates Lefebvre's (1991) observation about spaces that "Their interrelationships are ordered in a specific way. Might it not be a good idea…to try and ascertain what paradigm gives them their meaning…?" (p. 6). Active-learning classrooms were first introduced to allow faculty and students to take greater ownership and have greater flexibility in their uses of space and pedagogy for learning (Beichner & Saul, 1999; Belcher, 2001). The design and affordances of the ALCs has proven to amplify those behaviors that increase learning. The paradigm of space and teaching behaviors, if connected to developmental students at community colleges, can generate positive learning outcomes for this population of underprepared students and should be examined for its potential to influence student attendance, retention, persistence and performance.

Summary

Developmental students comprise between 40 and 75% of the community college population yet only one in five students in a developmental college classroom can expect to complete a college degree within six to eight years (Bailey, 2009; CAPR, 2018). Community colleges have funded costly interventions to try and address the low completion numbers of these students, but these interventions have either not scaled or have not been successful. Common to all of these interventions is that they are offered externally to the primary hub of student interaction – the classroom.

The classroom, its affordances and design, is evolving to support student-centered pedagogies which improve student engagement and performance. Active-learning classrooms (ALC) have been created as a response to changing pedagogy and increasing calls for student-centered instruction (Baepler et al., 2014; Beichner et al., 2000; Cotner et al., 2013; Oblinger, 2006). Developmental students benefit from active-learning strategies, but faculty are often constrained by the design of the learning environment. ALCs incorporate flexible furnishings and myriad embedded technologies (Harvey & Kenyon, 2013; Oblinger, 2006) to provide instructional options which are often difficult or impossible to conduct in a traditional classroom (Talbert & Mor-Avi, 2018).

Research on the student outcomes for instruction conducted in ALCs has demonstrated that they directly influence student engagement (Brown & Long, 2006; Lei, 2010; Oblinger, 2006) student attendance (Belcher, 2001) and student achievement (Belcher, 2001; Brooks, 2011) but these studies have been limited to four-year colleges and credit bearing courses. Further research is needed to determine if ALCs can influence some of the most common challenges with the developmental student population such as low attendance, poor academic performance, lack of engagement with peers, instructor and content, and high attrition rates.

CHAPTER III.
METHODOLOGY

The college classroom is the primary location for student learning and social interaction for most community college students (Tinto, 1997). Recognizing that classroom layout and affordances can contribute to or hinder student learning, institutions are developing and adopting various classroom designs (Oblinger, 2006) as alternatives to the traditional classroom layout. The resulting alternative spaces, such as active-learning classrooms (ALCs), have been examined in a number of contexts. These have included the role of ALCs in impacting classroom pedagogy (Brooks & Solheim, 2014; Lasry et al., 2013), student attitudes (Espey, 2008), student performance (Baepler & Walker, 2014b); student engagement (Benson, et al., 2010) social interactions among students (Walker & Baepler, 2017) and interactions between students and faculty (Brooks, 2012).

Active-learning classrooms, which can be configured in social groupings to support collaborative, active-learning techniques, have been used by faculty in a variety of disciplines (Beichner et al., 2000; Oblinger, 2006). Many studies of ALCs have credited the environment (Brooks, 2011) and the ability to employ student-centered, active-learning (Brooks, 2012; Dori & Belcher, 2005) with improving student engagement and performance (Espey, 2008), especially among those students whose initial academic rankings were deemed poor (Baepler & Walker, 2015; Brooks, 2011). Previous studies of the impact of ALCs have focused primarily on four-year institutions (Oblinger, 2006), and have not included community colleges which serve a majority of undergraduate students and the greatest number of students who have been identified as at-risk for non-completion (Bailey, 2009).

Students at highest risk of non-completion and stopping out are developmental students (Bettinger & Long, 2007). Findings from studies by Hayes and Williams (2016) and Schwartz, Jenkins and the Community College Research Center (2007) indicate that the performance outcomes of community college students placed in developmental reading classes would be positively influenced (or enhanced) if courses are taught in active, student-centered ways. Active-learning, student-centered pedagogies that have been associated with higher levels of student engagement and academic performance are best facilitated in ALCs which are designed to support this type of instruction (Cotner et al., 2013).

The current study was designed to determine the effect of ALCs on student performance for developmental reading students at a community college. This study compared final grades, attendance, retention, persistence, and student perceptions for a developmental reading course taught in two different learning environments. The purpose of this research was to determine if there was a difference in student performance outcomes when a developmental reading course was taught in an active-learning classroom as compared to a traditional classroom. This chapter describes the research methods for this study and includes the following sections: research setting, sample, research design, research questions, research procedures, instruments, data collection and analysis, and summary.

Research Setting

The study took place at a mid-size, mid-Atlantic community college with an annual total credit enrollment of over 14,000 students, which includes 3,118 students who enroll in at least one developmental course. The percentage of students enrolled in the

developmental courses at the institution during the time of the study was 22%, which is demonstrably lower than reported national averages of 41% (Snyder et al., 2016) to 68% (Chen, 2016) at community colleges. However, the number of students enrolled in developmental courses at the study institution does not reflect the number of students who may have been referred to developmental instruction. Nationally, over 30% of all students referred to developmental remediation do not enroll in the required courses (Bailey et al., 2010).

The institution's student population was comprised of 36% of students who identify as White, 31% of students who identify as African American, 13% identify as Asian, 11% who identify as Hispanic and the remaining population who reflect the college's international student population of various ethnicities. Seventy-five percent of all students at the institution were enrolled part-time. Almost half of all students received some sort of financial aid. While this population includes a variety of ages and life experiences, the college reports that the average age of a student is 26 years old (Office of Planning, Research and Organizational Development, 2018). The ENGL096 developmental reading course was selected for this study because the skill of reading at the collegiate level is a requisite cross-disciplinary skill required for all college courses (Jamieson, 2013). Following successful completion of this developmental reading course, students are eligible to enroll in ENG121 – College Composition, which is a prerequisite for most other college courses.

Course description. The developmental English course selected for the study is English 096 – Fundamentals of Academic Reading. The course is a non-credit course that meets face-to-face for four hours each week. A copy of the syllabus, course outline

and schedule of topics can be found in Appendix C. The culminating goal of the course is to prepare students for college-level, credit-bearing coursework by promoting effective reading, information literacy and critical thinking skills (Holschuh & Paulson, 2013). The course design required students to participate in faculty-led face-to-face instruction as well as use computers to complete a number of class assignments. Students who successfully completed this course should be able to:

- Evaluate, interpret and synthesize information from a variety of sources including college textbooks, periodicals, literature and electronic media sources.
- Make connections between reading and writing by finding, using, and referencing specific, relevant textual evidence to support ideas
- Expand vocabulary by using a variety of strategies (Course Outline, 2016, p. 1).

Students who enrolled in ENG096 at the study institution were advised to take the course as a result of their performance on the Accuplacer Reading Comprehension placement exam or through successful completion of a lower-level developmental reading course, such as ENG093. The study institution offers two sections of ENG096 in the summer and up to twelve sections in the fall.

Of the 14 total sections offered between the summer and fall semesters, only ten sections of the course were included in this study. The study was designed to have an equal number of sections in two learning environments, one an ALC and the other a traditional classroom and computer lab. Only 5 sections of the course were scheduled in the ALC; thus only 5 sections could be examined in the traditional environment.

Five instructors each taught a section in the ALC and five each taught a section in the traditional environment. Every effort was made to maintain homogeneity in the design and delivery of the course except the two different learning environments. All sections of the course were taught using the same syllabus, same materials, same lessons and same grading policy. Sections in both learning environments were taught during regularly scheduled class times, including morning, afternoon and evening hours. All instructors met regularly to discuss the course. Instructors collectively made adjustments, as needed, to timelines or assignments to maintain consistency between all sections of the course. Further details regarding the specifics of each classroom are described in the Research Procedures section.

Sample

The study used a sample of convenience including students who registered to take English 096- Developmental Reading in the summer or fall 2017 semesters. A sample of convenience was used based on sample participants meeting certain characteristics for the study, in this case registration in the specific developmental reading course. A sample of convenience is a nonprobability sampling method and is employed when a probability sampling method is not possible (Creswell, 2014). Students self-selected which section of the course they chose to enroll in and so their assignment to the control or treatment groups could not be randomized. One hundred and forty-two students were enrolled in the selected sections. One hundred and thirty-five students participated in the study. Participants were ENG096 students who were predominantly recent high school graduates, for whom English was their primary language and the majority were part-time students taking at least two courses concurrently.

Descriptive statistics. The sample for this study was comprised of 135 undergraduate participants, 75 were female and 60 were male. Table 5 provides a summary of the demographics, enrollment history, and enrollment status of the study sample. More than 60% of the total of the overall student population at the study institution were of diverse races, but minority students represented a higher portion in the developmental reading course. This higher ratio of African-American and Hispanic students is consistent with profiles of developmental courses throughout the literature (Bettinger & Long, 2007). Sixty-five students (48%) identified as African-American, 31 students (23%) identified as Hispanic, 20 students (15%) identified as Caucasian, 14 students (10%) identified as Asian, and 5 students (4%) identified as two or more races. The average age of the total sample was 20.1 years old (Table 6).

Ninety-one students (67.4%) were new to the college while 44 (32.5%) were returning students who had taken classes at the college previously. Eight-six students (63.7%) were enrolled full-time while 49 students (36.3%) were enrolled part-time. Students taking the English 096 courses also included a number of repeaters, which is a descriptor used for students who had taken the course in a prior semester. Twenty students (14.8%) in the sample were repeating the course. The remaining study population of 115 students (85.2%) were taking the course for the first time.

In order to know if the groups were similar with respect to the demographic characteristics collected, a bivariate chi-square was applied. The results of the chi square are displayed in Table 5 with no chi-square values having $p < .05$. The chi-square results indicate that there were no differences in the distribution of demographic characteristics between the ALC and traditional classrooms for gender (1, N = 135) = 2.65; p = .10.;

race/ethnicity (4, N = 135) = 2.26; p = .69; returning student (1, N = 135) = 2.70; p = .10); full or part-time status (1, N = 135) = 2.96; p = .09); or repeater (1, N = 135) = 10.46, p = .065).

Descriptive statistics of control group. The control group, who received instruction in the traditional classroom, was comprised of male and female students of 38 (51%) and 37 (49%) respectively. The traditional classroom control group was comprised of nine (12%) Caucasian students, seven (9%) Asian students, 40 (53%) African American and 16 (21%) Hispanic students. Fifty-five (73%) of students in the control group were new students who had not taken a course at the study institution previously while 20 students (26.7%) were returning to the college. Six (8%) of the control group were repeating the course. Forty-three (57%) of the students in the control group were considered part-time attendees while 32 (43%) were full-time students. The mean Accuplacer Reading Comprehension score of the group was 59.40 and the mean age was 19.25 years old.

Descriptive statistics of treatment group. The treatment group in the ALC had 38 (63%) female and 22 (37%) male students. The treatment group was comprised of 11 (18%) Caucasian students, seven (12 %) Asian students, 25 (42%) African American and 15 (25%) Hispanic students. Thirty-six (60%) of the students in the treatment group were new to the college while 24 (40%) were returning students. Fourteen (23%) of the students in the treatment group were repeating the course. Forty-three (72%) of the students in the treatment group were considered part-time attendees while 17 (28%) were full-time students. The mean Accuplacer Reading Comprehension score for this group was 59.11 and the mean age was 21.12 years old.

Table 5

Demographic Variables Based on Group

		Group					
		Total		Treatment (ALC)		Control (Traditional)	
Variable	Category	*n*	%	*n*	%	*n*	%
Gender							
	Female	75	56	38	63.3	37	49.3
	Male	60	44	22	36.7	38	50.7
Race/Ethnicity							
	African American	65	48	25	41.7	40	53.3
	Hispanic	31	23	15	25	16	21.3
	Caucasian	20	15	11	18.3	9	12
	Asian	14	10	7	11.7	7	9.3
	Two or More Races	5	4	2	3.3	3	1
Returning Student							
	New	91	67.4	36	60	55	73.3
	Returning	44	32.5	24	40	20	26.7
Status							
	Part-time	86	63.7	43	71.7	43	57.3
	Full-time	49	36.3	17	28.3	32	42.7
Repeated Course							
	No	115	85.2	46	76.7	69	92
	Yes	20	14.8	14	23.3	6	8

*Note. (n = 135). *p < .05*

The Accuplacer Reading Comprehension scores of students are used to place students in the appropriate reading course for their incoming skills. Table 6 indicates the Accuplacer mean scores for students in the treatment and control groups. The Accuplacer scores are used in this study to assess the degree of difference in background ability between the treatment and control groups. A significance level of $p < 0.05$ was used. Student scores for the Accuplacer placement exam were collected and the means

were not significantly different between the groups in the traditional classroom (*M* = 59.40, *SD* = 10.86) and the ALC (*M* = 59.11, *SD* = 13.23; *t*(133) = -.137, *p* = .89).

Further examination of the demographic data reveals a significant difference between the groups for age in the traditional classroom (*M* = 19.25, *SD* = 2.33) compared to the age of those in the ALC (*M* = 21.12, *SD* = 5.18; *t*(133) =2.78, *p* = .006). As noted in Table 6, students in the treatment (ALC) group were older on average than students in the control group. This means that any findings of group differences must consider age differences in the interpretation of findings.

Table 6

Accuplacer Mean Scores and Age Based on Group

	Group	*n*	*M*	*SD*	*t*	*df*	*p*
Accuplacer Reading Score	Total	135	59.27	11.93	-.137	133	.89
	Treatment	60	59.11	13.23			
	Control	75	59.40	10.86			
Age					2.78	133	.006*
	Total	135	20.10	3.95			
	Treatment	60	21.12	5.18			
	Control	75	19.25	2.33			

*Note. (n = 135). *p < .05*

Effect size and sample size. To determine the appropriate sample size for this study, a review of similar studies was conducted. The comparative study populations were exclusively undergraduates at four-year universities as that is the predominant population in the literature for ALCs. Two studies of similar design to the current study were reviewed to determine the effect size and desired sample size for this study. Benson et al (2010) examined an undergraduate population in a multivariate calculus course while Brooks and Solheim (2014) examined outcomes for an undergraduate social sciences course. Both Benson, et al (2010) and Brooks and Solheim (2014) evaluated the

student performance outcomes and student perceptions of active-learning classrooms compared to traditional classrooms, as well as student persistence for students receiving instruction in these different types of spaces. Using Cohen's *d*, the effect size calculated for the Benson (2010) study for a population of 186 students was .47. Effect sizes calculated using Cohen's *d* are considered small at .2, medium at .5 and large at .8 (Vacha-Haase & Thompson, 2004).

Using Cohen's *d*, a medium effect size (*d* =.53) was determined for the Brooks and Solheim study (2014) of 196 students. The effect sizes of both studies were used to calculate the necessary size of the sample for this study. Using G*power, sample size estimates were on the high end of 114 (Brooks & Solheim, 2014) and on the low end of 40 (Benson, 2010). Assuming alpha = 0.05 and power = 0.80, an effect size of 0.53 would require a sample size of 90 (45 per group), whereas an effect size of 0.70 would require a sample of 70 under the same assumptions. The sample size for this study was 135 students.

Research Design

This study was a quantitative quasi-experimental non-equivalent design. This study was a quantitative, non-equivalent design using quasi-experimental methods. In this design, the control and experimental group are selected without random assignment and a pre and post-test were administered (Creswell, 2014). Only the experimental group received the treatment. Data collection was through pretest and posttest and examined ten sections of ENG096 at a mid-sized community college from the summer and fall 2017 semesters. The quasi-experimental design was selected to determine if there were differences between the learning environments. Those differences were measured using

the following variables: attendance, retention, final grade, and persistence (subsequent enrollment). Additionally, student perceptions of their interactions with their classmates and instructor, as well as their perceptions of their own learning were evaluated.

The purpose of an experiment is to establish whether there is a causal relationship between measured variables. The quasi-experimental design is used when the groups being examined cannot be randomly assigned (Creswell, 2014). In this study, students self-selected their class section based on their personal preferences for the day and time the section was taught, resulting in a non-randomized sample. Faculty were assigned their teaching space randomly by the academic scheduler. This practice of teaching spaces being arbitrarily assigned for courses and faculty is common on a college campus (Bonutti, De Cesco, Di Gaspero, & Schaerf, 2012) and is rarely influenced by faculty preference or pedagogy.

Research Questions

In order to determine student performance outcomes, as well as several non-cognitive factors that influence student learning behaviors, the current study was guided by the following questions:

1. How does learning in an ALC impact student performance outcomes as defined by attendance, retention, final grade and persistence compare to learning in a traditional classroom?
    a. How does the attendance of developmental students taught in an ALC compare to the attendance of those students taking the same course taught in a traditional classroom?

b. How do the final grades of developmental students taught in an ALC compare to final grades of developmental students taking the same course taught in a traditional classroom?

c. How do the retention rates of developmental students taught in an ALC compare to the retention rates of those students taking the same course taught in a traditional classroom?

d. How does the persistence (as measured by enrollment in a subsequent credit-bearing course the following semester) of developmental students taught in an ALC compare to the persistence of those students taking the same course taught in a traditional classroom?

2. How did student ratings of their own learning and the teaching behaviors of the faculty compare between the treatment and control groups?

3. How did the student perceptions of their learning and their social interactions in the classroom as defined by the SCALE learning spaces survey compare between the treatment and control groups?

Research Procedures

This research study began in July of 2017 and concluded in December of 2017; it included 10 sections from both the summer and fall 2017 semesters of a developmental reading course. One hundred and forty-two students were invited to participate in the study. One hundred and thirty-five students participated and 123 completed the semester. Data were collected at discrete intervals each semester, as documented in Table 7, using four instruments and an additional three institutional measures. Prior to data collection, students were provided a cover letter that explained the purpose of the study, the role of

the investigator and the data that would be collected from them (Appendix D). Students were told their instructors would share attendance records and a record of their final course grade. Student were also told they would be asked to complete an anonymous survey about their experience learning in their assigned classroom. Students were assured they could choose not to participate in the study without penalty and seven students opted not to participate.

Ten faculty members were invited to participate in the study. Each faculty member was assured that they could choose not to participate without penalty. All invited faculty members opted to participate in the study. Faculty were also provided a cover letter (Appendix E) about their role in the study as well as to inform them that data from their ATI and IDEA surveys would be included. Institutional Review Board approval was granted by both Towson University and Howard Community College. Towson University's Institutional Review Board (IRB) for Research Involving the Use of Human Participants approval # 1705019591 was secured on August 9, 2017 (Appendix A). Howard Community College's IRB approved the study on July 7, 2017 (Appendix B).

Table 7

Research Instruments Implemented

Survey Instrument	Completers *n*	Sample *n*	Responders	Collection Interval
Accuplacer	135	135	Students	Prior to enrolling in the course
Approaches to Teaching Inventory	10	10	Faculty	Prior to beginning of the semester
SCALE (Social Context in Active-Learning Environments)	115	123	Students	One week before the final exam
IDEA Diagnostic Course Evaluation	82	123	Student	Completed by students within three weeks of the end of the semester
Attendance	123	123	Student	Immediately following the final exam
Final grades	123	123	Student	Reported at the conclusion of the semester
Persistence	112	123	Office of Registration	Reported at the conclusion of the semester

Control group learning experience. The control group used both a computer lab and a traditional classroom for all class meetings each week, with half of the class sessions conducted in the computer lab and half conducted in the classroom. The common design of the course was two discrete segments – one lecture and one lab. Each

segment was fifty minutes long and students attended two lab and two lecture sessions each week. The lab segment was assigned to be taught in a computer lab while the lecture segment was taught in a traditional classroom. This use of two separate teaching spaces for the same course is a common model for developmental English courses due to the limited number of dedicated computing spaces available on the community college campus (Donovan & Mastrantino, 2014; Hoover & Lipka, 2013).

For the control group setting, students met in the same traditional classroom that seated up to 30 students and with a fixed front orientation, and tablet armchairs or fixed tables and chairs (Figure 4). The room included two whiteboards affixed to the walls, a single projector, projection-screen and document camera. The instructor desk was a large rectangular desk at the front center of the room, and included a Windows computer with a dual monitor, and an attached keyboard and mouse. The control group participants also used a computer lab (Figure 5) to complete assignments that required technology. The computer lab had twenty-four hard-wired desktop computers for student use and an instructor desk that was positioned at the front center of the room. It also had two whiteboards affixed to the walls, a single projector, screen and document camera.

Figure 4. Image of traditional classroom for ENG096 lecture segment

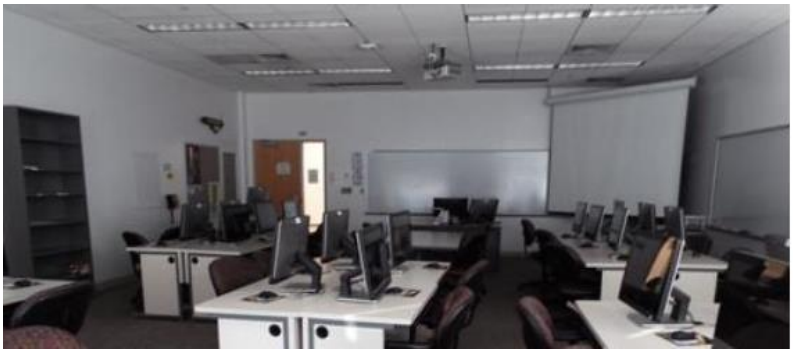

Figure 5. Computer lab. Image of lab used for technology-supported instruction in a traditional setting.

Treatment group learning experience. The treatment group used the active-learning classroom (Figure 6) for every class meeting. The ALC used in this study was a flexible learning studio which seated 24 students. Chairs and tables were on wheels, which made them moveable, foldable, and stackable. The common seating configuration is pictured in Figure 6 and consists of four chairs and two tables grouped together. The room had four projectors (two of them interactive), eight whiteboards affixed to the classroom walls, and six mobile whiteboards. The instructor desk was a small table on the side of the room, and included a Windows computer with dual monitors, and a control system to manage the technology in the room. A wireless mouse and keyboard afforded the instructor the ability to use the computer from anywhere in the room. A cart with 24 laptops was also included in the room and used for in-class assignments. Having a laptop cart in the room eliminated the need to relocate the class to a computer lab for class assignments and reflects the growing trend of creating spaces that can support various uses of technology instead of hard-wired, single-purpose applications (Oblinger, 2006).

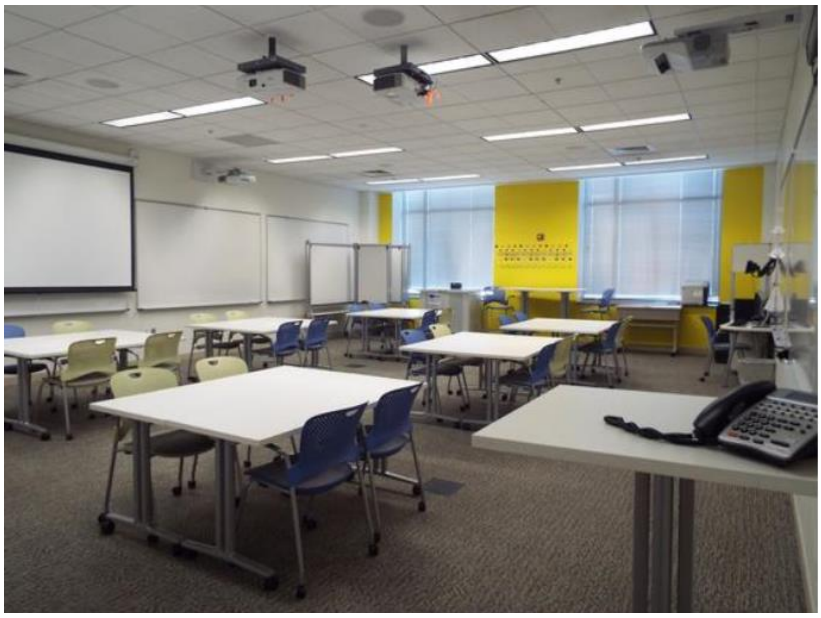

Figure 6. The Learning Studio ALC. Flexible, active-learning classroom used for treatment group.

Instruments

This study examined differences in student performance outcomes when a developmental reading course is taught in an active-learning classroom as compared to a traditional classroom. Four instruments were used to collect data for this study: Accuplacer Reading Comprehension, SCALE, ATI and IDEA. Two of the instruments were used to collect data regarding student performance and perceptions. Two of the instruments were used to examine faculty perceptions and performance. Additional institutional data related to student performance and attendance in the developmental reading course, as well as their subsequent registration records, were also collected.

Participating student demographic data was collected from the registrar at the start of the semester. Participating faculty provided data from their gradebooks regarding student attendance, retention and final grades at the conclusion of the semester. Student placement scores from the Accuplacer Reading Comprehension entrance exam were collected from the registrar for each individual student once consent was received from

each student participant. Student enrollment in subsequent credit courses, identified in this study as persistence, was retrieved from institutional enrollment records at the end of the semester (Table 7).

Student feedback related to learning spaces was collected using the University of Minnesota's Social Context and Learning Environments (SCALE) v.6 survey (Baepler & Walker, 2015). Trigwell and Prosser's (2005) revised Approaches to Teaching Inventory was used to identify faculty pedagogy preferences in the context of this specific course. Course evaluations of faculty were collected using the IDEA Diagnostic Feedback (IDEA, n.d.) survey instrument.

Instruments Used to Collect Student Data

Accuplacer reading comprehension. Studies of student performance outcomes in active-learning classrooms have often relied on the use of a screening exam to determine baseline student performance (Baepler & Walker, 2015; Benson, et al., 2010; Brooks, 2012). Students placed into ENG096 are most frequently referred to the course because of their performance on the Accuplacer Reading Comprehension exam (Appendix F). This placement exam, developed by the College Board, is used in more than 2,000 secondary and postsecondary institutions (College Board, 2016) including over 60% of community colleges (Hughes & Scott-Clayton, 2011). Accuplacer exams are designed to evaluate students' reading comprehension, writing, mathematics and computer skills (College Board, 2016). College Board researchers Mattern and Packman (2009) reported a Cronbach's alpha of $\alpha = .87$ for the Reading Comprehension portion of the exam which indicates high covariances that are measuring the same underlying concept.

Students who have not completed a college level English course prior to admission to the study institution must take the Accuplacer exam to determine the appropriate English course for their level of proficiency. Screening results of the Accuplacer lead to 37% of all first-time students at the study institution being directed to enroll in a developmental reading and/or writing class (Office of Planning, Research and Organizational Development, 2018).

The reading comprehension exam, which was the specific data used in this study, measured the student's ability to understand what was read, to identify the primary topic, infer information and relationships, and distinguish between direct statements and secondary or supporting ideas (College Board, 2017). This section of the instrument consisted of two segments of 10 questions each. The first 10 questions asked students to read a passage and then respond to a prompt concerning information in the passage. The second 10 questions consisted of two related sentences. Students were asked to determine the relationship between the sentences. The test had no time limitations and the score used for placement in developmental instruction was determined by each administering institution. The Accuplacer exam was administered to the students prior to their enrolling in the developmental reading course and the associated data was provided by the registrar. The Accuplacer data served as a pre-test to assessed how similar the groups were with respect to prior ability.

SCALE Survey. The Social Contexts and Learning Environment (SCALE) Survey v.6 (Baepler & Walker, 2015) (Appendix G) was administered to all research participants to collect self-reported data concerning the impact of their classroom on their learning experience. For this research, the survey was used to examine whether there

were differences between the two learning environments for students' reported levels of interaction with their instructor and their peers (Baepler & Walker, 2015).

The SCALE was developed by the University of Minnesota to assess student perceptions of the types of social interactions that may occur in the learning environment. Using a five-point Likert scale, participants responded to statements related to their classroom interactions and understanding of course content. The intention of this 27-item survey was to capture quantitative data regarding four dimensions of interactions:

- Student-Student Relations (ten items)
- Student-Instructor Formal Relations (five items)
- Student-Instructor Informal Relations (five items)
- Student as Instructor (seven items).

The SCALE survey has been administered to over 3000 students in 40 classes at three different institutions since 2015 (Walker & Baepler, 2017). Most of these classes were large-enrollment science classes for freshmen and sophomores. SCALE developers performed both exploratory and confirmatory factor analysis to develop the administered version of the instrument, version 6. Exploratory factor analysis (EFA) helped to determine information about the number of concrete factors required to represent the data. Confirmatory factor analysis (CFA) determined the number of factors required in the collected data and attempted to establish which measured variable was related to which latent variable.

To assure the reliability and validity of the instrument, researchers (Walker & Baepler, 2017) developed several iterations of the survey. The researchers tested the factor structure in several studies of numerous classes taught both in ALCs and in

traditional classrooms (Walker, personal communication, 2017). In SCALE version 6.0, Cronbach's alpha, which is used to measure internal reliability (Tavakol & Dennick, 2011), for each dimension was as follows:

Dimension 1, Student-Student General Relations (α= .92)

Dimension 2, Student-Instructor Formal Relations (α = .73)

Dimension 3, Student-Instructor Informal Relations (α = .85)

Dimension 4, Student as Instructor (α = .84)

The Cronbach's alpha scores for each dimension are greater than α = .7. This indicates that the scale items used for that dimension have sufficient internal consistency. Through a subsequent review of the validity of version 6 of the survey, Baepler and Walker (2017) removed question 10 – "The instructor knows my name" because this question was associated with several standardized residual covariances. The SCALE 6.0 instrument, with Question 10 still included, is presented as Appendix G.

For the current study, the Cronbach alpha reliability coefficients were:

Dimension 1, Student-Student General Relations (α= .85)

Dimension 2, Student-Instructor Formal Relations (α = .62)

Dimension 3, Student-Instructor Informal Relations (α = .50)

Dimension 4, Student as Instructor (α = .85)

Two of the four scale scores (Student-Student General Relations and Student as Instructor) had Cronbach alpha reliability coefficients higher than α = .70. These results suggest that there is strong internal consistency for the dimensions of student-student general relations and student as instructor. Dimension 2, student-instructor formal relations (α = .62) and dimension 3, student-instructor informal relations (α = .50)

generated Cronbach's alpha scores lower than α = .70, suggesting that these dimensions are not as internally consistent in the current study and should be interpreted with caution.

A printed copy of the SCALE survey was provided to each student participant during the last week of the course. Survey responses were anonymous and were correlated to the course section and classroom but not to individual students.

Instruments Used to Collect Faculty Data

Approaches to Teaching Inventory. The Approaches to Teaching Inventory (ATI) (Appendix H) (Trigwell, Prosser, & Ginns, 2005) was administered to faculty participants to determine the faculty members' instructional beliefs regarding instruction of the examined course as being student-focused or teacher-focused. This faculty self-assessment was specific to the context of teaching ENG096. The ATI is a 22-item, self-reporting questionnaire that measures the strength of the faculty's approach to teaching as student-focused or teacher-focused in a specific context. Scoring is on a continuum from conceptual change/student-focused, to information-transmission/teacher-focused forms of instruction. The ATI was administered online prior to the start of the semester. Faculty responded to statements on the survey using a Likert scale of 1 to 5 – 1 being never true of them to 5- almost always true of them, within the context of a specific course. Sample statements include:

- I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.

- It is important to present a lot of facts to students so that they know what they have to learn for this subject.

The faculty response to each question contributed to a score that detected a preference for one of two teaching approaches, conceptual change/student-focused (CCSF) – which places an expectation that students have responsibility in generating their own knowledge – and information-transmission/teacher-focused (ITTF) – which places the responsibility for instruction and student learning solely on the instructor. Trigwell, Prosser and Ginns (2005) performed a confirmatory factor analysis for the 11 CCSF items and confirmed a range of values of acceptable reliability (α=0.86, 95% CI 0.84-0.89); for the 11 ITTF items the result was α=0.83, 95% CI 0.80-0.85. The measured reliability of the ATI for the current study was α = .50 for the 11 CCSF items; and α= .85 for the 11 ITTF items. The evaluation of reliability of the CCSF items are not as internally consistent in the current study and should be interpreted with caution.

The ATI was used to establish the preferred teaching approaches for faculty teaching the selected course and was administered to faculty just prior to the start of the semester. Establishing the preferred teaching approaches helps to evaluate the homogeneity of the faculty teaching approaches used across the 10 sections in this study. In this study, faculty participants heavily favored the conceptual change/student-focused approach to teaching ENG096 – Developmental Reading establishing a homogenous approach to the teaching of this course.

IDEA Course Evaluation. Course evaluations are a common measure used to evaluate the quality of instruction and teaching effectiveness (Marsh, 2007). The IDEA course evaluations were used to gather data concerning student perceptions of faculty

behaviors and strength of instruction and were collected to correlate the student performance outcomes in a given section with student evaluations of teacher performance on specific learning objectives. In this study, faculty course evaluations were used, in correlation with the faculty ATI scores, to develop profiles of faculty members teaching in the two learning spaces.

Faculty course evaluation data was collected using the IDEA Student Ratings of Instruction (SRI) (IDEA, n.d.). IDEA produces several types of SRIs. The specific instrument used was the IDEA Diagnostic Feedback tool (Appendix I). This tool consists of 40 items for students to evaluate their perceived progress on specific learning objectives, as well as student self-reporting on factors related to motivation and work load. The tool collects both formative and summative data and is administered online to students in the final three weeks of the semester. The student data is anonymous and correlated only to the specific course being evaluated. Students are asked to respond to all 40 questions of the IDEA survey.

The IDEA was chosen by the study institution as the SRI because it is a nationally-normed course evaluation instrument; is employed by over 300 higher education institutions, and has been vetted and utilized by higher education for over forty years (IDEA, n.d.). The IDEA undergoes validity and reliability evaluation every few years and questions are refined or removed as a result of these ongoing reviews (Li, Benton, Brown, Sullivan, & Ryalls, 2016). The most recent validation study of the IDEA was in 2015. In that review of the validity of the IDEA Diagnostic Survey, researchers noted that the “correlations between instructor and student ratings of the same objective were all statistically significant and ranged from .05 to .32 (M = 0.19, SD = 0.07). These

correlations provide evidence for criterion-related validity in that students tend to report greater progress on objectives stressed by their instructor" (Li, Benton, Brown, Sullivan, & Ryalls, 2016, p. 18).

The reliability of the instrument was reported in a 2015 whitepaper by Benton, Li, Brown, Guo and Sullivan as part of their redesign of the IDEA instruments in 2014. Reliability is essential in determining "whether aggregated student ratings are consistent enough to be used for making administrative decisions about teaching effectiveness" (Benton, Li, Brown, Guo, & Sullivan, 2015, p. 56). Using the Spearman-Brown prophecy formula, Benton, et al. determined that overall reliability of each of the items on the Diagnostic Feedback survey approached or exceeded rs = .60 for each measure indicating a moderate – strong correlation, regardless of number of or size of classes evaluated. Reliability increased with medium sized classes of 15-34 students rated closer to rs = .70 which indicates a strong correlation.

The current study sample consisted of classes of 8-24 students. To determine the reliability for the current study of 82 student responses, evaluating 8 faculty members, Cronbach's alpha was calculated for each measured objective: Gaining a basic understanding of the subject ($\alpha = .93$), Developing knowledge and understanding of diverse perspectives ($\alpha = .94$), Learning to apply course material ($\alpha = .82$), Developing skill in expressing oneself ($\alpha = .78$), Learning how to find, evaluate and use resources ($\alpha = .81$), Learning to analyze and critically evaluate ideas ($\alpha = .90$). The reliability scores for each objective are greater than $\alpha = .70$ in all cases, suggesting that the instrument was reliable.

Faculty IDEA evaluation scores are generated by student responses to only those items that correlate with learning objectives identified as “essential” or “important” by the department leadership. Responses to items not aligned with essential and important objectives are for information purposes only and are not included in the survey calculations. This evaluation of faculty teaching behaviors as they relate to learning objectives is further supported by validity testing of the IDEA survey instrument which found that there was “increased criterion-related validity in that students tend to report greater progress on objectives stressed by their instructor” (Li, Benton, Brown, Sullivan, & Ryalls, 2016, p. 18). In the ENG096 Developmental Reading course the following six IDEA items were identified by the English department as being important or essential to the course:

1. Gaining a basic understanding of the subject;
2. Developing general knowledge and understanding of diverse perspectives, global awareness and other cultures;
3. Learning to apply course material (to improve thinking, problem solving, and decisions);
4. Learning to analyze and critically evaluate ideas, arguments, and points of view;
5. Developing skill in expressing myself orally and in writing;
6. Learning how to find, evaluate, and use resources to explore a topic in depth (IDEA, n.d.).

The IDEA course evaluation was administered online to students in each course section at the end of the semester. Students had three weeks to complete the survey and

their responses were anonymous. Of the 123 students who completed the course, 89 completed the survey resulting in a 72% response rate. IDEA data was correlated to the specific course section and instructional environment.

Summary

This study was intended to determine if differences exist in developmental reading student performance outcomes based on learning environments. The research method was a quasi-experimental non-equivalent quantitative design, which was the most appropriate methodology due to the inability to use random assignment to room condition. The study was conducted with ten sections of a Developmental Reading course, totaling 135 undergraduate students.

Data were collected from students using three survey instruments, in addition to institutional data on their Accuplacer Reading Comprehension score, attendance, final grades and subsequent enrollment. Homogeneity of faculty teaching approaches was assessed through the use of the Approaches to Teaching Inventory (Trigwell & Prosser, 2004). Previous research on the implications of active-learning spaces informed several of the research design decisions for this study including the use of the Approaches to Teaching Inventory, the use of the Accuplacer exam scores and the use of student final grades. Every effort was made to offer the same course in both learning environments. Faculty met regularly to maintain a consistent syllabus, schedule, content and assessment activities. The size of the study sample and data analysis methods were determined by evaluating the related literature.

CHAPTER IV.
RESULTS AND FINDINGS

The purpose of this research was to determine if there was a difference in student performance outcomes for developmental reading students in a traditional versus an active learning classroom. Data were collected from 10 sections of a face-to-face developmental reading course taught in two different learning environments at a mid-Atlantic community college. Studied outcomes included final grade, attendance, retention and enrollment in a subsequent course. Student perceptions of their learning and social interactions in each learning environment, as well as student feedback on faculty evaluations were also included in this study.

This chapter includes a presentation of the statistical results guided by each research question. Effect sizes were calculated for each measured variable and are included in Appendix J. The chapter concludes with a brief summary.

Research Questions

Three research questions framed this study. The questions focused on measures that related to student performance in an undergraduate developmental reading course. This section contains the results for each research question:

Research Question 1 a.

How does the attendance of developmental students taught in an ALC compare to the attendance of those students taking the same course taught in a traditional classroom?

Attendance is a predictor of course completion and persistence (Friedman, Rodriguez, & McComb, 2001). Attendance is used to measure frequency of a student's

physical presence in the learning environment as attendance frequency has been strongly positively correlated with course grades (Credé et al., 2010). Poor attendance is common in developmental courses which have a rate of 19-44% of students who miss a class meeting (Waycaster, 2001) as opposed to non-developmental courses where 25% of students may miss class on any given day (Friedman, Rodriguez, & McComb, 2001).

To answer the research question on attendance in an ALC versus a traditional classroom, student attendance data were collected from faculty teaching each course section. Attendance was recorded as the number of days a student was present in class. Attendance is not compulsory at the study institution. The developmental reading course for this study had 28 class meetings. Table 8 presents the results of the independent *t* test comparisons for attendance based on group. The mean attendance (number of days present) of students in the evaluated sections of ENG096 was slightly higher in the active-learning classroom (M = 22.87, SD = 7.26) compared to the mean attendance of sessions in the traditional classroom (M = 21.61, SD = 6.70) but this difference was not statistically significant ($t(133) = 1.04$, $p = .26$).

Table 8

Comparison of Class Attendance Based on Group

Variable	Group	*n*	*M*	*SD*	*t*	*df*	*p*
Attendance					1.04	133	.26
	Control	75	21.61	6.70			
	Treatment	60	22.87	7.26			

*Note. (n = 135). *p < .05*

Research Question 1 b.

How do the final grades of developmental students taught in an ALC compare to final grades of developmental students taking the same course taught in a traditional classroom?

Final grades are a common measure of student academic performance (Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012). Grades may be influenced by a variety of factors including student-faculty rapport (Wilson et al., 2010); student engagement (Kuh, 2003; Smith, Sheppard, Johnson, & Johnson, 2005; Umbach & Wawrzynski, 2005) and the learning environment itself (Adams & Corbett, 2010).

To answer the research question concerning student final grades in an ALC versus a traditional classroom, faculty reported final grades were collected at the end of the semester. In this study, a final grade of 70% or more is a passing grade and allows a developmental student to enroll in a subsequent credit bearing English course.

The study institution has reported pass rates for all developmental English courses as between 58 and 73%. (Course Success Rates, 2015, 2017). In the current study, 75% of students in the traditional classroom passed the course and 61% of students in the ALC passed the course. These results are consistent with typical pass rates for the course.

Table 9 presents the results of an independent *t* test comparison between the groups for final grades of students who remained enrolled in the course until its conclusion. The mean final grades of students in the evaluated sections of ENG096 were slightly higher in the traditional classroom (M = 72.67, SD = 17.36) compared to the final grades for students in the ALC (M =70.68, SD = 18.82) but this difference was not statistically significant $t(121) = .58$, $p = .56$).

Table 9

Comparison of Final Grades Based on Group

Variable	Group	*n*	*M*	*SD*	*t*	*df*	*p*
Grades					0.58	121	.56
	Control	67	72.57	17.36			
	Treatment	56	70.68	18.82			

*Note. (n = 123). *p < .05*

Research Question 1 c.

How do the retention rates of developmental students taught in an ALC compare to the retention rates of those students taking the same course taught in a traditional classroom?

Lack of retention during the semester is significantly higher for developmental students (Barnes & Piland, 2010) than for other community college populations. Dropping out or withdrawing from a single developmental course increases the likelihood that a student will not complete a college credential (Bailey, 2009). To answer the question of retention in an ALC versus a traditional classroom, student attendance data was collected from faculty for each group, including the number of students who dropped or withdrew from the course before its conclusion. Table 10 presents the results of a chi-square a test of the homogeneity of proportion of drops between groups. The chi-square was used to analyze data for this research question to determine if there was a relationship between the learning environment and the number of students who did not complete.

Students who did not complete the course had two formal options for leaving the course before the final class meeting: dropping the course within the first week or

formally withdrawing three weeks before the end of the course. Four students (6.7%) in the ALC did not complete the course due to a drop or withdrawal. Eight students (10.7%) in the traditional environment exited the course through a drop or withdrawal. The chi-square results indicate that the dropout rates for the two groups were not significantly different for drop (χ^2 (1, N = 135) = 0.66; p = .42). This means that students in either environment were neither more nor less likely to exit the course before its conclusion.

Table 10

Drops Based on Group

		No		Yes	
Variable	Group	*n*	%	*n*	%
Drop [a]					
	Control	67	89.3	8	10.7
	Treatment	56	93.3	4	6.7

Note. [a] χ^2 (1, N = 135) = 0.66, p = .42. Cramer's V = .07.

Research Question 1 d.

How does the persistence (as measured by enrollment in a subsequent credit-bearing course the following semester) of developmental students taught in an ALC compare to the persistence of those students taking the same course taught in a traditional classroom?

A student is considered as persisting when they enroll in a subsequent semester (Barnes & Piland, 2010). Unlike their undergraduate peers at four-year universities, enrollment patterns of community college students are often characterized as chaotic and non-linear due to factors such as financial aid availability, family and transportation issues, employment or other financial reasons (Crosta, 2014). While not all students in

the study population may have the means or interest to enroll in the semester that followed the evaluated course, subsequent enrollment is a positive indicator for ongoing student participation towards a college credential.

To answer the question of persistence in the current study, students were counted if they enrolled in at least one credit or non-credit course, or both for the semester following enrollment in the developmental reading course. Enrollment data were collected from the registrar at the study institution and evaluated using a bivariate chi-square test (Table 15). Analysis showed that there was no statistical difference, (χ^2 (3, N = 135) = 3.11, p = .38), between the groups for persistence as measured by subsequent enrollments of the students in each learning environment (Table 11).

Table 11

Subsequent Enrollment Based on Group

		Category							
Variable	Group	Did Not Enroll		Enrolled No Credit		Enrolled Credit		Enrolled Both	
		n	%	*n*	%	*n*	%	*n*	%
Subsequent Enroll [b]									
	Control	11	14.7	6	8.0	26	34.7	32	42.7
	Treatment	12	20.0	9	15.0	20	33.3	19	31.7

Note. [b] χ^2 (3, N = 135) = 3.11, p = .38. Cramer's V = .15.

Research Question 1.

The data in the previous tables were evaluated to address research question one: *How does learning in an ALC impact student performance outcomes as defined by attendance, retention, final grade and persistence compare to learning in a traditional classroom?* Each of the measured variables intended to address research question one

revealed no significant differences for student performance outcomes in the traditional classroom compared to students in the ALC.

Research Question 2.

How did student ratings of their own learning and the teaching behaviors of the faculty compare between the treatment and control groups?

Data used to answer this question were collected from the instructor's IDEA Diagnostic course evaluations. Higher education institutions continue to use course evaluations as a measure of teaching performance (Spooren, Brockx, & Mortelmans, 2013) although their use is still seen by some as controversial (Flaherty, 2016). The application of faculty course evaluations varies from formative evaluation of teaching approaches to serving as data points for faculty personnel decisions. The intention of having students provide substantive feedback on faculty teaching behaviors is grounded in the belief that students are stakeholders in the instruction they receive (Barre, 2015).

To answer this question, Mann-Whitney tests were conducted for the variable of IDEA objective and their total scores based on group. The Mann-Whitney was selected because it is a preferred non-parametric test to be employed when the sample size is small in order to determine the differences in mean ranks (Aldrich, 2018). It was appropriate for this evaluation as only eight of the ten faculty members reported evaluation data.

Table 12 shows the results of the Mann-Whitney tests for each individual objective as well as the total faculty scores, grouped by learning environment. Two of the seven comparisons determined significant differences between the two groups. Specifically, this analysis showed significant differences for Objective 11, "Learning to

analyze and critically evaluate ideas, arguments, and points of view," between the traditional (M = 4.17, SD = 0.21, *Median* = 4.26) and ALC (M = 4.49, SD = 0.22, *Median* = 4.44) groups;(z = 2.02, p = .04), as well as for the total score between the traditional (M = 4.05, SD = 0.18, *Median* = 4.06) and the ALC (M = 4.45, SD = 0.28, *Median* = 4.44) groups;(z = 2.02, p = .04). The higher total median and mean scores for faculty teaching in the ALC suggest that students viewed their learning and their instructor more favourably in the ALC environment. The higher median and mean scores for Objective 11 suggests that students in the ALC rated their ability to analyze and evaluate ideas more highly in that learning environment. There were no significant differences between the ALC and traditional groups for any of the other five objectives.

Table 12

Comparison of IDEA Objective Variables and Faculty Evaluation Score Based on Group

Variable	Group	*n*	*M*	*SD*	*z*	*p*
Objective 1[a]						
					1.89	.06
	Control	4	3.96	.311		
	Treatment	4	4.48	.251		
Objective 2[b]					1.89	.06
	Control	4	3.95	0.20		
	Treatment	4	4.47	0.34		
Objective 3[c]						
					1.61	.11
	Control	4	4.07	0.36		
	Treatment	4	4.52	0.38		
Objective 8[d]						
					0.73	.47
	Control	4	4.10	0.25		
	Treatment	4	4.38	0.35		
Objective 9[e]					1.38	.17
	Control	4	4.06	0.13		
	Treatment	4	4.35	0.34		
Objective 11[f]					2.02	.04*
	Control	4	4.17	0.21		
	Treatment	4	4.49	0.22		
Total Score					2.02	.04*
	Control	4	4.05	0.18		
	Treatment	4	4.45	0.28		

Note. (n = 8). *p < .05

[a] Gaining a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories).

[b] Developing knowledge and understanding of diverse perspectives, global awareness, or other cultures.

[c] Learning to apply course material (to improve thinking, problem solving, and decisions).

[d] Developing skill in expressing oneself orally or in writing.

[e] Learning how to find, evaluate, and use resources to explore a topic in depth.

[f] Learning to analyze and critically evaluate ideas, arguments, and points of view.

Research Question 3.

How did the student perceptions of their learning and their social interactions in the classroom as defined by the SCALE learning spaces survey compare between the treatment and control groups?

Student social interactions with faculty and other students have been correlated with increased student engagement, higher attendance and improved academic performance (Frisby & Myers, 2008). Further, studies have determined that a student's formal and informal positive interactions with faculty are the single greatest predictor of student engagement in a given course (Burke-Smalley, 2018; Demir, Burton, & Dunbar, 2019). Student engagement is also positively correlated for students who view themselves as contributing members to the classroom's academic environment through peer instruction and student interactions (Crouch & Mazur, 2001; Lasry, Charles, & Whittaker, 2016). All of these constructs contribute to research question 3 and were measured using the SCALE (Social Context in Active-Learning Environments) survey. One hundred and fifteen students (n=115) completed the evaluations during the last two weeks of the course. The SCALE survey is comprised of 27 questions evaluated using a 5-point Likert-scale and organized into four discrete dimensions that measure student interactions:

- Student-Student Relations (ten items)
- Student-Instructor Formal Relations (five items)
- Student-Instructor Informal Relations (five items)
- Student as Instructor (seven items).

Table 13 displays the results of the *t* tests for independent means for each dimension measured by the SCALE survey. One hundred and fifteen students completed the SCALE survey. The first dimension of Student-student relations measures "whether the respondent knew other students in the class and had learned from them" (Walker & Baepler, 2017, p. 36). Findings from measurement of this dimension were significant and indicate a difference between the perceived frequency of interactions among students in the traditional room (M = 3.78, SD = 0.56) as compared to the ALC (M = 4.18, SD = 0.55; $t(113) = 3.83$, $p = 0.001$). The second dimension of Student-instructor relations "focused on more formal aspects of class, like asking questions during class, taking tests or handling assignments" (Walker & Baepler, 2017, p. 36). The difference between the learning environments for this dimension was significant and indicate a difference between the student experience of communicating with their instructor in the traditional room (M = 4.05, SD = 0.51) as compared to the ALC (M = 4.32, SD = 0.54; $t(113) = 2.72$, $p = .008$). The third dimension of Student-instructor informal relations measured the type and frequency of casual discussions and interactions between the student and instructor. Results for this dimension were significant between the traditional room (M = 4.00, SD = 0.50) as compared to the ALC (M = 4.25, SD = 0.48; $t(113) = 2.70$, $p = .008$). The final dimension of Student as instructor, which referred to the student's response to inquiries related to them providing direct instruction or acting in the role of instructor to other students in the class, was also significant between the traditional room (M = 3.84, SD = 0.53) as compared to the ALC (M = 4.19, SD = 0.55; $t(113) = 3.36$, $p = .001$). The dimensions were also evaluated to compare their overall mean scores for the four dimensions. A significant difference was detected between the SCALE mean score for

the traditional room (*M* = 3.89, *SD* = 0.44) as compared to the ALC (*M* = 4.23, *SD* = 0.44; *t(113*) = 4.04, *p* =0.001).

The level of student agreement with survey statements that favored interaction demonstrated that students in the ALC reported stronger agreement with statements inquiring about their perceived interactions with their classmates and instructor as illustrated in Table 13. All five comparisons were statistically significant with the ALC treatment group having higher scores for each dimension.

Table 13

Comparison of SCALE Dimensions Based on Group.

Variable	Group	*n*	*M*	*SD*	*t*	*d*	*p*
Student-Student Relations					3.83	113	.000*
	Control	69	3.78	0.56			
	Treatment	46	4.18	0.55			
Student-Instructor Formal Relations					2.72	113	.008*
	Control	69	4.05	0.51			
	Treatment	46	4.32	0.54			
Student-Instructor Informal Relations					2.70	113	.008*
	Control	69	4.00	0.50			
	Treatment	46	4.25	0.48			
Student as Instructor					3.36	113	.001*
	Control	69	3.84	0.53			
	Treatment	46	4.19	0.55			
Total Score					4.04	113	.000*
	Control	69	3.89	0.44			
	Treatment	46	4.23	0.44			

Note. (*n* = 115). *$p < .05$

Summary

This study used data from 135 developmental reading students to determine the impact of the physical learning environment on various student performance outcomes. While students in the two groups were equivalent in factors related to race, enrollment status, placement test scores and gender, differences existed in the age between the two groups. No significant differences were detected between final grades, attendance or subsequent enrollment of students in the two learning environments.

Of the six objectives measured to evaluate faculty performance and student perceptions of their own learning, significant differences were detected between the two learning environments for a single objective, and for the total score mean with the faculty in the ALC scoring slightly higher on Objective 11 and in total. Significant differences were detected for all four of the social dimensions measured using the SCALE survey, with students in the ALC scoring higher on measures of perceived social interactions. In the final chapter, these findings will be compared to the literature, conclusions and implications will be drawn, and a series of recommendations will be suggested.

CHAPTER V.
DISCUSSION

Active-learning classrooms (ALC) represent an evolution of the traditional classroom design and were created to support the growing movement towards student-centered, active-learning. Research on ALCs at four-year universities has noted their positive impact on measures of student engagement (Johnson, 2011); student behaviors (Brooks, 2012); student enjoyment (Taylor, 2009); and student academic performance (Beichner, et al., 2007; Benson, et al., 2010). The current study extended this line of research to investigate the impact of active-learning classrooms on students at a community college, specifically developmental students.

Community colleges serve half of all undergraduate students (Mellow & Heelan, 2014) and the demographics of their student population is very different than those of four-year institutions (Ma & Baum, April 2016). Developmental learners comprise more than half of the community college population, yet only 4-17% of them complete a certificate, or degree within 6 years (Schak et al., 2017). Developmental interventions have focused almost exclusively on supports external to the classroom (Bailey, et al., 2016; Bailey & Cho, 2010; Barnett, et al., 2012; Gallard, et al., 2010) despite the fact that the classroom is the central learning environment for community college students (Tinto, 2000). What is common among developmental interventions is the intention to prepare students for college-level coursework (Bailey, et al., 2016).

Enacting student-centered, active-learning techniques in the classroom can enhance student connections to the faculty and their peers (Baepler & Walker, 2015) and improve student academic performance. However, these techniques of student

collaboration, content creation and small group discussion are often difficult to execute in a traditional classroom setting (Oblinger, 2006; Whiteside et al. , 2010). While an ALC is not required to enact student-centered learning, its intentional design and embedded resources such as flexible, collaborative seating, multiple whiteboards, multiple displays, embedded technologies make it easier for the faculty member to employ active pedagogies (Tom et al., 2008; Whiteside et al., 2010) that facilitate student learning and interaction.

This chapter describes the research results for the current study and an interpretation of the results. The chapter includes the following sections: research summary, research design, discussion of results, recommendations for future research and conclusion.

Research Summary

This study examined student performance outcomes for developmental community college students taking a developmental reading class in a traditional versus active-learning classroom. For the purpose of this study, student performance was evaluated through final grades, attendance, retention in the course and persistence with regard to enrollment in a subsequent course. These measures were selected because common behavioral characteristics of developmental students include poor attendance, high attrition, poor grades, and low enrollment persistence (Bailey, 2009). The active-learning classroom was selected as the treatment for the study population because this type of learning environment has been demonstrated to have a positive impact on lower-performing students at four-year institutions (Baepler & Walker, 2015; Brooks, 2011). While there exists a large body of research as to the value and potential impact of active-

learning environments on college students at four-year institutions, there has been no investigation on implications for the community college developmental learner.

The significance of examining the developmental student population in new and evolving spaces is rising, given their imminent convergence. The Horizon Report (Becker, et al., 2017) projected the creation and installation of active-learning classrooms as a key trend in higher education at least through 2022. Concurrently, researchers project an increase in higher education enrollees who will be first-generation, low-income minorities (Garcia & Serrata, 2016). These groups are disproportionally over represented in developmental coursework (Bailey & Cho, 2010). The potential is that developmental students may be receiving instruction in the types of learning spaces that have yielded positive performance gains in other contexts, yet the impact of these spaces has not been measured for this population. The possibility for the classroom itself to serve as an intervention tool for developmental students has significant implications as colleges search for ways to improve the poor retention and completion rates for these students.

Research Design

To examine the student performance outcomes of community college students taking a developmental reading course in an active-learning versus a traditional classroom, data were collected from 135 students in the Summer and Fall of 2017. These students were enrolled in one of ten sections of a developmental reading course, which was taught by adjunct or full-time faculty in the developmental English program at a medium-sized Mid-Atlantic community college. Faculty teaching approaches were measured to evaluate homogeneity of course instruction methods. By determining that faculty approached the instruction of the course in similar ways, it is less likely that any

measured differences in student outcomes were a result of variations in teaching approaches. Data were collected through the use of the Trigwell and Prosser (2005) revised Approaches to Teaching Inventory. The data revealed a faculty preference for conceptual-change, student-focused approaches to teaching the developmental reading course. Faculty whose expressed approach to instruction is conceptual-change, student-focused has been demonstrated to encourage deeper learning by students. In a study by Trigwell, Prosser and Waterhouse (1999) of 3956 undergraduate chemistry and physics students and 46 teachers, researchers examined the relationship between expressed teaching approach and associated student learning approach. The subsequent factor analysis of the relationships detected student learning at a surface level was more frequent when the teacher used an information-transmission approach. When a teacher's approach was identified as conceptual-change, student-focused, the factor for student's surface learning loaded at -38, indicating a significantly reduced instance of surface-level learning. The researchers credited the differences between teaching approaches for "64% of the variance" (Trigwell, Prosser, & Waterhouse, 1999, p. 64) between student levels of learning. In the current study, the homogeneity of the faculty as conceptual-change, student-focused in their approach likely contributed to the overall higher performance of the students in both learning environments.

Demographic information was collected on the student sample to detect differences between specific measures for the treatment and control groups. Demographic information is essential to collect when random assignment is not possible and thus the resulting group needed to be assessed for differences that could potentially influence the study findings. The demographic data for the participants showed

similarities between those in the control (traditional classroom) and treatment (active-learning classroom) groups. The distribution of males and females were consistent across groups as were ethnicities, with a majority of the study population being African-American (48%) or Hispanic (23%). The majority of participants (67%) were students new to the college who were taking the course for the first time. Further analysis of demographics between groups showed no significant difference in enrollment status (full or part-time). During the study, data for student performance on the Accuplacer Reading Comprehension placement exam, attendance, final grades and subsequent enrollment were collected. Additionally, students provided data on their learning experience through completing the Social Context in Active Learning Environments (SCALE v6) survey and the IDEA course evaluations.

Discussion of Results

This research investigated students enrolled in a developmental reading course to evaluate differences in student performance outcomes based on the assigned learning space (active-learning or traditional classroom). The findings shared in this chapter are organized by research question and include a discussion of the implications of each finding and its similarities or differences from existing research.

Research Question 1.

How does learning in an active-learning classroom impact student success as defined by attendance, retention, final grade and persistence compare to learning in a traditional classroom?

1a. Attendance by Learning Environment. To respond to this question a *t*-test was conducted to analyze the attendance data between the treatment and control group.

The difference in number of class sessions attended by each group was not statistically significant. The lack of difference between the two environments is not consistent with previous research on the effects of active-learning classrooms and student attendance reported by Beichner, et al. (2007). In 2007, Beichner, et al. reported data for 16,000 students taught in active-learning classrooms as compared to traditional classrooms over a five-year period and reported that attendance in the active-learning classroom was stronger than attendance in the traditional room and averaged greater than 90%. However, students in the Beichner study were not developmental students. In a study of developmental student attendance in an undergraduate biology class (2005), Moore reported that only 26- 29% of students attended 80-100% of all class meetings. Mulvey (2009) noted that sporadic class attendance is often a byproduct of poor self-regulatory behaviors that are common among students in developmental courses. In the current study, students averaged attendance at 82% of class meetings in the active-learning classroom; in the traditional classroom, students averaged attendance was 77%. This difference was not statistically significant.

In related studies concerning attendance, students were asked what their primary motivator was for attending or choosing not to attend a class meeting. Stripling, Roberts and Israel (2013) found that students reported that faculty who demonstrated a strong interest in engaging the students with themselves and the content as contributors to their attendance. Persky et al. (2014) similarly found that students who perceived their instructors as engaged with them, who were caring and employing active-learning techniques motivated them to attend class. In the current study, results of the Approaches to Teaching Inventory (Trigwell et al., 2005) found that faculty had a predisposition to

student-centered teaching approaches and attitudes. An expressed teaching approach that is conceptual/change, student-focused is often enacted using student-centered instructional methods (Lasry et al., 2014). These methods may include faculty efforts to communicate with students (Striplinget al., 2013), employing active-learning techniques (Brooks & Solheim, 2014; Cotner et al., 2013; Park & Choi, 2014) and other behaviors that earlier studies have correlated with improving student attendance. The homogeneity of student-centered teaching approaches of faculty in the current research may explain higher attendance results than are uncommon among developmental courses and the lack of significant differences in the current study.

1b. Final Grades by Learning Environment. To respond to Research Question 1b., which focused on determining if there was a difference in students' final grades between the treatment and control groups, a *t*-test comparison was calculated on the final grades for the 123 students who completed the course. The difference in mean final grades by each group was not statistically significant.

These findings are contradictory to similar research by Brooks (2011), Benson (2010), Cotner, Loper, Walker & Brooks (2013) and Baepler, Walker and Driessen (2014). In the previous studies noted here, those students receiving instruction in an active-learning classroom outperformed their expected course grade as opposed to their peers receiving instruction in a traditional classroom. Students in each of these studies were undergraduates in credit-bearing courses at a four-year institution who were assessed for academic variability of low, intermediate or high performance. The current study is with a sample of community college students identified exclusively as low-performing, by their scores on the Reading Comprehension section of the Accuplacer

exam, and who were enrolled in a non-credit bearing course. The resulting sample had limited variability in measured academic ability for the course material and, as a result, any collaborative, cooperative and peer instruction strategies that may have been employed with these students may not have provoked the same performance gains as were noted in previous research.

1. c. Retention by Learning Environment. To respond to Research Question 1c., a chi-square test of independence was performed to determine if there was a difference in students' dropout rates between the treatment and control groups. In evaluating the relation between the variables of learning environment and dropout rate, the results were not significant. Students in both learning environments were equally as likely to remain in or to exit the course, regardless of learning environment. The number of students who dropped or withdrew from the course before its completion was slightly higher in the traditional classroom with 8 students (10.7%) exiting the course and 4 students (6.7%) in the active-learning classroom but this difference was not statistically significant. No comparative data exists for dropout rates for the course at the study institution as the institution does not collect that information.

These findings contradict studies such as Dahlgren, Wille, Finkel & Burger (2005). In this study 249 introductory psychology students were enrolled in an active-learning or traditional lecture section of the course. Students in the active-lecture sections (n = 119) were seated together and worked collaboratively in groups throughout the semester while students in the lecture section (n = 120) were taught primarily through teacher-led lectures and demonstrations. Student retention in the active-learning sections was higher ($x^2(1, n=239) = 2.72$, $p = .10$) than that in the traditional lecture sections. In

the current study, all faculty teaching the developmental reading course identified conceptual-change/student-focused as their intended teaching approach for the course. This teaching approach has been positively correlated with increased student engagement (Trigwell, Prosser, & Waterhouse, 1999), a construct that has impact on student retention. While the current student detected no significant difference in the retention of students in the ALC, faculty use of student-centered teaching approaches in both environments may have contributed to the high retention rates in both environments.

Student retention in the course was examined because of the high attrition/withdrawal rate of the community college population in general (Liao et al., 2014) and developmental students more specifically. Schuetz (2005) reported that half of all first-year community college students leave higher education before they begin their second year. That number increased to 75% if the student took a developmental course in their first year (Barry & Dannenberg, 2016). Crisp and Delgado (2014) found that 44% of non-developmental community college students transferred to a four-year institution as compared to only 35% of developmental students. Bailey (2009) noted that "student resistance to remediation requirements may help explain low enrollment rates and high attrition rates" (p. 14). Providing developmental students active-learning instruction has been demonstrated to improve overall course outcomes, including retention. If the classroom itself influences faculty to employ active-learning methods (Lasry et al., 2014; Taylor, 2009) and those methods have demonstrated implications for improving retention, then the classroom itself may have a role in retention. Further study of this variable is warranted.

1. d. Subsequent Enrollment by Learning Environment. To respond to Research Question 1d., which focused on determining if there is a difference in students' subsequent enrollment in credit courses, a chi-square test was conducted. This analysis found no significant differences between the groups. Student subsequent enrollment in this study was examined as a measure of persistence. Student subsequent enrollment was strong with 112 (83%) of the original 135 students in the sample enrolling in either a credit, non-credit or both types of courses for the subsequent semester. Further study is warranted to see if student enrollment into a subsequent course, which is an expression of intention, translated into student attendance in the subsequent course, which is not assured especially at a community college.

Persistence is described as continuous pursuit of a college credential or certificate (Liao et al., 2014). However, the enrollment patterns of community college students are chaotic and non-linear (Crosta, 2014) so measurement of persistence in this instance is not conclusive. A number of factors external to the college classroom experience can contribute to a student not enrolling in a subsequent semester or in leaving the college altogether. Tinto's (1975) seminal work *Leaving College* focused on student departure and is often cited in regard to undergraduate persistence. Tinto's (1975) Interactionalist Theory of Student Departure, posits several contributors to student retention in college but cites a student's integration into various social communities of the college, both formal and informal, as a primary factor. Maue (2012) observed that critically underprepared students are unlikely to progress to credit-bearing courses before they leave the institution. This descriptor of "critically underprepared" has been associated with developmental students. Nationally, only 25% of students who enroll in even one

developmental course their first year of college return for a second year (Barry & Dannenberg, 2016). The study institution provides limited data on its completion rate for all students, which is further skewed because such reports evaluate student data based upon full-time and not part-time enrollment. The Chronicle of Higher Education reported that in 2013, the community college examined in this study had a 15.9% completion rate for full-time students who spent 150% of the expected time to completion (Chronicle of Higher Education, 2015). The high number of students in this study who enrolled in a subsequent course may be a reflection of the student-centered teaching approaches used by faculty, the high numbers of student completers and the positive evaluations of faculty in both learning environments. Students who have had positive experiences in a preceding course are more likely to enroll in additional coursework (Braxton, Milem, & Sullivan, 2000).

In a study of 18 baccalaureate-granting colleges and universities, Kuh, Cruce, Shoup & Gonyea (2008) examined persistence as a construct of the convergence of student behaviors, institutional practices and conditions that foster student success. Examining data (*n*= 6,193) collected from the National Survey of Student Engagement, researchers found that student engagement in educationally purposeful activities, such as those associated with student-centered learning, is positively related to persistence in college. More specifically, they concluded "…while exposure to effective educational practices generally benefits all students, the effects are even greater for lower ability students and students of color compared to White students" (p. 555). Liao, Edlin & Ferdenzi (2014) examined the roles of motivation and self-efficacy in student persistence and found that community college students were primarily extrinsically motivated. To

encourage positive student learning behaviors, the researchers recommended "learner-centered classrooms" to encourage student persistence (p. 607). These findings suggest the positive impact that active-learning classrooms would have on student persistence, but the current study does not substantiate that finding.

Research question one examined cognitive and non-cognitive factors that influence student performance outcomes. The results of this research do not affirm or contradict existing research in measures of attendance, retention, final grade and persistence. While there were no statistically significant differences in any of these measures for the active-learning classroom as compared to the traditional classroom, the consistent characteristic of the faculty as student-centered educators may have contributed to these outcomes and should be noted. First, faculty teaching in both environments identified as possessing a conceptual/change student-focused approach (CCSF) to teaching this course. This approach has been positively correlated with increased student performance in any learning environment (Engstrom, 2008; Lasry et al., 2014). Students taught by faculty who espouse a CCSF approach to teaching a course typically outperform students whose faculty member aligns with an ITTF approach (Lasry et al., 2013), as measured by the ATI. Student-centered teaching has also been credited with increasing student attendance (Moore, 2005) and retention. The homogeneity of the faculty teaching approaches may have qualified the variability in student outcomes.

Additionally, the limited measured differences in the academic abilities of the students, as measured by the Accuplacer exam, may also have contributed to the similarity in outcomes in both environments. Students in the examined course were

relatively homogenous academically compared to students in previous studies at four-year institutions. The narrow band of acceptable scores for placement in this developmental reading course, by design, enrolled students with limited variability of incoming academic skills. That limited variability of skills is a construct of developmental instruction and the intended outcome of the application of the Accuplacer screening tool. In previous studies of students in four-year universities, students were enrolled in the examined courses by virtue of academic interest or having completed a pre-requisite course, not as a measure of prior academic performance on a single screening instrument. This resulted in greater academic skills variability in the samples of students in previous studies. This construct of academic heterogeneity was credited in studies by Brooks and Solheim (2014) and Dori and Belcher (2005) as contributing to increased student academic performance as high performing students likely positively influenced the performance of students initially deemed as less skilled.

Research Question 2.

> *How did student ratings of their own learning and the teaching behaviors of the faculty compare between the treatment and control groups?*

Student Perceptions of Instructor and Course by Learning Environment. To respond to Research Question 2, which focused on determining if there is a difference in students' assessment of their instructor and the course, a Mann Whitney comparison was conducted to compare measured objectives and the instructor's total score based on group. Inspection of the results found significant differences for Objective 11 "Learning to analyze and critically evaluate ideas, arguments and points of view" between the treatment and control groups. The Mann-Whitney test indicated that the mean scores for

this objective were greater for faculty in the active-learning classroom than for traditional classroom as well as for the total score between the ALC and traditional classroom. There were no other significant differences between the treatment and control groups for any of the other five objectives. The lack of detected differences may also correlate to the consistency of faculty approaches to instruction for the selected course. Johnson (2011) in a study evaluating student evaluations of faculty who employ student-centered vs teacher-led pedagogies reported that student course evaluations were more favorable in those classes employing a student-centered approach than those where the teaching approach was predominantly lecture. The sample size to address the research question in the current study was small (n = 8) however the limited findings suggest that the room might play a role in students' perception of their own learning. Future research with a larger sample size might yield more generalizable results on these measures.

Research Question 3.

How did the student perceptions of their learning and their social interactions in the classroom as defined by the SCALE learning spaces survey compare between the treatment and control groups?

Student Perceptions of Social Interactions by Learning Environment. To respond to Research Question 3, data were collected using the SCALE survey. The SCALE measures perception of social interaction. Students responded to statements on the survey such as "I can clearly explain new concepts I've learned to others in class". Statements on the SCALE are organized within four dimensions: student-student, student-instructor (formal), student-instructor (informal), student as instructor. A *t*-test comparison was calculated for the statement variables for each of the four dimensions

and their total score based on group. The results of the SCALE survey were significant for all four dimensions, favoring the active-learning classroom. A detailed examination of the findings for each dimension is provided here.

Student-Student Relations. The first dimension of student-student relations measured "whether the respondent knew other students in the class and had learned from them" (Walker & Baepler, 2017, p. 36). This dimension evaluates the strength of the student's perceived connection to their classmates. Findings from measurement of this dimension found significant differences between the experiences of those in the active-learning classroom compared to the traditional classroom. These findings indicate that students in the active-learning classroom expressed a more favorable opinion and expressed stronger agreement with the statements associated with interactions between themselves and other students in the class.

These findings are consistent with a study by Morrone, et.al. (2014) where 86% of the 168 undergraduate students who responded, reported that it was easier to collaborate with other students in the active-learning classroom. The positive student response to this dimension with the active-learning environment could be reflective of several factors associated with active-learning classrooms. First, the room itself is designed with furnishings and flexibility to allow students and instructors to move freely about the space. The collaborative seating arrangement of four students sitting in groups for most class periods also is a passive way to support student interactions (Chism, 2006) as students are facing each other instead of the rows and column seating that discourages interaction.

Walker and Baepler (2017) have reported that strong peer connections in college are strongly correlated with persistence and positive impressions of the institution. Students who are first generation, which is a descriptor for a large population of community college students, are especially sensitive to the impact of peer interactions on a college campus (Pascarella, Pierson, Wolniak, & Terenzini, 2004). They rarely have peers or family members in their own lives that can understand and support their struggle as a student in higher education (Dennis, Phinney, & Chuateco, 2005). Having a strong relationship with others in the classroom could contribute to students' retention in a single course and their interest in pursuing other courses (Pascarella et al., 2004). Ashar and Skenes (1993), in a study of adult students in 25 business classes, found that social integration at the classroom level was more impactful and predictive of persistence than at the institution level. Many institutional interventions used with developmental students such as peer tutoring (Bruffee, 1984), cohorts and learning communities (Bailey & Cho, 2010) are designed in part to foster positive student interactions because those interactions strengthen the student's connection to the academic community.

In the current study, the SCALE survey results for this student-student dimension of the active-learning classroom, detected stronger agreement with statements inquiring about their peer interactions from ALC students than those in the traditional classroom. This suggests that the active-learning classroom can support and even tacitly encourage increased peer interactions which can translate to greater sense of inclusion and belonging for students. The capacity of the active-learning classroom to elicit similar results is encouraging and bears further investigation.

Student-Instructor Relations (Formal). The second dimension of student - instructor formal relations "focused on more formal aspects of class, like asking questions during class, taking tests or handling assignments" (Walker & Baepler, 2017, p. 36). Findings from measurement of this dimension found significant differences between the experiences of those in the active-learning classroom, compared to the traditional classroom. While instructors in both groups identified as having a predisposition to conceptual-change, student-focused beliefs about teaching, the findings for this dimension favor the active-learning classroom. These findings, while significant, should be interpreted with caution due to the low reliability score of $\alpha = .62$ for this dimension.

The design of the active-learning classroom offers a physical layout that encourages faculty interactions with students (Chism, 2006). The room is oriented with the instructor desk placed along the perimeter of the room as opposed to being positioned in the front, center of the room and facing the students. Faculty and staff at the study institution have referred to the traditional placement of large faculty desks in the front of the room to be the "demilitarized zone" which delineates faculty space from student space. The fixed-front furniture orientation in a traditional classroom is both credited and demonized for contributing to a teacher-as-arbiter-of-knowledge and a predominantly lecture-style of instruction (Gee, 2006). The active-learning classroom layout is designed to be more democratic in appearance (Park & Choi, 2014), with no identifiable front or back of the room (Cotner et al., 2013) and no centralized teaching desk (Oblinger, 2006). The result is an environment that reduces barriers to interaction (Oblinger, 2006); and encourages student-centered interactions that faculty have acknowledged in their agreement with Approaches to Teaching Inventory statements such as "I make available

opportunities for students in this subject to discuss their changing understanding of the subject".

Students are heavily influenced by their perception of faculty interest in them (Demir et al., 2019; Pascarella, 1980). This is especially true for students who are lacking support among their non-academic peers and family members. The power of positive faculty interactions, both formal and informal has been identified as contributing positively to students' reported development – both academically and socially (Braxton J. , 2013; Pascarella, 1980). Students in this study taking class in the active-learning classroom reported greater levels of agreement with statements referring to their interactions with their instructors formally and informally, as measured by the SCALE survey. These interactions have been correlated with higher levels of student engagement in previous research by Karp (2011), Baepler and Walker (2015) and Kuh (2003). Kuh (2003) evaluated three years of data collected from the National Survey of Student Engagement (n = 285,000) and reported that more frequent contact with faculty members, especially on purposeful educational activities correlated with increased student engagement. This was true if the interaction was formal such as feedback on assignments or informal such as discussing ideas outside of class. Increased student engagement has been demonstrated as contributing to more consistent attendance, stronger student engagement (Frisby & Myers, 2008) and more favorable evaluations of faculty. Students in the ALC did report a stronger level of agreement with statements inquiring about their interactions with their peers in the classroom, but there were limited differences in their evaluation of faculty and no difference in their attendance.

Student-Instructor Relations (Informal). The third dimension of student-instructor informal relations measured the strength of student perceptions of casual discussions and interactions between the student and instructor. Findings from measurement of this dimension found significant differences between the experiences of those in the active-learning classroom, compared to the traditional classroom and favored the active-learning classroom. These findings, while significant, should be interpreted with caution due to the low reliability score of $\alpha = .50$ for this dimension.

The importance of student interactions with their instructor has been noted by Astin, (2001), Pascarella (1980) and Tinto (2000) as one of the most significant contributors to student attendance and, conversely, leaving behavior. Astin's (2001) study of 27,064 undergraduate students at 309 four-year institutions determined that one of the most impactful factors for college students' satisfaction, academic and personal development were the interactions between students and faculty, as well as those between students. Informal faculty interactions, measured in the SCALE (Walker & Baepler, 2017) through statements such as "I've spoken informally with the instructor before, during or after class", were reported to be higher for students in the active-learning classroom. The findings for the two dimensions related to Student-instructor interactions in this research suggests that differences in the interactions of students with faculty, both formally and informally, can be attributed to the active-learning classroom.

Student as Instructor. This final dimension referred to the students' response to inquiries related to providing direct instruction or acting in the role of instructor to other students in the class. Findings from measurement of this dimension found significant

differences between the experiences of those in the active-learning classroom, compared to the traditional classroom, all favoring the active-learning classroom.

The dimension of Student as Instructor was measured through student responses to statements such as “I can clearly explain new concepts I’ve learned to others in class”. Learning by teaching is an instructional approach that is recognized for its role in helping students learn (Blair, Schwartz, Biswas, & Leelawong, 2007; Fiorella & Mayer, 2013; Fiorella & Mayer, 2014; Webb & Mastergeorge, 2003). It is employed in various models that place the students at the center of the knowledge creation process (Papert & Harel, 1991). The act of a student explaining their own understanding and approach to a problem can help solidify the student’s understanding of the material (Webb & Mastergeorge, 2003). In this study, student responses to the student-as-instructor focused questions in the treatment (active-learning classroom) group reflect their sense of ownership and participation in their own learning. While the current study was not observational, certain characteristics of the ALC may have contributed to the student’s perception that they had contributed to the learning of others. First, the predominant seating configuration in the ALC was in collaborative groupings, which can support greater frequency of interactions between students (Haghighi & Jusan, 2012). Second, the instructor station was not situated in the front and center of the room (as it was in the traditional classroom) and this non-dominate placement of the instructor desk is intended to message to students that the instructor is a guide in the classroom and not the sole arbiter of information (Oblinger, 2006). Third, the affordances of the room with multiple writing surfaces and display devices denote it as a collaborative space that is intended for a multitude of contributions, not just those of the faculty member.

Crouch and Mazur (2001) examined the student-as-instructor approach to learning in a more formalized, student-centered approach to peer instruction. In their ten-year study, which included 1,624 undergraduate students, they employed various opportunities each class for students to share their understanding of the course material with each other through conceptual questions called ConcepTests. Students were asked to formulate their own answers to the questions and then document them. Then students were given a few minutes to discuss their answers with others sitting around them and had the opportunity to modify their initial answers. Then the instructor solicited responses, provided feedback to ensure the correct answer was shared and then moved on with another topic. This approach yielded a normalized gain in test scores of between .49 and .74 when this technique was used as opposed to a normalized gain of .25 for students taught using traditional non-peer instruction methods. In the case of the current study, while no difference was detected in the student performance outcome of grades, responses to the SCALE by students in the ALC indicated that students perceived that they had learned more and contributed to the learning of other students. These contributions to others are reflections of peer instruction, which has also been credited with increased retention (Lasry, Mazur, & Watkins, 2008); improved learner self-efficacy (Gok, 2012); and increased participation (Vickrey, Rosploch, Rahmanian, Pilarz, & Stains, 2015).

Students are often encouraged to take greater ownership of their own learning when the faculty's teaching approach is student-centered (Smith, Sheppard, Johnson, & Johnson, 2005) which was determined to be the case in the current study. Dori and Belcher (2005) examined student outcomes in the social, cognitive and affective domains of learning for 811 undergraduate students taking an electromagnetism course. The

experimental group (n = 690) took the course in an active-learning classroom and the control group (n = 121) took the course in a traditional classroom. Findings for the cognitive domain, which reflected the students' ability to master and explain concepts to others, were measured by evaluating students' performance gains between the course pre-test and post-test. Average gains for the two experimental sections (M = 28 and M = 37) were significantly higher ($p < .000$) compared to average gain of the control group (M = 16). The researchers concluded that the active-learning classroom environment fostered social constructivism which strengthened student academic performance for all levels of learners. In this study, the SCALE survey detected a difference between the learning environments for the students' perceptions of engaging in various types of social interactions in the classroom. It may be that some of these social interactions, as measured by the SCALE dimension of student-as-instructor, translated to a more positive sense of subject mastery in the students, despite there being no difference in the mean student final grades. This positive sense of mastery is a measure of self-efficacy (Vickrey, Rosploch, Rahmanian, Pilarz, & Stains, 2015).

In studies by Zingaro and Porter (2014) and Gok (2012), the self-efficacy ratings of students enrolled in a class using peer instruction were compared to students in a traditional lecture course. In each of these studies, student self-efficacy in the peer instruction sections was significantly higher than in the traditional lecture sections, despite the fact that there was limited difference in final grades between the two instructional approaches.

The application of the student-as-instructor approach to learning is aligned with the design of the active-learning classroom as a space for students to be positioned as

knowledge creators and share their ideas with others (Beichner, et al., 2007; Brooks, 2011; Dori & Belcher, 2005) but this assertion would require classroom observations to confirm that these behaviors occured. What is clear is that students in the ALC believed that they interacted with others in the classroom and believed that they had a stronger grasp of the course material.

The comprehensive results of the SCALE survey detected the only significant differences in this study for the two learning environments. In each dimension, student-student relations (p = .001), instructor relations (formal and informal) (p = .008) and student-as-instructor (p = .001), findings favored the ALC. Further, through the dimension of student-as-instructor, students perceived that their presence in the classroom contributed to the learning of other students.

The findings from the current study did not detect significant differences between student performance outcomes related to final grades, attendance, retention and persistence for developmental students taught in an ALC as compared to a traditional classroom. These findings are counter to studies of students in ALCS in credit-bearing courses at four-year institutions. The difference in findings may be related to the expressed teaching approaches of the faculty in the study whose inclination for a student-centered, conceptual-change approach allowed them to transcend the potential limitations of the traditional classroom. In this case, it may be that faculty teaching approach was a more significant contributor to student performance than was the learning environment. Additionally, while studies by Brooks (Brooks & Solheim, 2014) and Benson, et al. (2010) credited ALCs providing opportunities for students to learn from each other, the

limited academic variability of the developmental students in the class may have reduced the influence of others on student academic performance.

The significant differences detected in all dimensions of the Social Context in Active Learning Environments survey did favor the active-learning classroom. Each of the measured dimensions is related to behaviors that have demonstrated to be essential for developmental students, especially at a community college. Connecting with academic peers and educators has measurable effects on a developmental students' long-term retention and completion at a community college (Pascarella, Pierson, Wolniak, & Terenzini, 2004). While there was no difference in the subsequent enrollment between the two groups in this study, the documented difference in students' perceptions of their interactions with their peers and each other bears further inquiry to see if those interactions contribute to longer term gains in retention and completion.

Recommendations for Future Research

The results of this study favor the active-learning classroom for student perceptions that they engaged in positive types of social interactions. Student final grades, attendance, persistence or faculty evaluations were not affected by the classroom environment. During the analysis it was determined that students in an active-learning classroom reported a stronger agreement with inquiries related to interactions with their peers and their instructor, as well as stronger agreement with statements concerning their own use of teaching behaviors. These findings support previous research by Brooks (2012), Walker (2011), and Baepler and Walker (2014b) on the power of active-learning classrooms to influence perceptions of positive interactions among students and encourage behaviors that positively correlate with student engagement. During the

analysis, several questions developed. These questions demonstrate a need and opportunities for further research.

Conceptual-change, Student-focused Instruction vs Information-transmission, Teacher-focused Instruction. Conceptual-change refers to the act of reconsidering one's beliefs and is a component of deep learning (Baeten et al., 2010). Generating deep learning relies on opportunities for the learner to both engage actively in a task and then reflect on their learning (Dahlgren, Wille, Finkel, & Burger, 2005). Both of these features of deep learning are aligned with student-centered instruction. Faculty reported, through the ATI, a preference for student-focused pedagogy methods suggesting that this approach is common among faculty teaching developmental reading courses.

Research on faculty pedagogy preferences has determined that faculty tend to employ those practices for which they have expressed an affinity (Lasry et al., 2013; Trigwell et al., 2005). Student-centered instruction, which was favored by faculty in this study, has been identified as a more impactful pedagogical approach for developmental learners (Hayes & Williams, 2016). Students reported, through the SCALE survey, that they perceived the opportunity to participate in student-centered behaviors. Further research could determine whether there are different outcomes for developmental learners in active-learning classrooms when faculty identify a preference for information-transmission, teacher-focused instruction. This information could help increase understanding of the role an instructor's pedagogical beliefs play in student performance outcomes for developmental students receiving instruction in active-learning classrooms.

Gaining an understanding of how faculty preferences in pedagogy impact student success could lead to changes in practice that better support student learning outcomes.

Homogenous vs Heterogenous Groupings. Student final grades were not significantly different between the two learning spaces, yet previous research by Benson (2010) Brooks (2011) and Cotner et al. (2013) consistently identified academic gains in lower-performing students who received instruction in active-learning classrooms. In each of those studies, students received instruction in academically heterogenous classrooms, as measured by placement tests, pre-tests or GPA. This suggests that the impact of active-learning classrooms on academic performance may be related to the academic diversity of the classroom population and the opportunity for students of varying abilities to interact with each other. In the case of this study, the Accuplacer score was the only measure used to evaluate a student's academic abilities and there was limited variability in student placement scores. For this study, students with limited variability in Accuplacer scores were selected by design to test a hypothesis within a developmental sample.

While students in the active-learning classroom reported a perception of greater confidence with the course material and reported stronger agreement with statements related to interactions with their classmates, that perception of student interaction may not translate to increased learning if the students are equivalent academically. Slavin (1996) has postulated various models for cooperative learning and observed that the underlying theory is that students who are performing tasks will model higher-quality solutions for each other provided the students are operating within each other's proximal zones of development. Komulainen, Lindstom, & Sandtro (2015), in a study of 49

students in an undergraduate engineering course taught in an active-learning classroom, specifically organized students in groups such that each group would have at least one A/B student, one or two C students and one D student, as determined by their average grade from a preceding course. Final grade results for students in the active-learning classroom were an average 2/3 of an entire letter grade higher than their peers taught the same course in a traditional classroom. In the current study, there was relative homogeneity of the developmental population in both groups, as such it is possible that, if collaborative learning techniques were utilized, they were limited in helping the students learn from their peers. This collaborative approach to learning is grounded in Vygotsky's socially oriented theory of development. His theory suggests that learners benefit from the modeling and relative expertise of others who are slightly more sophisticated or advanced in a specific skill set (Vygotsky, 1978). Vygotsky's social learning theory would suggest that students should experience greater cognitive gains and achievement when learning in heterogeneous groups (Jensen & Lawson, 2011).

Further research could determine whether there are different outcomes for developmental learners in active-learning classrooms when the classroom population is academically diverse. The room's capacity to be arranged into various seating arrangements can support peer interactions that have demonstrable positive impacts on learning, but the power of those groupings for developmental learners may rely on their ability to learn from peers who are stronger academically. Additionally, the same study should be repeated with developmental math students, who represent an even larger percentage of the developmental population at community colleges (CAPR, 2018). This would evaluate whether the findings are exclusive to students who are deemed

unprepared for college-level reading as opposed to students who are deemed unprepared for the other foundational college-level skill of mathematics.

Faculty Development for Teaching in Active-Learning Classrooms. The primary motivator for creating active-learning classrooms was to allow faculty to enact student-centered pedagogies without the physical limitations and lack of technology affordances of traditional classrooms (Beichner et al., 2000; Beichner, et al., 2007; Brooks, 2011; Dori & Belcher, 2005). The use of student-centered pedagogies is not common among faculty in all disciplines and most faculty need professional development to develop materials that align with this instructional approach (Brooks & Solheim, 2014). In this study, no professional development was provided to faculty in either learning environment.

Previous research reported that faculty will make modifications to their instructional approach by virtue of teaching in an active-learning classroom, regardless of their previously employed instructional approaches (Taylor, 2009). However, Brooks and Solheim (2014) found that providing faculty development focused on student-centered, active-learning to instructors teaching in an active learning classroom yielded positive gains for all students, not only those identified as lower-performing. This research has significant implications as Lasry et al (2013) determined that faculty who teach in active-learning spaces who do not have a student-centered teaching approach negatively impact student learning outcomes. This finding was expanded by Lasry et al (2014) who reported that faculty who profess a less student-centered approach to instruction, over time gradually modify their teaching to include more student-centered behaviors when teaching in an ALC. Cotner et al (2013) called for a faculty development

program exclusively for teaching in active-learning classrooms as essential for faculty success teaching in these spaces. Further research could determine whether participation in faculty development on the use of the active-learning classroom and associated pedagogies can amplify the student performance outcomes for developmental learners.

Strategies to Increase Student Interactions with Peers and Faculty. The most significant findings from this research related to students' perception of their social interactions with their peers and instructor. These measures of interactions: student-student, student – instructor (formal); student-instructor-informal and student as instructor all favored the active-learning classroom. Student interaction with faculty has been attributed to the construct of rapport (Wilson et al., 2010). Rapport has characteristics of immediacy, mutual attentiveness (Frisby & Myers, 2008), engagement and approachability (Burke-Smalley, 2018). Studies have positively correlated the role of faculty rapport in improved student performance (Wilson et al., 2010); student participation (Frisby & Martin, 2010) and student impressions of the instructor (Frisby & Myers, 2008).

Future studies should incorporate additional qualitative research methods to determine characteristics of student-student and student-faculty interactions in an active-learning classroom, and their frequency which contribute to student performance, retention and persistence.

Conclusion

Active-learning environments were first introduced in higher education as spaces to support student-centered, collaborative learning techniques (Beichner et al., 2000). Research on student-learning has affirmed that constructivist, active-teaching methods

can measurably improve student learning outcomes (Brooks & Solheim, 2014; Johnson, 2011) especially for students who are underprepared for college level instruction (Boylan, 2002). While the space itself is not a predictor of the use of active-learning pedagogies, current research has suggested that teaching and learning in active-learning classrooms influences student and instructor behaviors to be more collaborative, student-centered and interactive (Brooks, 2012; Taylor, 2009; Whiteside et al., 2010). In studies at four-year institutions, these active-learning behaviors and active-learning classrooms have demonstrated significant positive implications for students initially deemed lower performing (Benson, et al., 2010; Brooks, 2011; Crosta, 2014). Extending the potential application of active-learning classrooms as a positive intervention for students who are struggling academically, this study evaluated the lowest academic population of learners at community colleges, developmental students. The results of this study suggest that developmental reading students taught in an ALC perceived a higher level of engagement with their peers and instructor, and a stronger sense of contributing to the learning of others; all behaviors that have been positively correlated with persistence and retention for community college learners (Braxton et al., 2000; Braxton, 2013; Kuh, 2003; Tinto, 2000).

This study impacts the field of developmental learning and learning spaces. Findings related to student evaluations of their instructor and perceptions of social interactions in the classroom align with existing research on the potential impacts of ALCs; and are encouraging for the positive impact that active-learning classrooms may have on developmental student and faculty interactions, and student-centered/conceptual change-focused instructional approaches. The results of this study provide greater

support for the argument that active-learning classrooms may increase student social interactions with their peers and instructor. Higher levels of student engagement, as measured by reported social interactions, are an expressed goal of community college leaders, especially for the developmental population. The potential for the classroom design and furnishings to influence student learning behaviors that are associated with retention should encourage college leaders, facilities planners and faculty to advocate for incorporating more active-learning spaces on their campuses. Additionally, faculty whose expressed approach to instruction is conceptual – change/ student-centered may contribute to stronger academic performance and retention of developmental learners. When scheduling courses into active-learning classrooms, priority should be given to developmental courses.

REFERENCES

(2017). Retrieved from Association for Learning Environments: http://www.a4le.org/websites/main/index.php?p=139

Ackermann, E. (2001). Piaget's constructivism, Papert's constructionism: What's the difference. *Future of learning group publication, 5*(3), 438.

Adams, J., & Corbett, A. (2010). Experiences of traditional and non-traditional college students. *Perspectives, 2*(1), 2-29.

Adedokun, O. A., Parker, L. C., Henke, J. N., & Burgess, W. D. (2017). Student perceptions of a 21st century learning space. *Journal of Learning Spaces, 6*(1), 1-13.

Akanegbu, A. (2012, October 11). *A Visual History of School Desks.* Retrieved from EdTech Magazine: https://edtechmagazine.com/k12/article/2012/10/visual-history-school-desks

Akinciturk, N., Erbil, Y., & Yucel, C. (2011). Cooperative learning in an architectural design studio. *Uludağ University Journal of The Faculty of Engineering, 16*(2), 35-43.

Aldrich, J. (2018). *Using IBM SPSS Statistics: An interactive hands-on approach.* Los Angeles: Sage Publications.

American Association of Community Colleges (AACC). (2015). *Community College Completion.* American Association of Community Colleges.

American Association of Community Colleges. (2015). *2015 Fact Sheet.* Washington, DC: American Association of Community Colleges.

Amro, H. J., Mundy, M. A., & Kupczynski, L. (2015). The effects of age and gender on student achievement in face-to-face and online college algebra classes. *Research in Higher Education Journal, 27*, 1-22.

Ashar, H., & Skenes, R. (1993). Can Tinto's student departure model be applied to nontraditional students?. *Adult Education Quarterly, 43*(2), 90-100.

Astin, A. W. (2001). *What matters in college? : Four critical years revisited.* CA, San Francisco: Jossey-Bass Publishers,.

Attard, A., Di Iorio, E., Geven, K., & Santa, R. (2010). *Student-centered learning: Toolkit for students, staff and higher education institutions.* Brussels: European Student's Union.

Baepler, P., & Walker, J. (2014b). Active learning classrooms and educational alliances: Changing relationships to improve learning. *New Directions for Teaching and Learning*(137), 27-40.

Baepler, P., & Walker, J. (2015). Social context matters: Learning spaces, classroom relationships, and student outcomes. *40th Annual POD Conference.* San Francisco.

Baepler, P., Walker, J. D., & Driessen, M. (2014). It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. *Computers & Education, 78*, 227-236. doi:doi:10.1016/j.compedu.2014.06.006

Baeten, M., Kyndt, E., Struyven, K., & Dochy, F. (2010). Using student-centred learning environments to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness. *Educational Research Review, 5*(3), 243-260.

Bailey, T. (2009). Challenge and opportunity: Rethinking the role and function of developmental education in community college. . *New Directions for Community Colleges*(145), 11-30.

Bailey, T. R., & Cho, S. W. (2010). Developmental education in community colleges. *Community College Research Center*, 46-51.

Bailey, T., & Cho, S. W. (2010). *Issue Brief: Developmental Education in Community Colleges.* Columbia University. NY: Community College Research Center.

Bailey, T., Bashford, J., Boatman, A., Squires, J., Weiss, M., Doyle, W., . . . Wilson, W. (2016). *Strategies for Postsecondary students in developmental education: A practice guide for college and university administrators, advisors, and faculty.* NCEE 2017-4011. What Works Clearinghouse.

Bailey, T., Jeong, D. W., & Cho, S. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. . *Economics Of Education Review, 29(Special Issue in Honor of Henry M. Levin)*, 255-270. doi:10.1016/j.econedurev.200

Baker, L. (2012). A history of school design and its indoor environmental standards, 1900 to today. . *National Clearinghouse for Educational Facilities.*, 1-30.

Barhoum, S., & Wood, J. L. (2016). Differences in active and collaborative learning by race for community college developmental writing students. *Community College Enterprise*, *22*(2), 18-28.

Barnes, R. A., & Piland, W. E. (2010). Impact of learning communities in developmental English on community college student retention and persistence. *Journal of College Student Retention: Research, Theory & Practice*, *12*(1), 7-24.

Barnett, E. A., Bork, R. H., Mayer, A. K., Pretlow, J., Wathington, H. D., & Weiss, M. J. (2012). Bridging the gap: An impact study of eight developmental summer bridge programs in Texas. *National Center for Postsecondary Research.*, 1-90.

Barre, E. (2015, July 9). *Do student evaluations of teaching really get an F?* Retrieved from Rice University Centre for Teaching Excellence: http://cte.rice.edu/blogarchive/2015/07/09/studentevaluations

Barry, M. N., & Dannenberg, M. (2016). *Out of pocket: The high cost of inadequate high schools and high school student achievement on college affordability.* Washington, DC: Education Reform Now.

Bates, A. W. (2015). *Teaching in a digital age.* BCCampus Open Education. Retrieved from http://opentextbc.ca/teachinginadigitalage/

Bean, J. P., & Eaton, S. B. (2000). A psychological model of college student retention. In J. M. Braxton (Ed.), *Reworking the student departure puzzle* (pp. 48-61). Nashville, TN: Vanderbilt University Press.

Bean, J., & Eaton, S. B. (2001). The psychology underlying successful retention practices. *Journal of College Student Retention: Research, Theory & Practice, 3*(1), 73-89.

Becker, S. A., Cummins, M., Davis, A., Freeman, A., Hall, C. G., & Ananthanarayanan, V. (2017). *NMC horizon report: 2017 higher education edition.* Austin, TX: The New Media Consortium.

Beichner, R. (2008). *The SCALE-UP Project: A student-centered active learning environment for undergraduate programs.* National Academy of Sciences.

Beichner, R. J. (2014). History and evolution of active learning spaces. *New Directions for Teaching and Learning, 137*(2014), 9-16.

Beichner, R. J., & Saul, J. (1999, Beichner, R. J., & Saul, J. (1999). Student-centered activities for large-enrollment university physics (SCALE-UP). In Proceedings of the Sigma Xi Forum on the Reform of Undergraduate Education (pp. 43-52).). Student-centered activities for large-enrollment university physics (SCALE-UP). *In Proceedings of the Sigma Xi Forum on the Reform of Undergraduate Education,* (pp. 43-52).

Beichner, R. J., Saul, J. M., Abbott, D. S., Morse, J. J., Deardorff, D., Allain, R. J., & Risley, J. S. (2007). The student-centered activities for large enrollment undergraduate programs (SCALE-UP) project. *Research-based reform of university physics., 1*(1), 2-39.

Beichner, R., Saul, J., Allain, R., Deardorff, D., & Abbott, D. (2000). Introduction to SCALE-UP: Student-centered activities for large-scale enrollment university

physics. *Proceedings 2000 Annual ASEE Conference* (pp. 1-13). Washington, DC: American Society for Engineering Education.

Belcher, J. W. (2001). *Studio physics at MIT.* MIT, Physics. Rochester: MIT. Retrieved from http://web. mit. edu/8.02 t/www/802TEAL3D/visualizations/resources/PhysicsNewsLetter. pdf

Belcher, J. W. (2003). Improving student understanding with TEAL. *The MIT Faculty Newsletter, 16*(2), 1-8.

Belfield, C. (2015). *Efficiency gains in community colleges: Two areas for further investigation.* New York: CCRC.

Benson, L. C., Orr, M. K., B iggers, S. B., Moss, W. F., Ohland, M. W., & Schiff, S. D. (2010). Student-centered active, cooperative learning in engineering. *International Journal of Engineering Education, 26*(5), 1097-1110.

Benton, S. L., Li, D., Brown, R., Guo, M., & Sullivan, P. (2015). *IDEA Technical Report No. 18: Revising the IDEA Student Ratings of Instruction System.* Manhattan, KS: IDEA. Retrieved from https://www.ideaedu.org/

Bergman, M., Gross, J. K., Berry, M., & Shuck, B. (2014). If life happened but a degree didn't: Examining factors that impact adult student persistence. *62*(2), 90-101. doi:10.1080/07377363.2014.915445

Bettinger, E. P., & Long, B. T. (2005). Remediation at the community college: Student participation and outcomes. *New Directions for Community Colleges, 129*, 17-26.

Bettinger, E. P., & Long, B. T. (2007). Remedial and developmental courses. In S. Dickert-Conlin, & R. (. Rubenstien (Eds.), *Economic inequality and higher education: Access, persistence and success* (pp. 69-100). Russell Sage Foundation.

Bettinger, E. P., Boatman, A., & Long, B. T. (2013). Student supports: Developmental education and other academic programs. *The Future of Children*, 93-115.

Bettinger, E., & Long, B. (2007). Institutional responses to reduce inequalities in college outcomes: Remedial and developmental courses in higher education. In S. Dickert-Conlin, & R. Rubenstien (Eds.), *Economic inequality and higher education: Access, persistence, and success.* (pp. 69-100). NY, NY: Russell Sage Foundation.

Biggs, J. B. (2011). *Teaching for quality learning at university: What the student does.* UK: McGraw-Hill Education.

Blair, K., Schwartz, D. L., Biswas, G., & Leelawong, K. (2007). Pedagogical agents for learning by teaching: Teachable agents. *Educational Technology, 47*(1), 56-61.

Bligh, B., & Pearshouse, I. (2011). Doing learning space evaluations. In A. Boddington, & J. Boys (Eds.), *Re-shaping learning: A critical reader* (pp. 3-18). Rotterdam: Sense Publishers.

Bonutti, A., De Cesco, F., Di Gaspero, L., & Schaerf, A. (2012). Benchmarking curriculum-based course timetabling: Formulations, data formats, instances, validation, visualization, and results. *Annals of Operations Research, 194*(1), 59-70.

Bonwell, C. C., & Eison, J. A. (1991, 1991). *Active Learning: Creating Excitement in the Classroom.* The George Washington University. Washington, DC : ASHE-ERIC Higher Education Reports. ERIC Clearinghouse on Higher Education.

Boylan, H. R. (2001). *What works: Research-based best practices in developmental education.* Boone, NC: Continuous Quality Improvement Network with the National Center for Developmental Education.

Boylan, H. R., & Bonham, B. S. (2007, 2007). 30 years of developmental education: A retrospective. *30*(3), 2-4.

Boys, J. (2010). *Towards creative learning spaces: Re-thinking the architecture of post-compulsory education.* NY, NY: Routledge.

Braxton, J. (2013). *Rethinking College Student Retention.* San Francisco, CA: Jossey-Bass.

Braxton, J. M., Milem, J. F., & Sullivan, A. S. (2000). The influence of active learning on the college student departure process: Toward a revision of Tinto's theory. *The Journal of Higher Education, 71*(5), 569-590.

Brooks, D. C. (2011). Space matters: The impact of formal learning environments on student learning. *British Journal of Educational Technology, 42*(5), 719-726.

Brooks, D. C. (2012). Space and consequences: The impact of different formal learning spaces on instructor and student behavior. *Journal of Learning Spaces, 1*(2). Retrieved from http://z.umn.edu/jols

Brooks, D. C., & Solheim, C. A. (2014). Pedagogy matters, too: The impact of adapting teaching approaches to formal learning environments on student learning. *New Directions For Teaching & Learning,, 137*, 53-61.

Brown, M., & Long, P. (2006). Trends in learning space design. In D. G. Oblinger (Ed.), *Learning spaces* (pp. 9-1-9-11). EDU CAUSE. Retrieved from www.educause.edu/learningspaces

Brown, M., Cevetello, J., Dugdale, S., Felix, E., Holeton, R., & Meyers, C. (2014). *Learning Spaces Rating System.* EDUCAUSE.

Bruffee, K. A. (1984). Collaborative learning and the "conversation of mankind". *College English, 46*(7), 635-652.

Burke-Smalley, L. A. (2018). Practice to research: Rapport as key to creating an effective learning environment. *Management Teaching Review, 3*(4), 354.

Butt, A. (2014). Student views on the use of a flipped classroom approach: Evidence from Australia. *Business Education & Accreditation, 6*(1), 33.

Cajiao, J., & Burke, M. J. (2016). How instructional methods influence skill development in management education. . *Academy of Management Learning & Education, 15*(3), 508-524.

Campbell, D. T., & Riecken, H. W. (1968). Quasi-experimental design. In D. Sills, & R. Merton (Eds.), *International Encyclopedia of the Social Sciences* (Vol. 5, pp. 259-263). Macmillan Reference.

CAPR. (2018). *Developmental Education FAQs.* Retrieved from CAPR: Center for the Analysis of Postsecondary Readiness: https://postsecondaryreadiness.org/developmental-education-faqs

Chen, X. (2016). *Remedial coursetaking at US public 2-and 4-Year institutions: Scope, experiences, and outcomes.* . Washington, DC: National Center for Education Statistics.

Chickering, A. W., & Gamson, Z. F. (1987). *Seven principles for good practice in undergraduate education.* AAHE bulletin.

Chism, N. V. (2006, . Learning spaces, 2-1.). Challenging traditional assumptions and rethinking learning spaces. In D. Oblinger, & J. K. Lippincott (Eds.), *Learning Spaces* (pp. 2.1-2.12). Boulder, CO: EDUCAUSE.

Chronicle of Higher Education. (2015, February). *College Completion* . Retrieved from Chronicle of Higher Education: https://collegecompletion.chronicle.com/

Chronicle of Higher Education. (2017, August 18). Undergraduate students who were 25 and older. *Chronicle of Higher Education*, p. 32.

Churcher, K., Downs, E., & Tewksbury, D. (2014). "Friending" Vygotsky: A social constructivist pedagogy of knowledge building through classroom social media use. *Journal of Effective Teaching, 14*(1), 33-50.

Coe, R. (2002). It's the effect size, stupid. What effect size is and why it is important. *Annual Conferene of British Educational Research Association* (pp. 1-18). Devon, England: University of Exeter.

College Board. (2016, December 20). *Why Accuplacer?* Retrieved from Accuplacer: https://accuplacer.collegeboard.org/educator/why-accuplacer

College Board. (2017, February 27). *Inside the Test*. Retrieved from College Board: Accuplacer: https://accuplacer.collegeboard.org/student/inside-the-test

Community College Research Center. (2018). *Community College Research Center.* Retrieved from Community College FAQs: https://ccrc.tc.columbia.edu/Community-College-FAQs.html

Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis for field settings.* Chicago, IL: Rand McNally.

Cooper, J. L., & Robinson, P. (2014). Using classroom assessment and cognitive scaffolding to enhance the power of small-group learning. *Journal on Excellence in College Teaching, 25,* 149-161.

Cornell, P. (2002). The impact of changes in teaching and learning on furniture and the learning environment. *New Directions for Teaching and Learning, 2002*(92), 33-42.

Cotner, S., Loper, J., Walker, J. D., & Brooks, D. C. (2013). It's not you, it's the room. Are the high-tech, active learning classrooms worth it. *Journal of College Science Teaching, 42*(6), 82-88.

Course Outline. (2016). EN096 Syllabus. Columbia, MD.

Cox, A. M. (2011). Students' experience of university space: An exploratory study. . *International Journal of Teaching and Learning in Higher Education, 23*(2), 197-207.

Credé, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research, 80*(2), 272-295.

Creswell, J. W. (2014). *Research design : Qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, CA, : SAGE Publications.

Crisp, G., & Delgado, C. (2014). The impact of developmental education on community college persistence and vertical transfer. *Community College Review, 42*(2), 99. doi:10.1177/0091552113516488

Crosta, P. M. (2014). Intensity and attachment: How the chaotic enrollment patterns of community college students relate to educational outcomes. *Community College Review, 42*(2), 118-142.

Crouch, C. H., & Mazur, E. (2001). Peer instruction: Ten years of experience and results. *American Journal of Physics, 69*(9), 970-977.

Dahlgren, D., Wille, D., Finkel, D., & Burger, T. (2005). Do active learning techniques enhance learning and increase persistence of first-year psychology students? *Journal of The First-Year Experience & Students in Transition, 17*(1), 49-65.

Demir, M., Burton, S., & Dunbar, N. (2019). Professor–student rapport and perceived autonomy support as predictors of course and student outcomes. *Teaching of Psychology, 46*(1), 22-33.

DeNicco, J., Harrington, P., & Fogg, N. (2015). Factors of one-year college retention in a public state college system . *Research in Higher Education Journal*, 1-13.

Dennis, J. M., Phinney, J. S., & Chuateco, L. I. (2005). The role of motivation, parental support, and peer support in the academic success of ethnic minority first-generation college students. *Journal of College Student Development, 46*(3), 223-236.

Dewey, J. (1916). *Democracy and education.* Hazleton, PA: Penn State University. Retrieved from http://library.um.ac.id/images/stories/ebooks/Juni10/democracy%20and%20education%20-%20john%20dewey.pdf

Donovan, E., & Mastrantino, K. (2014). From Roots to Canopy: Developmental reform and institutional growth. Union City, NJ, USA. Retrieved from http://www.njccc.org/wp-content/uploads/2014/03/Union-County-College-Developmental-English-Reform.pdf

Dori, Y. J., & Belcher, J. (2005). How does technology-enabled active learning affect undergraduate students' understanding of electromagnetism concepts? *The Journal of the Learning Sciences, 14*(2), 243-279.

Dougherty, K. J., & Reddy, V. (2013). *Performance Funding for Higher Education: What Are the Mechanisms What Are the Impacts: ASHE Higher Education Report.* Hoboken, NJ: John Wiley & Sons.

Education, U. D. (2017). *Developmental Education: Challenges and Strategies for Reform.* Washington, D.C.: Office of Planning, Evaluation and Policy Development.

Engstrom, C. (2008). Curricular learning communities and unprepared students: How faculty can provide a foundation for success. In J. Braxton (Ed.), *The role of the classroom in college student persistence* (pp. 5-19). San Francisco: Jossey-Bass.

Espey, M. (2008). Does space matter? Classroom design and team-based learning. *Review of Agricultural Economics, 30*(4), 764-775.

Executive Office of the President. (2014). *Increasing college opportunity for low-income students.* www.White House.gov. Retrieved from https://www.whitehouse.gov/sites/default/files/docs/white_house_report_on_increasing_college_opportunity_for_low-income_students_1-16-2014_final.pdf

Fain, P. (2017, May 24). *Enrollments continue to slide at for-profits and community colleges.* Retrieved from Inside Higher Ed: https://www.insidehighered.com/quicktakes/2017/05/24/enrollments-continue-slide-profits-and-community-colleges

Finkelstein, A., Ferris, J., Weston, C., & Winer, L. (2016). Research-Informed Principles for (Re) designing Teaching and Learning Spaces. *Journal of Learning Spaces, 5*(1), 26-40.

Fiorella, L., & Mayer, R. E. (2013). The relative benefits of learning by teaching and teaching expectancy. *Contemporary Educational Psychology, 38*(4), 281-288.

Fiorella, L., & Mayer, R. E. (2014). Role of expectations and explanations in learning by teaching. *Contemporary Educational Psychology, 39*(2), 75-85.

Fisher, K. (2010). Technology-Enabled Active Learning Environments: An appraisal. *CELE Exchange*, 1-9.

Fisher, K., & Newton, C. (2014). Transforming the twenty-first-century campus to enhance the net-generation student learning experience: Using evidence-based design to determine what works and why in virtual/physical teaching spaces. *Higher Education Research & Development, 33*(5), 903-920.

Flaherty, C. (2016, January 11). *Bias against female instructors.* Retrieved from Inside Higher Ed: https://www.insidehighered.com/news/2016/01/11/new-analysis-offers-more-evidence-against-student-evaluations-teaching

FLEXSpace Core Team. (2017, 11 1). Retrieved from FLEXSpace Learning Enviornments Exchange: http://flexspace.org/

Fragoso, A. G. (2013). The transition of mature students to higher education: Challenging traditional concepts? *Studies in the Education of Adults, 45*(1), 67. doi:10.1080/02660830.2013.11661642

Freeman, A., Becker, S. A., & Cummins, M. (2017, The New Media Consortium.). *NMC/CoSN Horizon Report: 2017 K.* The New Media Consortium.

Freire, P. (1968). *Pedagogy of the Oppressed.* (T. M. Ramos, Ed.) New York, NY: Herder.

Friedman, P., Rodriguez, F., & McComb, J. (2001). Why students do and do not attend classes. *College Teaching, 49*(4), 124-133.

Frisby, B. N., & Myers, S. A. (2008). The relationships among perceived instructor rapport, student participation, and student learning outcomes. . *Texas Speech Communication Journal, 33*(1), 27-34.

Frisby, B., & Martin, M. (2010). Instructor-student and student-student rapport in the classroom. *Communication Education, 59*, 146-164.

Gallard, A. J., Albritton, F., & Morgan, M. W. (2010). A comprehensive cost/benefit model: Developmental student success impact. *Journal of Developmental Education, 1*, 10-25.

Ganga, E. (2017, August 24). *How developmental education policy gets done.* Retrieved from CAPR: Center for the Analysis of Postsecondary Readiness: https://postsecondaryreadiness.org/how-developmental-education-policy-gets-done/

Garcia, J., & Serrata, W. (2016, December 6). *Meeting the Challenge of Demographic Change.* Retrieved from The Chronicle of Higher Education: https://www.chronicle.com/article/Meeting-the-Challenge-of/238582

Gatch, D. (2010, International Journal for the Scholarship of Teaching and Learning). Restructuring ntroductory physics by adapting an active learning studio model . *4*(2).

Gee, L. (2006). Human-centered design guidelines. In D. Oblinger (Ed.), *Learning Spaces* (pp. 10-1-10-13). Educause.

Gok, T. (2012, June). The effects of peer instruction on students' conceptual learning and motivation. *Asia-Pacific Forum on Science Learning and Teaching, 13*(1), 1-17.

Goldrick-Rab, S. (2010). Challenges and opportunities for improving community college student success. *Review of Educational Research, 80*(3), 437-469.

Graetz, K. A. (2006, , 41(6), 60.). The Psychology of Learning Environments. In D. G. Oblinger (Ed.), *Learning Spaces* (pp. 6.1-6.13). Educause.

Granito, V. J., & Santana, M. E. (2016). Psychology of learning spaces: Impact on teaching and learning. *Journal of Learning Spaces, 5*(1), 1-8.

Gump, S. (2005). The Cost of Cutting Class: Attendance as a predictor of student success. *College Teaching, 53*(1), 21-26.

Haghighi, M. M., & Jusan, M. M. (2012). Exploring students behavior on seating arrangements in learning environment: A review. *Procedia-Social and Behavioral Sciences, 36*, 287-294.

Hakimzadeh, H., Adaikkalavan, R., & Batzinger, R. (2011, November). Successful implementation of an active learning laboratory in computer science. *39th annual ACM SIGUCCS conference on User services*, (pp. 83-86).

Harvey, E. J., & Kenyon, M. C. (2013). Classroom seating considerations for 21st century students and faculty. *Journal of Learning Spaces, 2*(1), 1-13.

Hayes, S. M., & Williams, J. L. (2016). ACLT 052: Academic Literacy--An Integrated, Accelerated Model for Developmental Reading and Writing. *NADE Digest, 9*(1), 13-22.

Hepworth, D., Littlepage, B., & Hancock, K. (2018). Factors influencing university student academic success. *42*(1), 45-61.

Hershner, S. D., & Chervin, R. D. (2014). Causes and consequences of sleepiness among college students. *Nature and science of sleep, 6*, 73.

Hill, M. C., & Epps, K. K. (2010). The impact of physical classroom environment on student satisfaction and student evaluation of teaching in the university environment. *Academy of Educational Leadership Journal, 14*(4), 65.

Holschuh, J. P., & Paulson, E. J. (2013). The terrain of college developmental reading. *Oak Creek: College Reading and Learning Association*.

Hoover, E., & Lipka, S. (2013, March 11). The second-chance club: Inside a semester of remedial English. *The Chronicle of Higher Education*.

Horne, S., Murniati, C. T., Saichaie, K., Jesse, M., Florman, J. C., & Ingram, B. F. (2014). Using qualitative research to assess teaching and learning in technology-infused TILE classrooms. *New Directions for Teaching and Learning, 137*, 17-26.

Horton, J. (2015). Identifying at-risk factors that affect college student success. *International Journal of Process Education, 7*(1), 83-101.

Hughes, K. L., & Scott-Clayton, J. (2011). Assessing developmental assessment in community colleges. *Community College Review, 39*(4), 327-351.

IDEA. (n.d.). *About Us*. Retrieved April 4, 2018, from IDEA: https://www.ideaedu.org/About-Us/Our-Approach

Jaggars, S. S., & Stacey, G. W. (2014, January). What we know about developmental education outcomes. Research overview. *Community College Research Center, Teachers College, Columbia University.*, 1-8.

Jamieson, P., Fisher, K., Gilding, T., Taylor, P. G., & Trevitt, A. C. (2000). Place and space in the design of new learning environments. . *Higher Education Research & Development, 19*(2), 221-236.

Jamieson, S. (2013). Reading and engaging sources: What students' use of sources reveals about advanced reading skills. . *Across the Disciplines, 10*(4).

Jenkins, D., Speroni, C., Belfield, C., Jaggars, S. S., & Edgecombe, N. (2012). A model for accelerating academic success of community college remedial English students: Is the accelerated learning program (ALP) effective and affordable? CCRC Working Paper No. 21. . *Community College Research Center, Columbia University.*, 1-33.

Jensen, J. L., & Lawson, A. (2011). Effects of collaborative group composition and inquiry instruction on reasoning gains and achievement in undergraduate biology. *CBE—Life Sciences Education, 10*(1), 64-73.

JISC. (2009). *Designing spaces for effective learning: A guide to 21st century learning space design.* Bristol: HEFCE. Retrieved from http://www.jisc.ac.uk/media/documents/publications/learningspaces.pdf

Johnson, C., & Lomas, C. (2005). Design of the learning space: Learning and design principles. *EDUCAUSE review, 40*(4), 16-28.

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015). *The NMC Horizon Report: 2015 Higher Education Edition.* Austin, TX: New Media Consortium.

Johnson, P. A. (2011). Actively pursuing knowledge in the college classroom. *Journal of College Teaching & Learning, 8*(6), 17-30.

Kadar, R. S. (2001). A counseling liaison model of academic advising. *Journal of College Counseling, 4*(2), 174-178.

Karp, M. (2011, February). Toward a new understanding of non-academic student support: Four mechanisms encouraging positive student outcomes in the community college. *CCRC Working Paper No. 28*, 1-42.

Keiner, L. E. (2015). Implementation of interactive engagement teaching methods in a physical oceanography course. . *Journal of College Science Teaching, 45*(2), 70-77.

Kobza, C. (2017). *Learning Space*. Retrieved from EDUCAUSE: https://library.educause.edu/topics/teaching-and-learning/learning-space

Komulainen, T. M., Lindstom, C., & Sandtro, T. (2015). Work in progress: Development and use of an active learning classroom for a course on Dynamic Systems. *American Society for Engineering Education* (pp. 1-13). Seattle: ASEE.

Kosiewicz, H., Ngo, F., & Fong, K. (2016). Alternative models to deliver developmental math: Issues of use and student access. *Community College Review*, *44*(3), 205-231.

Kuh, G. (2003). What we're learning about student engagement from NSSE: Benchmarks for effective educational practices. *Change: The Magazine of Higher Learning, 35*(2), 24-32.

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *79*(5), 540-563.

Lasry, N., Charles, E., & Whittaker, C. (2014). When teacher-centered instructors are assigned to student-centered classrooms. *Physical Review Special Topics-Physics Education Research, 10*(1), 010116-1-010116-9.

Lasry, N., Charles, E., & Whittaker, C. (2016). Effective variations of peer instruction: The effects of peer discussions, committing to an answer, and reaching a consensus. *American Journal of Physics, 84*(8), 639-645.

Lasry, N., Charles, E., Whittaker, C., Dedic, H., & Rosenfield, S. (2013, 1513, 218-241.). Changing classroom designs: Easy; Changing instructors' pedagogies: Not so easy. *Proceedings from American Institute of Physics*, (pp. 218-241).

Lasry, N., Mazur, E., & Watkins, J. (2008). Peer instruction: From Harvard to the two-year college. . *American Journal of Physics, 76*(11), 1066-1069.

Lattimer, H. (2015). Translating theory into practice: Making meaning of learner centered education frameworks for classroom-based practitioners. *International Journal of Educational Developmen, 45*, 65-76.

Lee, D., Morrone, A. S., & Siering, G. (2018). From swimming pool to collaborative learning studio: Pedagogy, space, and technology in a large active learning classroom. *Educational Technology Research and Development, 66*(1), 95-127.

Lefebvre, H. (1991). *The Production of Space.* Oxford, England: Blackwell.

Lei, S. A. (2010). Classroom physical design influencing student learning and evaluations of college instructors: A review of the literature. *Education, 131*(1), 128-134.

Levine, T. R. (2015). *Confirmatory Factor Analysis.* Retrieved from Wiley Online Library: https://onlinelibrary.wiley.com/doi/10.1002/9781118540190.wbeic183

Li, D., Benton, S., Brown, R., Sullivan, P., & Ryalls, K. (2016). *IDEA Technical Report No. 19: Analysis of IDEA Student Ratings of Instruction System 2015 Pilot Data.* IDEA.

Liao, H. A., Edlin, M., & Ferdenzi, A. C. (2014). Persistence at an urban community college: The implications of self-efficacy and motivation. *Community College Journal of Research and Practice, 38*(7), 595-611.

Lomas, C., & Oblinger, D. G. (2006). Student practices and their impact on learning spaces. . In D. Oblinger (Ed.), *Learning spaces* (pp. 5-1).

Lublin, J. (2003). Deep, surface and strategic approaches to learning. *Centre for Teaching and Learning*, 806-825.

Luna Scott, C. (2015). *The Futures of Learning 3: What kind of pedagogies for the 21st century?. ERF Working Paper Series 15.* Paris: UNESCO.

Lutz, K. N. (2012). *Postsecondary developmental education and its impact on student learning and academic success.* Detroit: Wayne State University.

Ma, J., & Baum, S. (2016). *Trends in community colleges: Enrollment, prices, student debt, and completion.* College Board Research.

Marsh, H. (2007). Students' evaluations of university teaching: Dimensionality, reliability, validity, potential biases and usefulness. In P. R.P., & S. J.C. (Eds.), *The Scholarship of Teaching and Learning in Higher Education: An Evidence-Based Perspective.* Springer, Dordrecht.

Martin, D. J. (1967). The "Interpretive" Classroom.

Martorell, P., & McFarlin, I. J. (2010). Help or hindrance? The effects of college remediation on academic and labor market outcomes. *The Review of Economics and Statistics, 93*(2), 436-454.

Mattern, K. D., & Packman, S. (2009). *Predictive validity of ACCUPLACER® scores for course placement: A meta-analysis. Research Report No. 2009-2.* New York: College Board.

Maue, L. (2012). *Perceptions of persistence: Why underprepared community college students are not persisting.* Carbondale, IL: Southern Illinois University at Carbondale.

McCabe, A., & O'Connor, U. (2014). Student-centred learning: The role and responsibility of the lecturer. *Teaching in Higher Education, 19*(4), 350-359.

McCann, C., & English, J. (2017). *Developmental Education: Challenges and Strategies for Reform.* Washington, D.C.: US. Department of Education.

Mellow, G. O., & Heelan, C. M. (2014). *Minding the dream: The process and practice of the American community college.* Lanham, MD: Rowman & Littlefield.

Meltzer, D. E., & Manivannan, K. (2002). Transforming the lecture-hall environment: The fully interactive physics lecture. *American Journal of Physics, 70*(6), 639-654.

MIT. (2005). *TEAL Technology Enabled Active Learning.* Retrieved from Educational transformation through technology at MIT: http://web.mit.edu/edtech/casestudies/teal.html

Monaghan, D., Kolbe, T., & Goldrick-Rab, S. (2018). Experimental evidence on interventions to improve educational attainment at community colleges. In B. Schneider (Ed.), *Handbook of the Sociology of Education in the 21st Century* (pp. 535-559). Springer International.

Monahan, T. (2002). Flexible space and built pedagogy: Emerging IT embodiments. *Inventio, 4*(1).

Moore, R. (2005). Attendance: Are penalties more effective than rewards? *Journal of Developmental Education, 29*(2), 26-32.

Morrison, C. D. (2014). From ‘sage on the stage’to ‘guide on the side’: A good start. *International Journal for the Scholarship of Teaching and Learning, 8*(1-4), 1-15.

Morrone, A. S., Ouimet, J. A., Siering, G., & Arthur, I. T. (2014). Coffeehouse as classroom: Examination of a new style of active learning environment. *New directions for teaching and learning, 137*, 41-51.

Mullin, C. M. (2012). *Why access matters: The community college student body.* AACC Policy Brief.

Mulvey, M. E. (2009). Characteristics of under-prepared students: Who are "The under-prepared"?. *Research and Teaching in Developmental Education, 25*(2), 29-58.

NADE. (2018, January). NADE News. *NADE News, 40, 1*, 1-16. Retrieved from thenade.org

Narum, J. (2017). Retrieved from Learning Spaces Collaboratory: http://www.pkallsc.org/

Niemeyer, D. C. (2003). *Hard facts on smart classroom design: Ideas, guidelines, and layouts.* . Lanham, MD: Rowman & Littlefield.

NSC Research Center. (2018, June 27). *Persistence & Retention - 2018.* Retrieved from National Student Clearinghouse Research Center: https://nscresearchcenter.org/snapshotreport33-first-year-persistence-and-retention/

Obeidat, A., & Al-Share, R. (2012). Quality learning environments: Design-studio classroom. *Asian Culture and History, 4*(2), 165-174.

Oblinger, D. (2006). *Learning spaces.* EDUCAUSE.

Oblinger, D. (2006). Space as a change agent. In D. Oblinger (Ed.), *Learning spaces* (pp. 1-3). Boulder, CO.

Office of Planning, Research and Organizational Development. (2018, June 10). *HCC at A Glance*. Retrieved from Howard Community College: https://www.howardcc.edu/about-us/hcc-at-a-glance/index.html

Oldenburg, R., & Brissett, D. (1982). The third place. . *Qualitative sociology, 5*(4), 265-284.

Orr, D. W. (1997). Architecture as pedagogy II. *Conservation biology,, 11*(3), 597-600.

Osterholt, D. A., & Barratt, K. (2012). Ideas for practice: A collaborative look to the classroom. *Journal of Developmental Education, 36*(2), 22-44.

Papert, S., & Harel, I. (1991). Situating constructionism. In S. Papert, & I. Harel, *Constructionism* (pp. 1-11). Santa Barbara, CA: Praeger .

Park, E., & Choi, B. (2014). Transformation of classroom spaces: Traditional versus active learning classroom in colleges. *Higher Education, 68*(5), 749-771.

Pascarella, E. T. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research,, 50*(4), 545-595.

Pascarella, E. T., Pierson, C. T., Wolniak, G. C., & Terenzini, P. T. (2004). First-generation college students: Additional evidence on college experiences and outcomes. *The Journal of Higher Education, 75*(3), 249-284.

Pearce, R. S., & Okwuashi, L. O. (2013). Lecturing versus teaching in foundation and first year mainstream chemistry. *Journal of Modern Education Review, 3*(7), 568-75.

Pellathy, S., & Leibovich, A. K. (2008). Implementing proven introductory physics reforms. Retrieved from http://scaleup. ncsu.edu/groups/adopters/wiki/1 5c 1 e/attachments/ca7e3/BemaStudy .pdf.

Perks, T., Orr, D., & Alomari, E. (2016). Classroom re-design to facilitate student learning: A case study of changes to a university classroom. *Journal Of The Scholarship Of Teaching & Learning, 16*(1), 53-68. doi:10.14434/josotl.v16i1.19190

Persky, A. M., Kirwin, J. L., Marasco, J. J., May, D. B., Skomo, M. L., & Kennedy, K. B. (2014). Research: Classroom attendance: Factors and perceptions of students and faculty in US schools of pharmacy. *Currents In Pharmacy Teaching And Learning, 6*, 1-9.

Piaget, J. (2001). The psychology of intelligence. [electronic resource]. London ; New York: Routledge.

Porchea, S. F., Allen, J., Robbins, S., & Phelps, R. P. (2010). Predictors of long-term enrollment and degree outcomes for community college students: Integrating

academic, psychosocial, socio-demographic, and situational factors. *The Journal of Higher Education, 81*(6), 750-778.

Pretlow III, J., & Wathington, H. D. (2012). Cost of developmental education: An update of Breneman and Haarlow. *Journal of Developmental Education, 36*(2), 2-12.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering in Education, 93*(3), 223-231.

Prosser, J. (2007). Visual methods and the visual culture of schools. *Visual Studies, 22*(1), 13-30.

Pruett, P. S., & Absher, B. (2015). Factors influencing retention of developmental education students in community colleges. *Delta Kappa Gamma Bulletin, 81*(4), 32-40.

Pundir, R., & Surana, A. (2016). Constructivism learning: A way to make knowledge construction. *3*(2), 158-162.

Reschly, A. L., & Christenson, S. L. (2012). Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct. In A. L. Reschly, S. L. Christenson, & C. Wylie (Eds.), *Handbook Of Research On Student Engagement* (pp. 3-19). Springer. doi:doi:10.1007/978-1-4614-2018-7_1

Rikoon, S., Liebtag, T., Olivera-Aguilar, M., R. S., & Jackson, T. (2014). *A pilot study of holistic assessment and course placement in community college: Findings and recommendations.* Princeton, NJ: Educational Testing Service.

Russell, A. (2008). Enhancing college student success through developmental education. *American Association of State Colleges and Universities (A Higher Education Policy Brief)*, pp. 1-8. Retrieved from Retrieved from http://www. aascu. org/media/pm/pdf/pmaugo8. pdf

Schak, O., Metzger, I., Bass, J., McCann, C., & English, J. (2017). *Developmental education: Challenges and strategies for reform.* Washington, DC: US Department of Education, Office of Planning, Evaluation and Policy Development. Retrieved 9 27, 2018

Schuetz, P. (2005). Campus enviornment: A missing link in studies of community college attrition. *Community College Review, 32*(3), 60-80.

Schwartz, W., Jenkins, D., & Columbia Univ., N. Y. (2007). *Promising practices for community college developmental education: A discussion resource for the Connecticut community college system.* Manhattan, NY: Community College Research Center, Columbia University.

Scott-Clayton, J. (2012). Do high-stakes placement exams predict college success? CCRC Working Paper No. 41. *Community College Research Center, Columbia University.*, 1-40.

Scott-Clayton, J., & Rodriguez, O. (2012). *Development, discouragement, or diversion? New evidence on the effects of college remediation* (Vol. NBER Working Paper No.18328). Cambridge, MA, MA: National Bureau of Economic Research.

Secolsky, C., & Judd, T. P. (2013). Using logistic regression for validating or invalidating initial statewide cut-off scores on basic skills placement tests at the community college level. . *Research in Higher Education Journal, 19*, 1.

Shapiro, D., Dundar, A., Wakhungu, P., Yuan, X. N., & Hwang, Y. (2015, (2015, November). . Herndon, VA: National Student Clearinghouse Research). *Completing College: A National View of Student Attainment Rates – Fall 2009 Cohort (Signature Report No. 10).* Herndon, VA:: National Student Clearinghouse Research Center.

Sheninger, E. C., & Murray, T. C. (2017). *Learning transformed: 8 Keys to designing tomorrow's schools, today.* ASCD.

Skinner, B. F., & Epstein, R. (1982). *Skinner for the classroom : Selected papers.* Champaign, Illinois: Research Press.

Slavin, R. (1996). Research on cooperative learning and achievement: What we know, what we need to know. *Contemporary Educational Psychology, 21*, 43-69.

Smith, K. A., Sheppard, S. D., Johnson, D. W., & Johnson, R. T. (2005). Pedagogies of engagement: Classroom-based practices. *Journal of Engineering Education, 94*(1), 87-101.

Snyder, T. D., de Brey, C., & Dillow, S. A. (2016). *Digest of Education Statistics 2014, NCES 2016-006.* Washington, D.C.: National Center for Education Statistics.

Spooren, P., Brockx, B., & Mortelmans, D. (2013). On the validity of student evaluation of teaching: The state of the art. *Review of Educational Research, 83*(4), 598-642.

Stabler, E. P. (1988). Rule governed behavior in computational psychology. In B. F. Skinner, C. Catania, & S. Harnard (Eds.), *The Selection of Behavior: The Operant Behaviorism of B. F. Skinner: Comments and consequences* (pp. 268-271). Cambridge: Cambridge University Press.

Stefaniak, J. E., & Tracey, M. W. (2015). An exploration of student experiences with learner-centered instructional strategies. *Contemporary Educational Technology, 6*(2), 95-112.

Stephens, N. M., Fryberg, S. A., Markus, H. R., Johnson, C. S., & Covarrubias, R. (2012). Unseen disadvantage: How American universities' focus on independence undermines the academic performance of first-generation college students. *Journal of Personality and Social Psychology, 102*(6), 1178-1197.

Strange, C. C., & Banning, J. H. (2001). *Education by Design: Creating Campus Learning Environments That Work.* San Francisco, CA: The Jossey-Bass Higher and Adult Education Series. Jossey-Bass, Inc.

Stripling, C. T., Roberts, T. G., & Israel, G. D. (2013). Class attendance: An investigation of why undergraduates choose to not attend class. *NACTA Journal, 57*(3), 47-59.

Talbert, R., & Mor-Avi, A. (2018). *A space for learning: A review of research on active learning spaces.* Retrieved March 6, 2019, from SocArXiv: https://osf.io/preprints/socarxiv/vg2mx/?fbclid=IwAR1wdaGrA7OYLTWG7D-Ad0-7TrnsGtV624SGAoyzGDeeU_02YhnG9UBGTkk

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53-55.

Taylor, S. S. (2009). Effects of studio space on teaching and learning: Preliminary findings from two case studies. *Innovative Higher Education, 33*(4), 217-228.

Temple, P. (2008). Learning spaces in higher education: An under-researched topic. *London Review of Education, 6*(3), 229-241.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125.

Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *The Journal of Higher Education, 68*(6), 599-623.

Tinto, V. (2000). Exploring the role of the college classroom in student departure. In J. M. Braxton (Ed.), *Reworking the student departure puzzle.* (pp. 81-94). Nashville, TN: Vanderbilt University Press.

Tom, J. S., Voss, K., & Scheetz, C. (2008). The space is the message: First assessment of a learning studio. . *Educause Quarterly, 31*(2), 42-52.

Trigwell, K., & Prosser, M. (2004). Development and use of the approaches to teaching inventory. *Educational Psychology Review, 16*(4), 409-424. doi:doi:10.1007/s10648-004-0007-9

Trigwell, K., Prosser, M., & Ginns, P. (2005). Phenomenographic pedagogy and a revised approaches to teaching inventory. *Higher Education Research and Development, 24*, 349–360.

Trigwell, K., Prosser, M., & Waterhouse, F. (1999). Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Education, 37*(1), 57-70.

Ultanir, E. (2012). An epistemological glance at the constructivist approach: Constructivist learning in Dewey, Piaget, and Montessori. *International Journal of Instruction, 5*(2), 95-212.

Umbach, P. D., & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in student learning and engagement. *Research in Higher Education, 46*(2), 153-184.

University of Iowa. (2010). *TILE - Transform, Interact, Learn, Engage.* Retrieved from Information Technology Services: https://its.uiowa.edu/tile

Vacha-Haase, T., & Thompson, B. (2004). How to estimate and interpret various effect sizes. *Journal of Counseling Psychology, 51*(4), 473-481.

Van Horne, S., Murniati, C., Gaffney, J. D., & Jesse, M. (2012). Promoting active learning in technology-infused TILE classrooms at the University of Iowa. *Journal of Learning Spaces, 1*(2), 1-10.

Veltri, S., Banning, J. H., & Davies, T. G. (2006). The community college classroom environment: Student perceptions. *College Student Journal, 40*(3), 517-528.

Vickrey, T., Rosploch, K., Rahmanian, R., Pilarz, M., & Stains, M. (2015). Research-based implementation of peer instruction: A literature review. *CBE—Life Sciences Education, 14*(1).

Vivian, C. (2005). Advising the at-risk college student. *The Educational Forum, 69*(4), 336-351.

Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children, 23*(3), 34-41.

Walker, J. D., & Baepler, P. (2017). Measuring social relations in new classroom spaces: Development and validation of the social context and learning environments (SCALE) survey. *Journal of Learning Spaces, 6*(3), 34-41.

Walker, J. D., Brooks, D. C., & Baepler, P. (2011). Pedagogy and space: Empirical research on new learning environments. *Educause Quarterly, 34*(4), 1-21.

Waycaster, P. (2001). Factors impacting success in community college developmental mathematics courses and subsequent courses. *Community College Journal of Research and Practice, 25*(5/6), 403-416.

Webb, N. M., & Mastergeorge, A. (2003). Promoting effective helping behavior in peer-directed groups. *International Journal of Educational Research, 39*(1-2), 73-97.

Weimer, M. (2013). *Learner-centered teaching: Five key changes to practice.* San Francisco, CA: Jossey-Bass.

White, F. C. (1992). Enhancing class attendance. *NACTA Journal*, 13-15.

Whiteside, A. L., Jorn, L., Duin, A. H., & Fitzgerald, S. (2009). Using the PAIR-up model to evaluate active learning spaces. *Educause Quarterly, 32*(1), 1-18.

Whiteside, A., Brooks, D., & Walker, J. (2010). Making the case for space: Three years of empirical research on learning environments. *Educause Quarterly, 33*(3), 1-18.

Wilmer, E. (2009). The influence of learning communities on the interaction levels of developmental English students. *Inquiry, 14*(1), 55-67.

Wilson, J. H., Ryan, R., & Pugh, J. L. (2010). Professor-Student Rapport Scale predicts student outcomes. *Teaching of Psychology, 37*, 246-251.

Wolfe, R. E., & Poon, J. D. (2015). *Educator Competencies for Personalized, Learner-Centered Teaching.* Boston, MA: Jobs For the Future and the Council of Chief State School Officers.

Wulsin, J. (2013). *Classroom Design - Literature Review.* Princeton, NJ: Princeton University.

Yourstone, S. A., & Tepper, R. J. (2014). Learning studios for introductory accounting. *Decision Sciences Journal Of Innovative Education, 12*(4), 321-338. doi:10.1111/dsji.12042

Zingaro, D., & Porter, L. (2014). Peer instruction in computing: The value of instructor intervention. *Computers & Education, 71*, 87-96.

APPENDICES

Appendix A

Towson University IRB Approval

TOWSON UNIVERSITY

Date: August 9th, 2017

Office of Sponsored Programs and Research

Towson University
8000 York Road
Towson, MD 21252-0001

t. 410 704-2236
f. 410 704-4494

NOTICE OF APPROVAL

TO: Amy Martin ***DEPT:*** EDTL

PROJECT TITLE: *Comparative Analysis of Student Success Indicators of Developmental Students in Learning Studios versus Traditional Classrooms*

SPONSORING AGENCY: N/A

APPROVAL NUMBER: 1705019591

The Institutional Review Board for the Protection of Human Participants has approved the project described above. Approval was based on the descriptive material and procedures you submitted for review. Should any changes be made in your procedures, or if you should encounter any new risks, reactions, injuries, or deaths of persons as participants, you should notify the Board.

A consent form ☑ is required of each participant
☐ is not

Assent ☐ is required of each participant
☑ is not

This protocol was first approved on. August 9th, 2017
This research will be reviewed ***every year*** from the date of first approval.

Elizabeth Katz, Chair
Towson University Institutional Review Board, IRB

APPENDIX B

Howard Community College IRB Approval

HOWARD COMMUNITY COLLEGE
You Can Get There From Here.

10901 Little Patuxent Parkway
Columbia, MD 21044-3197
443-518-1000
TTY/STS Use MD Relay
www.howardcc.edu

Date: July 7, 2017

PI Name: Amy Chase Martin

Study #: HCC-2016-11-17

Study Name: Comparative Analysis of Student Success Indicators of Developmental Students in Learning Studios versus Traditional Classrooms

Date approved: July 7, 2017

Your proposed research study has been approved under an expedited process, and you may use Howard Community College as a site. The objective of this proposed study is to examine the impact of the Learning Studio on the academic performance of developmental reading students. Using a quasi-experimental design, the study will examine various student success indicators in a developmental English course who receive instruction in either a traditional college classroom or an active-learning, flexible classroom – The Learning Studio. Student success indicators will include attendance, AccuPlacer score, final grade and retention of students. Faculty course evaluations, faculty responses to the Approaches for Teaching Inventory, and student perceptions of the learning spaces will also be collected.

Once Towson University has officially approved your application, please send that notification to me along with the stamped and approved consent forms for faculty and students.

If there are any changes to the study protocol you must submit an IRB Change Form to Howard Community College, and get that approved prior to implementing any changes. All data related to this study and informed consent forms should be kept for three years after the completion of this study.

Research is reviewed every year. If you anticipate this project extending beyond 7/7/2018 you should submit an application for Continuation of Research/IRB Renewal four weeks prior to this expiration date. Finally, it is your responsibility to inform the IRB Chair of any adverse consequences to subjects that occur in the course of the study.

Please retain a copy of this notice for your reference, and contact me with questions (slichtinger@howardcc.edu, or 443-518-4289).

Shannon Tinney Lichtinger

Shannon Tinney Lichtinger
Institutional Review Board, Chair
Associate Director of Research and Planning
Planning, Research, and Organizational Development (PROD)

APPENDIX C

ENGL-096 Developmental Reading Course Materials

SYLLABUS FOR ENGL 096, FUNDAMENTALS OF ACADEMIC READING

Summer, Fall 2017

Course description:

ENGL 096 is designed to improve your academic reading skills. In this course, you will develop proficiency in comprehending and interpreting a variety of college-level reading materials. The course emphasis is reading as an interactive process. You will develop an understanding of this process by practicing and mastering various reading strategies. The course meets four hours weekly (two hours of class and two hours of reading lab).

Pre-requisite: Placement is determined by results of the reading placement test or successful completion of ENGL 093.

Co-requisite: FYEX 100, *First Year Experience*

Overall Course Objectives:

Upon completion of this course you will be able to:

1. Evaluate, interpret and synthesize information from a variety of sources including college textbooks, periodicals, literature and electronic media sources.

2. Comprehend the literal meaning across disciplinary texts by identifying the topic, stating the main idea, and locating supporting details.

3. Evaluate and make logical inferences by identifying the author's tone, purpose, point of view and bias.

4. Apply knowledge of metacognition and critical thinking skills as an effective reader and writer.

5. Make connections between reading and writing by finding, using, and referencing specific, relevant textual evidence to support ideas.

6. Demonstrate information literacy skills by locating source information effectively and using it appropriately.

7. Summarize clearly and accurately.

8. Expand vocabulary by using a variety of strategies.

Other Course Information:

This course does not transfer to any four-year college or university.

This course does not count towards graduation requirements.

The grade in this course **does** count in your Quality Point Average.

Attendance

Attendance in ENGL 096 is absolutely necessary for the small-group work you will be doing during class sessions and the one-to-one work in the lab. Students who arrive promptly and remain for the entire session and attend class regularly have the best opportunities to earn the highest grades in this class which values participation and active learning.

Please note that missing more than 25% of class or lab sessions may result in a failing grade for ENGL 096.

Lateness

Class and lab will begin and end promptly. You are expected to be on time and stay for the entire class/lab period. Late arrivals and early departures are not only disruptions to the class, but you will also miss important information if you are not there for the entire class session. Your grade for **3** instances of lateness or early departure will result in an absence.

Cell Phones and other distractions

To establish a positive, respectful learning environment, follow HCC's Code of Conduct. **Turn off your cell phone in class and in lab.** As stated in the Student Handbook, p. 71 "…must disengage or place devices on inaudible signal so as not to disturb or interfere with classroom activities." Also, as stated in the Student Handbook, p. 69, do not use "HCC's computer network and Internet access for other than educational purposes." That means no checking Facebook, banking or shopping. Conduct yourself responsibly, and use your class and lab time for getting work done.

Email Communication

Be sure that you employ the appropriate level of expression in your e-mail messages to me. This includes properly addressing me and identifying yourself, the course you are in,

and the specific issue for which you have a question/comment. Please follow the sample form listed below:

Subject Line: Your name, course, and section number (Ex: John Doe, ENGL 096)

Proper address: Dear Professor _____,

Proper signature: Sincerely, John Doe

Proper e-mail request: Use proper language only!

Please expect at least one to two business days for returned emails and phone calls.

Support Services

- ***HCC Early Alert***

This class is participating in the HCC Early Alert Program. The program is designed to promote student success through coordination and communication between students, instructors, and advisors. If I observe that you are experiencing difficulties (alerts) in the course (attendance issues, low test scores or grades, late/missing assignments or in danger of failing) or if you are doing a great job in the class (kudos), I will send an email message to your HCC email account or a text message to your phone through the Starfish system.

My email message will let you know about my concerns and will recommend that you meet with me and to contact a Retention Specialist (443-518-1320) or your advisor who can work with you to create a success plan.

Since the HCC Early Alert Program provides essential notices by email, a course requirement is that you check your HCC email and Starfish account frequently and respond to communications from me and the advisors. We also ask that you set up your profile on the Starfish account (located on Canvas) and include your cell phone and cell phone carrier so that we can send texts to your phone as well.

- ***Instructor Conferences***

All instructors are available for conferences throughout the semester during office hours. Check with your instructor to make appointments.

- ***Composition and Literature Center (CLC) – Duncan Hall 210***

The CLC is open throughout the week for assistance with all of your ENGL 096 assignments. You may use the lab as a place to work or get help with your English assignments. An English teacher will be there to assist you when the lab is open. Hours are posted outside of DH 210. For more information and hours, go to

http://www.howardcc.edu/academics/academic_divisions/english/resources/students/clc.html

- ***Open Computer Labs – Duncan Hall 110 and CL 129***

Students may use the computers during the hours they are open. The schedules are posted in the labs. For more information and hours of operation, go to

http://www.howardcc.edu/students/helpdesk/help_desk_support/computer_labs.html

- ***Write Room – RCF 340***

The Write Room is located in the Learning Assistance Center, room RCF 340. It is another resource for you when you are completing writing assignments for this or any other course. There, you may review your writing with a writing tutor before you hand it in for a grade. For more information and hours of operation, go to:

http://www.howardcc.edu/students/academic_support_services/lac_and_tutoring/index.html

- ***Student Support Services – RCF 302***

Student Support Services, a federally-funded grant project, provides various services to students including tutoring in reading, writing, and other academic areas, seminars in study skills and career counseling. A reading specialist will be working with students in the program on an individual and small-group basis. See the counselor in Student Support Services (443-518-4276) to enroll in the program.

- ***Disability Support Services – RCF 302***

Important: If you need special accommodations because of a physical or learning disability, please notify Disability Support Services so that arrangements can be made to provide needed services for you. Also, advise your instructor, so you can work together to create a positive learning environment for you and your classmates. More information about Student Support Services and Disability Support Services is available at 443-518-1300 or online at:

http://www.howardcc.edu/students/academic_support_services/disability_support_services/index.html

- ***Personal and Career Counseling – RCF 302***

If you encounter personal or academic problems during the semester, consult the counselors in the Counseling and Career Services Office, or call 443-518-4499 to make an appointment. More information about counseling and career services is available at:
http://www.howardcc.edu/students/counseling_career_services_and_job_assistance/index.html

- ***Tutoring – RCF 340***

Free tutoring is available for this and all other courses offered at HCC. Go to the Learning Assistance Center to sign up for tutoring. More information about tutoring is available at 443-518-4092 or online at:

http://www.howardcc.edu/students/academic_support_services/lac_and_tutoring/index.html

- ***Test Center – RCF 359***

Students, who need extra time to take exams because of documented disabilities, may go to the Test Center. Also, students who miss vocabulary tests along with any unit test may make them up in the Test Center within a week of the original testing. More information is available at 443-518-4257 or online at:

http://www.howardcc.edu/admissions/advising/testcenter/index.html

- ***Wellness Center – CL 178***

The Wellness Center offers a variety of educational materials, hosts educational workshops, plans awareness activities, and provides students with referrals as necessary. Visit the Wellness Center to find out what activities are planned and how to access wellness-related materials. For more information:

http://www.howardcc.edu/students/wellness_center/index.html

- ***Step UP***

Students who volunteer to participate in Step UP are paired with a faculty or staff coach who provides one-on-one support for managing the challenges of college. There are no agendas or set goals; instead, students are encouraged to question, share, and explore ideas with a caring listener. More information about Step UP can be found at:

http://www.howardcc.edu/academics/academic_enrichment/stepup/

Third Try Repeaters Policy

Third Try Developmental Repeaters Policy: Any student who repeats a developmental education course for the third (or more) time(s) will be required to participate in free one-on-one tutoring through the Learning Assistance Center for a minimum of one hour per week.

Academic Honesty

Academic honesty means the use of one's own thoughts and materials in the writing of papers, taking of tests, and other classroom related activities. Students are expected to give full credit if they borrow of others' words or ideas. Intentional or unintentional use of another's words or ideas without acknowledging their use constitutes plagiarism.

There are four common forms of plagiarism:

1. The duplication of an author's words without quotation marks and accurate references or footnotes;
2. The duplication of an author's words or phrases with footnotes or accurate references, but without quotation marks.
3. The use of an author's ideas in paraphrase without accurate references or footnotes.
4. Submitting a paper in which exact words are merely rearranged even though footnoted.

Misrepresentation is the submission of materials for evaluation that are not the student's own.

Unauthorized use of notes, copying from a classmate or peer, using another individual's materials, or use of instructional materials during tests, or quizzes, shall be considered a violation of the Academic Honesty Policy. Any students intentionally aiding another student in any infraction of the academic honesty policy is considered equally guilty.

Penalties

As the college expects academic honesty, procedures for dealing with infractions to the policy are outlined in the Student Handbook.

First Infraction: For the first infraction of the Academic Honesty Policy the faculty member shall give the student a “0” or its equivalent on the paper, examination, or presentation in question. The faculty member will notify the student and explain the reason for the grade. This action could result in a lower final grade. The appropriate division chairperson will be informed of the infraction in writing and the Vice President of Student Services will notify the student in writing of the consequences and implications of this infraction.

Second Infraction: The faculty member shall give the student “0” on the paper, examination, or presentation in question. A second infraction of the Academic Honesty Policy, either in the same course or in another course, will also result in an automatic “F” in the course in which the second infraction occurred. The Vice President of Student Services will meet with the student to discuss the consequences and implications of this infraction.

ENGL 096 - GRADING PLAN

Your grade will be based on the following:

Homework/Classwork = 20%

Diagnostic Quiz

Project/Novel = 25%

Vocabulary = 20%

Exams

Family Unit Exam = 15%

Money Unit Exam = 20%

Your grade will be determined as follows:

A = 90-100%

B = 80-89%

C = 70-79%

*D = 60-69%

F = Below 60%

A “D” or "F" grade will be assigned when all course objectives are not mastered due to student controlled factors such as motivation, effort, attendance or commitment.

An "L" grade will be assigned when all course objectives are not mastered due to the student's learning style.

***IMPORTANT: To be eligible to take the next level English course, you must complete ENGL 096 with a minimum grade of a C.**

<u>Academic Standards Policy</u>

All HCC students are required to adhere to academic standards which require them to make steady progress towards a 2.0 cumulative GPA, a minimum requirement for transfer and graduation, before reaching 41credits.

For additional information:
http://www.howardcc.edu/students/student_handbook/handbook.html

COURSE COMPONENTS

Academic reading is challenging, and improvement requires mastery of skills and lots of practice. An important objective of the course is to ensure that you have opportunities to develop both. The following components will comprise your grade for ENGL 096:

Articles = *(*Homework/ Classwork 20%)

Following the due dates on the calendar, employ the specified reading strategies to help you complete assignments and/or identify, organize, review and learn the important information in the assigned readings.

Project/Novel = 25%

The best thing you can do to improve your reading skills is to establish a routine and read every day. You will find that as you read more, the task will become easier and far more enjoyable. Therefore, the objective for this required reading component is to provide you with an opportunity to read for fun, pleasure, and learning.

As you read the novel you will complete assignments that will require you to relate events in the book with experiences you have had, and to practice key reading skills presented in the textbook. Additionally, there will be a mini research project designed to clarify some concepts that appear as we read, and to give you practice locating and using HCC library information effectively and appropriately. You will research a concept that you would like to learn more about, organize the information, and create a presentation to share what you have learned with your class.

Vocabulary = 20%

One way to improve your reading is to build your vocabulary. As adult learners, the best way to do that is pay attention to new words as you read and to study a set of frequently used vocabulary words.

Vocabulary Exams

There will be **two-vocabulary** unit exams based on assigned words throughout the semester. Each exam will be a combination of multiple-choice items, fill in the blank, and definitions and sentences, using the assigned vocabulary.

Vocabulary Work

Each unit of vocabulary is organized to provide several opportunities for you to learn the assigned words. These exercises will be assigned by your instructor. As you do the exercises, make flash cards, and review the words, you will increase your speaking, listening, reading and writing vocabulary.

You are required to complete all of the assigned exercises, participate in vocabulary groups, and complete other review exercises.

Unit Exams = 35%

Family Unit Exam (15%) – This exam will be used to measure the skills that you have learned in the first unit of the semester.

Money Unit Exam (20%) – This exam will be used as a final exam to measure all the objectives taught during this course.

Late Opening/Early Closing Policy

If the college has a late opening and there is more than 30 minutes of time left in a scheduled class at the late opening time, that class will meet for the remainder of the class time. If the college will be closing early and there will be more than 30 minutes of time available for a scheduled class before the college closes, that class will meet during the available time. Check the HCC homepage for notification at www.howardcc.edu or call 443-518-1000.

If you want to receive notices of college closings and other urgent information via text messaging or e-mail, sign up for HCC's mobile alert system at www.howardcc.edu/alert

Appendix D

Informed Consent Student

HOWARD COMMUNITY COLLEGE
You Can Get There From Here.

10901 Little Patuxent Parkway
Columbia, MD 21044-3197
443-518-1000
TTY/STS Use MD Relay
www.howardcc.edu

August 26, 2017

Dear ENG096 Student,

My name is Amy Chase Martin and I am a doctoral student in the College of Education at Towson University. I am doing a study to learn more about how various classroom designs can affect student learning. The results of this study will help HCC plan the design of future learning spaces and also help me complete my degree.

Your teacher has agreed to participate in this study in order to learn more about how the classroom design and technologies help you learn the material in *this* course. In order for the study to be complete, I am asking ENG096 students to participate as well.

Your name, your teacher's name and other course information is confidential and no names or course section numbers will be reported in the study.

Your participation in this study is valuable and voluntary. If you choose to be part of my study, you will complete a short survey at the end of the semester. The survey will ask questions about how taking ENG096 in this classroom affected your learning. **Your answers to the survey are anonymous.** If you do not choose to be part of the study, your grade in this course will not be affected and you may withdraw from the study at any time.

Your teacher will be compiling student final grades and other course information as part of the study. **This information will be combined with student information from other ENG096 sections. Your name, grades and any other information is confidential. No names, student IDs, course sections or individual grades will be reported in the study. Data collected in this study will be coded and kept in a secure online computing space and any printed materials will be stored in a locked filing cabinet in my office.**

Your participation will make a difference in our understanding of how the design of the classroom can help or hurt student learning.

If you have any questions about my project, you may contact me at (443) 248-4352; my faculty advisor, Dr. Bill Sadera at (410) 704-2731 or HCC's Institutional Review Board at zirvin@howardcc.edu.

Thank you for considering my request. I am happy to share my final report with you and you may request it by emailing me at acmartin@howardcc.edu.

Sincerely,

Amy Chase Martin

I have read this information. I have had a chance to ask questions. I agree to take part in this study.
I will receive a copy of this letter.

Signature of Research Participant _____ ← Date _____

Printed name of Research Participant _____← Date _____

Signature of Investigator _____ Date _____

THIS PROJECT HAS BEEN REVIEWED BY THE INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN PARTICIPANTS AT HOWARD COMMUNITY COLLEGE.

Appendix E

Informed Consent Faculty

HOWARD COMMUNITY COLLEGE
You Can Get There From Here.

10901 Little Patuxent Parkway
Columbia, MD 21044-3197
443-518-1000
TTY/STS Use MD Relay
www.howardcc.edu

INSTRUCTOR CONSENT FORM

Towson University -Information about Research Study

Use of Learning Studios in Developmental Instruction: A Classroom Study

You are invited to participate in a research study about the impact of Learning Studio active-learning classrooms on the student success indicators of developmental English students. In this study, we want to better understand how the classroom atmosphere (e.g., its size, shape, furniture, lighting, acoustics, ambience, arrangement, technology, and comfort) influences student academic performance, attendance and evaluation of the course. Your participation will help us to understand how the classroom space and environment contributes to student success indicators as compared to student success indicators in a traditional classroom. The results will be used to improve classes at HCC and other universities. This study is supervised by Dr. William Sadera, Professor, Department of Educational Technology and Literacy and Program Director, Instructional Technology Ed.D at Towson University. As part of this study, data will be collected on student final grades in the course, student attendance, IDEA course evaluations of the instructor, a survey of your teaching approaches as well as surveys of the students' impressions of the classrooms. It will be conducted and collected by Ms. Amy Chase Martin, an Ed.D. Student in Instructional Technology at Towson University.

What is this study about?

This study is being conducted in order to gather data the impact of instruction conducted in a flexible, active-learning classroom, aka Learning Studio on the student success indicators of developmental students.

What will I be asked to do in this study?

In addition to your normal instruction of the class, you will be asked to keep a complete a survey about your teaching approaches, keep accurate records of your students' attendance, allow the researcher to review your IDEA evaluation scores for the studied course and permit time for your students to complete a questionnaire about the classroom space.

Why is this study important – what good will the results do?

Establishing role of classroom design in the student success indicators for developmental education will inform the design of future spaces. Examination of comparative student success indicators, attendance and other factors that influence student retention and success can provide measurable results for future studies.

Why have I been asked to participate in this study?

Because you are an instructor of ENG096, you are an expert on your students' development in this course and well-versed in the instructional needs for developmental students. You are in a position to help other educators understand your experience with conducting this course in two

distinctly different spaces and provide data that can inform the best decisions about providing learning spaces in the future.

How many people besides me will be in this study?
During the 2016-2017 academic year, there will be 7 other faculty members and approximately 130 students.

How much time will I spend being in this study?
The total amount of out-of-class time spent will be less than one hour. The Spring term is a sixteen week study. The Fall term is a sixteen week study. You may participate in only **one** study term. You are asked to teach your class as normal, recording attendance each class session and making note of students who arrive late or leave early. You will record final grades and report them as you normally would.

Will I be paid for participating in this study?
You will not be paid for being in this study, but you will be provided with a copy of the completed aggregate study data if you request it.

Are there risks (dangers) to me from being in this study?
There are no risks to you or your students. You may withdraw from the study at any time; this is your right as a participant in a research study.

Will being in the study cost me anything?
There will be no cost to you except for your time.

What are the alternatives (my other choices) to being in this study?
Your alternative to being in this study is not to participate in it. Taking part in this study is voluntary – it is your free choice. You may choose not to be a part of it or stop at any time. Leaving the study will not affect your standing at the college in any way.

How will my privacy (confidentiality) be protected?
Several things will be done to protect your privacy. Your information sheet and other identifying information will be kept strictly confidential by giving you a code number on your information sheet to protect your identity. This information will be kept in a password protected folder online and any printed documents will be maintained in a locked cabinet in Ms. Chase-Martin's home office. Once the data is aggregated and identified only by code, all records will be locked in the cabinet or password protected folder and will be destroyed in five years.
The results of this study will be used for Ms. Chase Martin's dissertation and may be published in a professional journal and/or book, but no names or other identifying information will be used. Also, the dissertation and the article and/or subsequent publications will say only that the students in the study came from a midsize, community college in the mid-Atlantic United States.

What are my rights as a participant in this study?
Your decision to be in this study is voluntary. It is your free choice. You may refuse or agree/consent to participate in as many of the parts of the project (survey, data reporting of attendance and students' final grades and IDEA scores) as you wish, and you may change your mind about participating once you start. If you start the study, you can stop at any time and continue teaching your classes, which will not be included in the results of the study. There will be no effect on your relations with Howard Community College.

Who do I call if have questions or problems?
If you have questions about the study at this time, please ask. If you have questions about the study later on, which can be done anonymously, please call me at (443) 248-4352 or contact me:
Amy Chase Martin
Howard Community College
acmartin@howardcc.edu

You may also contact the chair of my dissertation committee, Dr. William Sadera, Professor and Program Director, Instructional Technology Ed.D at the following address: The College of Education, Towson University, 8000 York Rd. Towson University 21252
If you have questions about your rights as a research participant or if you would like to make suggestions or file complaints or concerns, you may call Ms. Zoe Irvin, the Research Compliance Officer at Howard Community College, at 443-518-4742.

I have read this information. I have had a chance to ask questions. I agree to take part in this study.
I will receive a copy of this information.
Signature of Research Participant _____← Date _____
Signature of Investigator _____ Date _____

Appendix F

Sample Accuplacer Reading Comprehension Exam Questions

Sentence Skills

In an ACCUPLACER® placement test, there are 20 Sentence Skills questions of two types.

- The first type consists of sentence-correction questions that require an understanding of sentence structure. These questions ask you to choose the most appropriate word or phrase for the underlined portion of the sentence.
- The second type consists of construction-shift questions. These questions ask that a sentence be rewritten according to the criteria shown while maintaining essentially the same meaning as the original sentence.

Within these two primary categories, the questions are also classified according to the skills being tested. Some questions deal with the logic of the sentence, others with whether or not the answer is a complete sentence, and still others with the relationship between coordination and subordination.

Sentence Skills Sample Questions

Directions for questions 1–11

Select the best version of the underlined part of the sentence. The first choice is the same as the original sentence. If you think the original sentence is best, choose the first answer.

1. Stamp collecting being a hobby that is sometimes used in the schools to teach economics and social studies.
   A. being a hobby that is
   B. is a hobby because it is
   C. which is a hobby
   D. is a hobby
2. Knocked sideways, the statue looked as if it would fall.
   A. Knocked sideways, the statue looked
   B. The statue was knocked sideways, looked
   C. The statue looked knocked sideways
   D. The statue, looking knocked sideways,
3. To walk, biking, and driving are Pat's favorite ways of getting around.
   A. To walk, biking, and driving
   B. Walking, biking, and driving
   C. To walk, biking, and to drive
   D. To walk, to bike, and also driving
4. When you cross the street in the middle of the block, this is an example of jaywalking.
   A. When you cross the street in the middle of the block, this
   B. You cross the street in the middle of the block, this
   C. Crossing the street in the middle of the block
   D. The fact that you cross the street in the middle of the block
5. Walking by the corner the other day, a child, I noticed, was watching for the light to change.
   A. a child, I noticed, was watching
   B. I noticed a child watching
   C. a child was watching, I noticed,
   D. there was, I noticed, a child watching
6. Going back to his old school, everything there looked smaller than Don remembered.
   A. Going back to his old school,
   B. When he went back to his old school,
   C. To go back to his old school,
   D. As he went back to his old school,
7. Painting, drawing and to sculpt are some of the techniques artists such as Picasso used to express themselves.
   A. Painting, drawing and to sculpt
   B. To paint, to draw, and sculpting
   C. Painting, drawing, and sculpting
   D. To paint, draw, and sculpting
8. Playing sports in school which is an activity meant to teach teamwork and leadership skills students can use later in life.
   A. which is an activity
   B. is an activity because it is
   C. being an activity which is
   D. is an activity
9. Glancing at his watch, Daniel picked up his speed.
   A. Glancing at his watch,
   B. He glanced at his watch, and
   C. To glance at his watch,
   D. He glanced at his watch,
10. For a snake, shedding their skin up to eight times a year is part of a natural process.
   A. For a snake, shedding their skin
   B. A snake's shedding its skin

Appendix G

Social Contexts and Learning Environment (SCALE) Survey v.6

University of Minnesota Learning Spaces Research Survey

This survey is part of a study designed to learn more about student perceptions of and experiences in classrooms such as this one. This study is completely voluntary, **anonymous** and will not affect your grade in this class or your relationship with your instructor or the college; survey data will be kept strictly confidential.

ENG096-

← PLEASE ENTER YOUR COURSE AND SECTION NUMBER

Fall 2017

Please fill in the circle with dark pen or pencil.

Correct: ● Incorrect: ✓ ⊗ ◐

Please indicate whether you *Strongly Agree, Agree, Neither Agree nor Disagree, Disagree*, or *Strongly Disagree* with the following statements. (If you do not know the answer to a question, please leave that question blank and go on to the next one.)

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1	I've learned something from my classmates.	❍	❍	❍	❍	❍
2	I can explain my ideas in specific terms.	❍	❍	❍	❍	❍
3	The material covered by the tests and assignments in this class was presented and discussed in class or online.	❍	❍	❍	❍	❍
4	The people sitting near me have learned something from me this semester.	❍	❍	❍	❍	❍
5	The instructor knows my name.	❍	❍	❍	❍	❍
6	My instructor makes class enjoyable.	❍	❍	❍	❍	❍
7	I can clearly explain new concepts I've learned to others in class.	❍	❍	❍	❍	❍
8	The students sitting near me rely on each other for help in learning class material.	❍	❍	❍	❍	❍
9	In general, people sitting near me in class work well together on class assignments, questions, etc.	❍	❍	❍	❍	❍
10	The instructor seems to care about me.	❍	❍	❍	❍	❍
11	My instructor wants me to do well on the tests and assignments in this class.	❍	❍	❍	❍	❍

Please turn over the page and continue the survey.

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
12	The instructor is acquainted with me.	❍	❍	❍	❍	❍
13	I can persuade my classmates why my ideas are relevant to the problems we encounter in this class.	❍	❍	❍	❍	❍
14	I know something personal about the people sitting near me in class.	❍	❍	❍	❍	❍
15	I feel comfortable asking for help from my classmates.	❍	❍	❍	❍	❍
16	I can use the terminology in this class correctly.	❍	❍	❍	❍	❍
17	Sometimes I feel like my instructor and I are on opposing teams in this class.	❍	❍	❍	❍	❍
18	I am acquainted with the instructor.	❍	❍	❍	❍	❍
19	I can explain my thought process from start to finish to others in class.	❍	❍	❍	❍	❍
20	I've spoken informally with the instructor before, during, or after class.	❍	❍	❍	❍	❍
21	I am acquainted with the students sitting near me in class.	❍	❍	❍	❍	❍
22	My instructor encourages questions and comments from students.	❍	❍	❍	❍	❍
23	I can help others in this class learn.	❍	❍	❍	❍	❍
24	During class, I often have a chance to discuss material with some of my classmates.	❍	❍	❍	❍	❍
25	The students sitting near me respect my opinions.	❍	❍	❍	❍	❍
26	Other students pointed out a helpful resource.	❍	❍	❍	❍	❍
27	Other students explained a concept to me.	❍	❍	❍	❍	❍

Appendix H

Approaches to Teaching Inventory (ATI)

Approaches to Teaching Inventory

This inventory is designed to explore various approaches that faculty employ when providing instruction in a specific discipline, course or context. **Please respond to this inventory considering only the context of teaching English 096.**

For each item, please indicate by circling one of the numbers 1-5. The numbers correlate with the following responses:

- **1-** This item is **only rarely true** for me in this course.
- **2-** This item is **sometimes true** for me in this course.
- **3-** This item is **true about half the time** for me in this course.
- **4-** This item is **frequently true** for me in this course.
- **5-** This item is **almost always true** for me in this course.

	1 Only Rarely True	**2**	**3**	**4**	**5 Almost Always True**
1. In this subject, students should focus their study on what I provide them.	**1**	**2**	**3**	**4**	**5**
2. It is important that this subject should be completely described in terms of specific objectives relating to what students have to know for formal assessment items.	**1**	**2**	**3**	**4**	**5**
3. In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying.	**1**	**2**	**3**	**4**	**5**
4. It is important to present a lot of facts to students so that they know what they have to learn for this subject.	**1**	**2**	**3**	**4**	**5**
5. I set aside some teaching time so that the students can discuss, among themselves, the difficulties that they encounter studying this subject.	**1**	**2**	**3**	**4**	**5**
6. In this subject I concentrate in covering the information that might be available from a good textbook.	**1**	**2**	**3**	**4**	**5**
7. I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop.	**1**	**2**	**3**	**4**	**5**
8. In teaching sessions for this subject, I deliberately provoke debate and discussion.	**1**	**2**	**3**	**4**	**5**
9. I structure my teaching in this this subject to help students to pass the formal assessment items.	**1**	**2**	**3**	**4**	**5**
10. I think an important reason for running teaching sessions in this subject is to give students a good set of notes.	**1**	**2**	**3**	**4**	**5**
11. In this subject, I only provide the students with the information they will need to pass the formal assessments.	**1**	**2**	**3**	**4**	**5**
12. I should know the answers to any questions that students may put to me during this subject.	**1**	**2**	**3**	**4**	**5**

	1 Only Rarely True	2	3	4	5 Almost Always True
13. I make available opportunities for students in this subject to discuss their changing understanding of the subject.	1	2	3	4	5
14. It is better for students in this subject to generate their own notes rather than always copy mine.	1	2	3	4	5
15. A lot of teaching time in this subject should be used to question students' ideas.	1	2	3	4	5
16. In this subject, my teaching focuses on the good presentation of information to students.	1	2	3	4	5
17. I see teaching as helping students develop new ways of thinking in this subject.	1	2	3	4	5
18. In teaching this subject, it is important for me to monitor students' changed understanding of the subject matter.	1	2	3	4	5
19. My teaching in this subject focuses on delivering what I know to the students.	1	2	3	4	5
20. Teaching in this subject should help students question their own understanding of the subject matter.	1	2	3	4	5
21. Teaching in this subject should include helping students find their own learning resources.	1	2	3	4	5
22. I present material to enable students to build up an information base in this subject.	1	2	3	4	5

Trigwell and Prosser (2005)

Appendix I

IDEA Diagnostic Feedback Survey

Diagnostic Feedback 2016 Instrument
Sample Student Survey

The Instructor:
Your thoughtful answers to these questions will provide helpful information to your instructor.

Please answer the following for Sample Instructor:
Describe the frequency of your instructor's teaching procedures.

The Instructor:

	Hardly Ever	Occasionally	Sometimes	Frequently	Almost Always
Found ways to help students answer their own questions	○	○	○	○	○
Helped students to interpret subject matter from diverse perspectives (e.g., different cultures, religions, genders, political views)	○	○	○	○	○
Encouraged students to reflect on and evaluate what they have learned	○	○	○	○	○
Demonstrated the importance and significance of the subject matter	○	○	○	○	○
Formed teams or groups to facilitate learning	○	○	○	○	○
Made it clear how each topic fit into the course	○	○	○	○	○
Provided meaningful feedback on students' academic performance	○	○	○	○	○
Stimulated students to intellectual effort beyond that required by most courses	○	○	○	○	○
Encouraged students to use multiple resources (e.g. Internet, library holdings, outside experts) to improve understanding	○	○	○	○	○
Explained course material clearly and concisely	○	○	○	○	○
Related course material to real life situations	○	○	○	○	○
Created opportunities for students to apply course content outside the classroom	○	○	○	○	○
Introduced stimulating ideas about the subject	○	○	○	○	○
Involved students in hands-on projects such as research, case studies, or real life activities	○	○	○	○	○
Inspired students to set and achieve goals which really challenged them	○	○	○	○	○

Diagnostic Feedback 2016 Instrument
Sample Student Survey

The Instructor *(continued)*:

Asked students to share ideas and experiences with others whose backgrounds and viewpoints differ from their own	○	○	○	○	○
Asked students to help each other understand ideas or concepts	○	○	○	○	○
Gave projects, tests, or assignments that required original or creative thinking	○	○	○	○	○
Encouraged student-faculty interaction outside of class (e.g., office visits, phone calls, email)	○	○	○	○	○

Progress On:

Thirteen possible learning objectives are listed, not all of which will be relevant in this class. Describe the amount of progress you made on each (even those not emphasized in this class) by using the following scale:

- No Apparent Progress
- Slight Progress; I made small gains on this objective
- Moderate Progress; I made some gains on this objective
- Substantial Progress; I made large gains on this objective
- Exceptional Progress; I made outstanding gains on this objective

Please answer the following for Sample Instructor:
Describe your progress on:

	No Apparent Progress	Slight Progress	Moderate Progress	Substantial Progress	Exceptional Progress
Gaining a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories)	○	○	○	○	○
Developing knowledge and understanding of diverse perspectives, global awareness, or other cultures	○	○	○	○	○
Learning to *apply* course material (to improve thinking, problem solving, and decisions)	○	○	○	○	○
Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course	○	○	○	○	○
Acquiring skills in working with others as a member of a team	○	○	○	○	○

Diagnostic Feedback 2016 Instrument
Sample Student Survey

Progress On *(continued)*:

Developing creative capacities (inventing; designing; writing; performing in art, music, drama, etc.)	○	○	○	○	○
Gaining a broader understanding and appreciation of intellectual/cultural activity (music, science, literature, etc.)	○	○	○	○	○
Developing skill in expressing myself orally or in writing	○	○	○	○	○
Learning how to find, evaluate, and use resources to explore a topic in depth	○	○	○	○	○
Developing ethical reasoning and/or ethical decision making	○	○	○	○	○
Learning to *analyze* and *critically evaluate* ideas, arguments, and points of view.	○	○	○	○	○
Learning to apply knowledge and skills to benefit others or serve the public good.	○	○	○	○	○
Learning appropriate methods for collecting, analyzing, and interpreting numerical information	○	○	○	○	○

Please answer the following for Sample Instructor:
On the next two items, compare this course with others you have taken at this institution.

The Course:

	Much Less than Most Courses	Less than Most Courses	About Average	More than Most Courses	Much More than Most Courses
Amount of coursework	○	○	○	○	○
Difficulty of subject matter	○	○	○	○	○

Diagnostic Feedback 2016 Instrument

Sample Student Survey

Please answer the following for Sample Instructor:

For the following items, choose the option that best corresponds to your judgement.

	Definitely False	More False than True	In Between	More True than False	Definitely True
As a rule, I put forth more effort than other students on academic work.	○	○	○	○	○
I really wanted to take this course regardless of who taught it.	○	○	○	○	○
When this course began I believed I could master its content.	○	○	○	○	○
My background prepared me well for this course's requirements.	○	○	○	○	○
Overall, I rate this instructor an excellent teacher.	○	○	○	○	○
Overall, I rate this course as excellent.	○	○	○	○	○

Please answer the following for Sample Instructor:

Comments

- End of Survey -

APPENDIX J

Effect Sizes for Measured Variables

Effect sizes for each variable were calculated to measure the size of the difference between the two groups. Effect sizes were calculated using the method appropriate for the type of variable and the statistical test being measured and are reported here.

Independent *t*-test

Table	Variable	*n*	*d*	*p*
8	Attendance	135	.18	.30
9	Grades	123	.105	.56

Note. *$p < .05$

Table	Variable	*n*	*r*	*p*
13	Student-student relations	115	.34	.000*
13	Student-Instructor Formal	115	.25	.008*
13	Student-Instructor Informal	115	.25	.008*
13	Student as Instructor	115	.30	.001*
13	Total SCALE Score	115	.36	.000*

Note. *$p < .05$

Chi-square

Table	Variable	*n*	Cramer's v	*p*
10	Drop	135	.07	.42
11	Persistence	135	.15	

Note: *$p < .05$

Mann-Whitney

Table	Variable	*n*	*d*	*p*
12	Objective 1	82	.93	.06
12	Objective 2	82	.94	.06
12	Objective 3	82	.82	.11
12	Objective 8	82	.78	.47
12	Objective 9	82	.81	.17
12	Objective 11	82	.90	.04*
12	Total for Objectives	82	.76	.04*

Note. *$p < .05$

CURRICULUM VITAE

Amy Chase Martin

[redacted]

Program of Study: Instructional Technology

EDUCATION:

April 2019	Doctorate of Education –Instructional Technology Focus: Learning Spaces
	Towson University, Towson, MD
May 2007	Master of Education – Instructional Technology
	Towson University, Towson, MD
May 1988	Bachelor of Science – Writing for Television, Radio and Film
	Syracuse University, Syracuse, NY

EMPLOYMENT:

July 2014 – present	Director of Faculty Development and Instructional Media Howard Community College, Columbia, MD
August 2011- July 2014	Director of AV and Instructional Media Howard Community College, Columbia, MD
August 2009 - July 2011	Clinical Instructor – College of Education Towson University, Towson, MD
August 2007 – August 2009	Manager of Teaching and Learning Services Towson University, Towson, MD

AWARDS:

2014	Administrator of the Year Howard Community College

PRESENTATIONS: *representative*

Long, M. & Martin, A.C. (2018, January) Cookie rubrics at the county fair. Presentation for AFACCT Conference. Catonsville, MD January 12, 2018

Martin, A.C. & Galloway, J. (2018, January) Escape this workshop! Using escape rooms in instruction and professional development. Presentation for AFACCT Conference. Catonsville, MD.

Martin, AC. & Macaulay, L. (2017, February) Are you flexible enough for a flexible classroom? Strategies and successes for adapting your instruction. Presentation for Lancaster Learns Conference. Elizabethtown, PA.

Martin, A.C. & Yerrid, B. (2016, June) The flexible classroom - After the break-up (Starting again with student-centered instruction). Presentation for UB Tech Conference, Las Vegas, NV.

Martin, A.C. & Yerrid, B. (2015, June) The flexible classroom - A love story. Presentation for UB Tech Conference, Orlando, FL.

Kenton, J.; Crisp, E. & Martin, A.C. (2012, March) Developing effective professional development spaces, real and virtual, for college of education faculty. Presentation for SITE (Society for Technology and Teacher Education), Austin, TX.

Sadera, B. & Martin, A.C. (2011, March) Using technological pedagogical content knowledge as a framework for video case analysis and teacher technology preparation. Presentation for SITE (Society for Technology and Teacher Education), Nashville, TN