THE IMPACT OF EXTRACURRICULAR ACTIVITIES AND ATTENDANCE ON STUDENT ACHIEVEMENT AT A MISSISSIPPI COMMUNITY COLLEGE

by Amanda Hyde Marbury

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APPROVED BY:

DJ Mattson, Ed. D., Committee Chair
Michelle Jones Barthlow, Ed. D., Committee Member
ABSTRACT

The purpose of this quantitative study was to determine the impact of extracurricular activities and class attendance on student achievement in science courses at a Mississippi community college. Public colleges are dependent on state funding for survival, with one main criterion for determining that funding being the number of students enrolled. Students need to be successful in courses to keep up the retention and enrollment rates. Student success is potentially linked to class attendance and student involvement in extracurricular activities. Schools need to look at factors that might be affecting students’ performance in the classroom such as participation in extracurricular activities. There is little research on the effects of extracurricular activities on college students, and a gap in the literature exists on the effects of student achievement in science courses. This quantitative study used a casual-comparative and predictive correlational design to determine the impact of extracurricular activities and class attendance on success by using archived academic records. The researcher used two different independent $t$ tests and multiple linear regression to analyze the data. The science course grade was used as the dependent variable and science course class attendance and extracurricular activity participation were used as the independent variables. Additionally, the data were analyzed with science course grades as the criterion variable, while science course attendance and extracurricular participation were used as predictor variables. It was determined that there was no statistically significant difference in student achievement among students that participated in extracurricular activities and those that did not participate. However, it was determined that class attendance could successfully predict student science scores.

*Keywords:* Extracurricular activities, community college, attendance, student achievement, science course grades
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List of Abbreviations

Average Daily Attendance (ADA)
Dependent Variable (DV)
Grade Point Average (GPA)
Independent Variable (IV)
National Collegiate Athletic Association (NCAA)
National Junior College Athletic Association (NJCAA)
Predicted Values (PRE_1)
Scholastic Assessment Test (SAT)
Science, Technology, Engineering, and Mathematics (STEM)
Studentized Residuals (SRE_1)
Variance Inflation Factor (VIF)
CHAPTER ONE: INTRODUCTION

Overview

Chapter One will build a foundation of background knowledge on student involvement in extracurricular activities and student attendance and the impact these factors may have on student achievement in science courses. This chapter will give a background on the historical and theoretical context of extracurricular activities in community colleges and those students that participate in these activities. This chapter will also discuss the gap in the literature and the need for more research that the impact of extracurricular activities and attendance may have on student achievement in science courses. Chapter One will focus on determining why this is a significant problem in education and what research is still missing to help determine the link between student achievement and student involvement in extracurricular activities. Finally, this chapter will include the research questions as well as definitions that are important to this study.

Background

Students that participate in extracurricular activities during college may have increased outcomes after college (Kim & Bastedo, 2017); however, a question remains regarding the benefits of participation in extracurricular activities while students are enrolled in college. In high schools, extracurricular activities have been shown to increase student attendance, and in some cases increase student achievement (Shaffer, 2019), but there is little research as to how extracurricular activities affect attendance at the college level. States around the country are gaining funding based on both average daily attendance (ADA) as well as student achievement, which have colleges interested in increasing both to help with funding (Kreisman & Steinberg, 2019).
In the past decade, there has been an increase in government interest in higher education, specifically in community colleges. Most community colleges have a variety of ways in which they receive funding, including state mandates and tuition from student enrollment. Recently many states have been cutting the budget for community colleges. This means that community colleges must place more financial emphasis on tuition rates, and specifically enrollment numbers (Kelchen, 2019). Community colleges are also having to depend on crowdsourcing for some immediate income for use directly for the institution (Gearhart, Smith, & Miller, 2019). Some states, such as Texas and Louisiana, have even implemented performance-based funding for community colleges (Hu, 2019; McKinney & Hagedorn, 2017).

Since more colleges are focusing on tuition rates, institutions need to focus on enrollment and retention rates to achieve full financial funding (Kreisman & Steinberg, 2019). One way to do this is to examine how students are performing in classes at that specific institution and factors that might affect student performance, such as student involvement in extracurricular activities. Extracurricular activities have been part of American higher education institutions such as community colleges for years and have a deep-rooted historical, and theoretical context in education.

**Historical and Social Context**

Extracurricular activities have been a part of colleges in the United States since the 19th century (Massoni, 2011). These early extracurricular activities originally started as literacy clubs and then moved onto other activities such as sororities and fraternities. Soon after the establishment of literacy clubs and social clubs, athletic clubs were established. Extracurricular sports first started as intramural sports among students, until college officials stepped in to make sports safer (College Athletics, n.d.).
Sporting events and student involvement in activities have increased at the turn of each century. With more student involvement in sports comes more economic effects on colleges in the United States. Since schools began experiencing financial gain from sports, a governing body was established in order to ensure there were equitable resources for each school. The National Collegiate Athletic Association (NCAA) was established in 1910 to regulate and oversee college athletics. The National Junior College Athletic Association (NJCAA) was established in 1938 to help give athletic opportunities to Junior and Community colleges (History of the NJCAA, n.d.). In 2017 the NCAA had a revenue of over $1 billion (Where Does the Money Go, 2019). Not only does the NCAA help with money distribution for colleges, they also determine the eligibility of student-athletes.

According to the NCAA, the average Division I school has 6% of students participating in athletics (Play Division I Sports, 2018). During the school year 2016-2017, NJCAA reported a total of 36,411 male athletes and 22,785 female athletes with a total of 3,428 teams (History of the NJCAA, n.d.). Currently, for students to be eligible to play college sports, they must maintain at least a 2.3 grade point average (GPA) and be enrolled in a variety of classes as outlined by the NCAA (Play Division I Sports, 2018). This is an important consideration for schools, as they need to help their student-athletes maintain the grade point average requirements to remain eligible to participate.

Sports are not the only extracurricular activities offered at the college level. Most schools offer academic or social clubs in which students may participate. According to Sadker and Zittleman (2010), one in four students participate in academic clubs on college campuses. These include a variety of activities, such as student government, religious groups, social groups, newspapers, honor societies, music, art, and drama. These activities may have a wide variety of
positive effects on students, such as better behavior, higher grades, increased graduation rates, and social aspects (Kulp, Pascale, & Grandstaff, 2019). Some activities, such as band and student-run newspapers, do not have academic requirements for their participants, while activities such as the National Honor Society do have academic requirements (Tenhouse, n.d.). Many students find purpose in extracurricular activities and as a result are more motivated to do well in school. In fact, some colleges are making participation in extracurricular activities a requirement for admission (Russell, 2014).

Research has shown that approximately half of all students enrolled in community colleges need some form of remediation classes in mathematics, and a third of students need to take remediation courses to help with reading skills (Foshee, Elliott, & Atkinson, 2016). Historically, students that enroll in a community college have a low completion rate for associate degrees and/or a low transfer rate to a four-year institution (Monaghan & Attewell, 2015). Typically, students that attend community colleges have diverse backgrounds such as age, race, and socioeconomic status (Pena & Rhoads, 2019). With the diverse student population, community colleges continually examine ways to make sure all students are achieving. The historical aspect regarding the effect of extracurricular activities in higher education institutions may provide further insight into what the future may look like for students involved in these activities.

**Theoretical Context**

Astin’s student involvement theory (1999) describes factors that are part of college environments that may affect student performance in the classroom and their viewpoints while in college. The student involvement theory has a significant impact on three pedagogical theories: subject-matter theory, resource theory, and individualized (eclectic) theory. These three
pedagogical theories help to provide a link between student outcomes achieved and student outcomes theorized to achieve. The student involvement theory may be used to help college administrators and faculty design effective learning environments for students of all learning levels. Astin describes involvement as the amount of energy, both physical and psychological, that a student uses during their academic experience. According to Astin, a student that is highly involved spends a significant amount of energy studying, or spends time on campus participating in student organizations and interacting with faculty members and other students. The involvement theory has both quantitative and qualitative aspects, and the amount of student learning is directly related to the quality and quantity of student involvement in an educational program.

The most important institutional resource that affects student achievement and college success is student time. College administrators and faculty need to recognize that all institutional policies may affect how students spend time and effort in their educational endeavors (Astin, 1999). Students need to learn how to balance their time between the social and educational aspects of college life. Colleges need to take into consideration how students use their time in both academics and extracurricular activities, as well as how that time can affect student achievement inside the classroom. This in turn would impact student enrollment and therefore, college funding.

**Problem Statement**

Previous research studies have noted a relationship between student involvement in extracurricular activities and student achievement in school settings; however, these studies were conducted mainly at the primary, middle, or high school level (Lee & Lee, 2017; Im, Hughes, Cao, & Kwok, 2016; Schwartz, Cappella, & Seidman, 2015). In addition, most studies on student
involvement and achievement were conducted in English or mathematics courses; not in science courses (Schuepbach, 2015). Studies have shown that students who participate in extracurricular activities in high school are more successful in college (Palmer, Elliott, & Cheatham, 2017). There have also been studies that have shown attendance in classes at the college level over four years of undergraduate work have been linked to achievement in lecture-based courses (Nordmann, Calder, Bishop, Irwin, & Comber, 2019). However, there is a need for college students, specifically athletes, to be supported in multiple ways both inside and outside the classroom to help with academic achievement (Munoz-Bullon, Sanchez-Bueno, & Vos-Saz, 2017). As of this writing, there were no research studies that related attendance in lecture classes in a college setting to participation in extracurricular activities and their effect on student achievement in science courses.

According to research conducted by the American Academy of Sleep Medicine in 2017, 62.4% of college students participated in some form of extracurricular activity. Extracurricular activities offered at colleges do have an impact on student enrollment, which may in turn impact an institution’s overall funds (Gibbs, Erickson, Dufur, & Miles, 2014). With a high percentage of students participating in extracurricular activities, colleges need to know how student involvement is affecting student achievement, as it may directly affect the institution’s enrollment, retention, and funding.

Achievement in all courses is important for community college students so they can keep their full-time enrollment status, assuming they take the required amount of hours needed. If students are not performing well, they will not get credit for the course, which could cause students to drop out of college, which in turn would decrease the institution's retention and enrollment numbers (Southern Association of Colleges and Schools Commission on Colleges,
student enrollment rates drop, funding for the institution can also drop (D’Amico, Morgan, Katsinas, Adair, & Miller, 2017). Therefore, there is a need for further research to help mitigate the problem.

Student achievement in science courses is important to students for different reasons, depending on their major of choice. Students that choose a science-specific major, such as biology or environmental science, need to get credit for their science course to move on and graduate with their chosen degree. For students that are not majoring in science, most community colleges require students to take a science course as determined by the college’s accreditation board (Accrediting Standards, n.d.). When students do not get the needed course credit, they may fail to graduate on time, which affects not only the retention rate but also funding for the school.

When it comes to student achievement in science courses, non-science major students need to have conversational knowledge about science because science is an integral part of daily life. Science has become increasingly important as society has advanced. With the advancement of medicine and technology, more science courses are being offered and taken by college students (Orzel, 2015). The problem is the literature has not addressed the effects of student participation in extracurricular activities and class attendance on student achievement in science courses at the community college level, which may affect funding for institutions.

**Purpose Statement**

The purpose of this quantitative causal-comparative and correlational study was to explore the effects of extracurricular activities and class attendance on science achievement scores in a population of community college students. The independent variables were involvement in extracurricular activities, type of activities (sports), and attendance in lecture courses. Attendance in lectures was measured by the total days present in the course. The
dependent variable was student achievement in science courses, which was measured by the end of course percentage grade for Principles of Biology I. The population for this study included traditional full-time students enrolled in a science course at a Mississippi community college.

**Significance of the Study**

There is currently a gap in the literature when it comes to science achievement scores in community colleges and the effect of participation in extracurricular activities and class attendance. There have been several studies conducted over the years as to how participation in extracurricular activities affects student achievement at the K-12 level. For example, Schuepbach (2015) conducted a study comparing the mathematics scores of first-, second-, and third-grade students that participated in extracurricular activities with those that did not participate in extracurricular activities. Schuepbach concluded that there was a positive effect on mathematic scores in students that participated in extracurricular activities. Im, Hughes, Cao, and Kwok (2016) conducted a study that compared the effect of participation in middle school extracurricular activities on student achievement, as measured by letter grades. The researchers concluded that participating in an extracurricular activity could predict student letter grades in grades seven, eight, and nine. There is currently no research studies on how participation in extracurricular activities affects student achievement of any kind in higher education.

Research has shown that regular attendance in college courses is a better predictor of student achievement than standardized testing scores such as the SAT (Carroll & St. Peter, 2017). Some studies have shown that attendance in classes at a community college can predict the enrollment of students in graduate and professional schools, as well as the completion of those programs (Wang, Lee, & Wickersham, 2019). As of this writing, no research studies have been conducted that examined both attendance in class at community colleges and participation
in extracurricular activities as predictors for student achievement scores. This study will add to the literature when using these two predictors for student achievement in a community college science course.

This study is important because it seeks to determine if community college students that participate in extracurricular activities have higher achievement in science courses than students that do not participate in extracurricular activities. It could also determine if community college students that participate in athletics have higher achievement in science courses than students that participate in other extracurricular activities such as band or social clubs. If there is a significant difference in the two groups, then community colleges may have or may wish to develop a program that may be implemented to help increase student achievement in those students that perform at a lower rate. This in turn may increase student retention and enrollment and therefore could increase funding for the school.

Research has shown that there is a positive influence between student achievement and student participation in extracurricular activities in K-12 schools. There is also research showing that regular attendance may be associated with higher student achievement in middle and high schools (Maxwell, 2016); however, more research needs to be conducted to examine if participation in extracurricular activities and class attendance plays a role in student achievement at the community college level.

**Research Questions**

**RQ1:** Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in extracurricular activities and students that do not participate in extracurricular activities?
**RQ2:** Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in varsity sports and students who do not participate in varsity sports?

**RQ3:** How accurately can Principles of Biology 1 achievement scores of community college students be predicted from a linear combination of attendance in science class and participation in extracurricular activities?

### Definitions

1. *Extracurricular activities* – Extracurricular activities are activities students partake in not during school hours, such as sports, music, and clubs (Im, et al., 2016).

2. *Final course grades* – Grades that are recorded at the end of the semester and become part of a student’s permanent record (Academic Policies, 2020).

3. *Full-time student* – A full-time student is enrolled in a minimum of 12 hours per semester in many universities or colleges (Klempin, 2014).

4. *Grade Point Average (GPA)* – A grade point average is the average of all the cumulative grades a student has earned throughout their college career (Sellman, 2018).

5. *National Collegiate Athletic Association (NCAA)* – The National Collegiate Athletic Association is an organization that governs most universities in the United States. It helps to make and enforce rules set to ensure the well-being of a student-athlete (Busby, 2011).


7. *Student-athlete* – A student-athlete is a student who partakes in both athletics and academics (Bukowski, 2013).
8. *Student involvement* – Student involvement is the amount of energy students put into activities that are part of their academic experience (Astin, 1999).

9. *Traditional student* – A student that is under the age of 24 and enrolls full time in a higher education institution directly after high school (National Center of Education Statistics, n.d.).

10. *Varsity sports* – Sports that are competing with other community colleges and are held to all standards provided by NJCAA; for the community college in this study, this includes: Baseball, Men and Women’s Basketball, Men’s Football, Men’s Golf, Men and Women’s Soccer, Softball, Men and Women’s Tennis, and Men and Women’s Track and Field (Athletics, n.d.)
CHAPTER TWO: LITERATURE REVIEW

Overview

The literature that currently exists on student achievement, class attendance, and student participation in extracurricular activities shows that in a majority of cases and instances, students that participate in extracurricular activities have higher achievement. Chapter Two will discuss an overview of the literature and research pertaining to student achievement, class attendance, and extracurricular activities with a focus in higher education. The first section of Chapter Two will discuss the theoretical framework as it relates to student involvement and academic achievement in higher education by discussing the student involvement theory. The second section in this chapter will combine the related literature that discusses extracurricular activities, funding and enrollment in community colleges, attendance and student achievement, class attendance in college, student motivation, and science course achievement in community colleges. This information is important because it will allow for an understanding of how student achievement, class attendance, and extracurricular activities are related to the research. Finally, the chapter will discuss the gap in the literature and the need for more research as it relates to student participation in extracurricular activities and academic achievement in higher education.

Theoretical Framework

The student involvement theory lays the groundwork and is the foundation upon which this study is based. Alexander Astin (1999) developed the theory, in which he described a student’s development and achievement in higher education based on the student’s involvement within the institution of higher learning. Astin stated, “Student involvement refers to the amount of physical and psychological energy that the student devotes to the academic experience” (p. 518). This implies that a student that is highly involved devotes a great amount of energy to
studying academics and spending time on other campus activities. An uninvolved student spends little time on campus and is involved in few, if any, extracurricular activities. Milem and Berger (1997) noted that factors that lead to students departing from college may be associated with their noninvolvement, according to the student involvement theory. Being involved is very much an active form of behavior as it relates to the theory of student involvement. The student involvement theory also has an impact on several pedagogical theories: subject-matter theory, resource theory, and individualized theory. Students themselves play a key role in the student involvement theory, along with higher education institutions and the faculty and staff at those institutions.

**Student Involvement Theory**

Student involvement theory affects education as a whole, not just the student. There are five major postulates that Astin (1999) defined as part of the student involvement theory. The first one is that involvement must have a physical and psychological aspect in the exertion of energy into various objects or activities. Second, involvement is a continuous process and a student can have different amounts of involvement towards the same object over a period of different times. Next, there are both quantitative and qualitative aspects of the student involvement theory. One can measure how long a student spends being involved with a certain activity, such as how long a student spends studying a certain subject. One can also determine qualitatively if a student puts effort and quality into the involvement, such as comprehending reading a textbook for a specific class. Astin described the fourth postulate as, “The amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program” (p. 519). This means that for a college program to be successful, students need to be involved in that program.
The last postulate, as noted by Milem and Berger (1997), is that for an educational program or policy to be effective and successful, it has to increase and maintain active student involvement. Therefore, a successful educational program needs to have policies that ensure students, as well as faculty and staff, remain involved. Overall, for an educational program to be successful, it needs to ensure that students have an intentional involvement within the program.

**Impact of Student Involvement Theory on Pedagogical Theories**

Astin (1999) discussed three important pedagogical theories and how they are affected by and expand upon the student involvement theory. These theories are the subject-matter theory, the resource theory, and the individualized theory. According to Astin, these three theories provide a link between the learning outcomes students achieve and learning outcomes that college professors might desire students to achieve.

**Subject-Matter Theory.** According to the subject-matter theory, the amount and quality of student learning are directly dependent upon students being exposed to the subject that interests them the most. The subject-matter theory suggests that students learn best by attending lectures, completing class assignments, and working with other students in the class (Astin, 1999). Students will not be successful in classes if they do not get involved with the subject matter of the class. If students take a passive role in learning material for a class, they will not be successful in learning class material. Soffer and Yaron (2017) concluded that students that are more involved in learning, especially with tablets, will not only achieve greater but also have positive attitudes towards learning. Since professors are somewhat of an expert in their field of teaching, they need to be able to pass on that information in such a way that students can receive and understand it and be successful. Students need to interact with the material by attending lecture classes and participating in assignments (Astin, 1999).
Corkin, Horn, and Pattison (2017) conducted a study in biology classes at a large U.S. public college to see if student involvement in class would affect motivation and achievement. The researchers found that when students were using active learning strategies in class they reported that the class was more interesting, the teacher supported the learner more often, and students reported that they had a better understanding of the class material. In classrooms with active learning, one might find opportunities for students to problem-solve, achieve deeper learning opportunities through in-class activities, and collaborate with fellow students (Carrasco, Behling, & Lopez, 2018). Overall, a meta-analysis concluded that active learning increased students’ course grades, which would be explained by the subject-matter theory.

Diving deeper into the active-learning atmosphere of undergraduate biology classes, Cleveland, Olimpo, and DeChenne-Peters (2017) conducted a study using two different types of active learning: graphic organizers/worksheets, and clicker-based activities. In the quasi-experimental model, the researchers used two different classes and collected quantitative data to determine which type of active learning had a greater impact on students’ attitudes, motivation, and understanding of biology. Cleveland, Olimpo, and DeChenne-Peters determined that graphic organizers/worksheets had a significant effect on students’ enjoyment of biology and their ability to make connections with the real world. There were no significant differences in the two types of active learning activities and students’ understanding of class material or motivation. This study suggests that student involvement with subject matter leads to student success.

**Resource Theory.** The resource theory focuses on resources allocated to increase student learning. These resources could include anything from physical facilities, to human resources, to manipulatives for classroom use. When it comes to human resources there are aspects of teachers and colleges that could play a role in student achievement and involvement in classes and school
programs. Two examples would be student-teacher ratio and “high-quality” professors. Research suggests that a lower student-to-teacher ratio will increase student achievement in the classroom. For example, Koc and Celik (2015) conducted a study at several schools and examined student-teacher ratio as it related to student achievement on standardized tests. They concluded that schools that have a lower student-teacher ratio have students that had higher achievement on standardized tests, regardless of location.

Highly qualified teachers can also be a resource that affects student involvement and achievement in the classroom. A highly qualified teacher is measured by level of education, years of experience, or other measures that add value to a teacher (Kalogrides & Loeb, 2013). A study conducted by Lee (2018) determined that if students are consistently taught by high-performing and qualified teachers, they have a greater chance of having both long-term and short-term success throughout their educational career. This also applies to science teachers and other teachers in the STEM field. Lee and Mamerow (2019) found that students with multiple highly qualified teachers performed better in school. This suggests that institutions need to focus on hiring highly qualified teachers to increase student achievement.

Astin (1999) described high achieving students as an important resource for colleges to have and spend time and money on. Astin stated, “…large numbers of such students on the campus enhance the quality of the learning environment for all students” (p. 521). Having these high-achieving students on campus will attract other high-achieving students and thus lead to an increase in overall student body achievement (van der Meer, Wass, Scott, & Kokaua, 2017). Colleges recognize the importance of these high achieving students and routinely award these students incentives such as scholarships for attending their school. In a study conducted by van der Meer, et al. (2017), results indicated that front-loading resources not only helped to attract
high achieving students, but it also helped them achieve as well as increase their retention rates and complete their degrees. These studies suggest that having resources allocated for student involvement may lead to an increase in student learning and achievement.

**Individualized Theory.** Focusing on the individual student can help benefit student involvement. Taking an individualized approach to education means one has a one-way approach for teaching students in the classroom or even one way to allocate resources in a way that benefits all students. The individualized theory says that no one method is going to help all students, so an individualized approach to curriculum is best in order to achieve learning gains in students (Astin, 1999). In the college format, elective courses play a bigger role in the individualized theory of higher education as part of the involvement theory. Having self-paced courses are one way to help students individualize their own educational plan (Lim, 2016).

A study conducted by Hibbard, Sung, and Wells (2016) examined a semi-self-paced chemistry class in a four-year college. The researchers determined that having students complete the course at a semi-self-pace led to students achieving higher scores on a standardized test when compared to students that completed the course in a traditional format. The semi-self-paced course also led to an increase in student perceptions of semi-self-paced classes, as well as an increase in student motivation.

Lin, Kwon, and Zhang (2019) conducted a study that examined a fully online, self-paced high school and determined that students had higher achievement when they were among peers that were also in a self-paced high school. The aspect of individualized theory as part of the involvement theory may lead to an increase in student achievement and be the reason for an increase in achievement in self-paced classes.
Students’ Role in Involvement Theory

Student involvement theory impacts overall student actions, with the main players in the student involvement theory being the students themselves. The student involvement theory depends on student actions and how students interact with their environment. Each student that comes to a college is going to have a wide variety of differences while they take classes. These differences are going to impact how students act and therefore achieve during their time at college. This was demonstrated through a study conducted by Boelens, Voet, and De Wever (2018) in which the researchers looked at the effect of diversity on student achievement through a blending learning environment. With diversity in the background comes diversity in the use of time in higher education.

Time is a valuable resource and is an important aspect of the student involvement theory (Astin, 1999). Astin noted, “The most precious institutional resource may be student time” (p. 522). According to the student involvement theory, the extent to which students achieve their goals is directly related to the amount of time and the value of the effort that students devote to their studies and activities. In a study conducted by Thibodeaux, Deutsch, Kitsantas, and Winsler (2017), the researchers determined that first-year college students spend less time on academics than they do on socializing during their first semester in college. The researchers also found that the longer students were enrolled in college, the longer they devoted time to school work. Thibodeaux et al. (2017) also identified that the use of time for academics was related to students' higher self-regulated learning, as well as higher grade point average (GPA). This is also true for students that have a specific learning disability, as noted by Barrett, Stevenson, and Burns (2020). Colleges and educational institutions are in direct competition for students’ time.
Higher education administrators need to think about how students’ use of time should have an impact on all policies and procedures, not just students’ time for academics.

Another aspect of students that affects their academic achievement through the student involvement theory is the student's place of residence (Astin, 1999). A study conducted by Simpson and Burnett (2017) determined that the amount of time and energy students put into their overall academic experience relates directly to student success regardless of their housing residence. However, students that live on campus experience some benefits when it comes to student involvement. For example, Graham, Hurtado, and Gonyea (2018) concluded there are some benefits that students have that live on campus over those that live off-campus. These benefits included collaborative learning, discussions with diverse people, student-faculty interaction, quality of interactions, supportive environment, time spent preparing for class, and perceived co-curricular gains. Lopez, Turley, and Wodtke (2010) conducted a study that specifically examined African-American students who lived on campus, and concluded they had higher GPAs than similar students who lived off-campus. Higher learning institutions should try to help close the gap with student achievement differences based on residence during the students’ college experience.

**Related Literature**

The following section will provide information on extracurricular activities and their effect on students in higher education. This literature will reveal that there is often a positive link between student participation in extracurricular activities and academic achievement. It will discuss the background and types of extracurricular activities, students that participate in extracurricular activities, and special resources students might have because they participate in extracurricular activities. This section will then discuss funding and enrollment in community
Extracurricular activities have been a part of higher education in the United States since the 19th century (Massoni, 2011). There is a wide variety of extracurricular activities currently in higher education, such as social clubs, academic clubs, religious clubs, arts or drama clubs, and sports, both intramural and intercollegiate. Studies have shown that when students participate in extracurricular activities during their time in higher education, it can lead to both social and personal growth that lasts even after students leave those institutions (Palmer, Elliott, & Cheatham, 2017). Even though most higher education institutions do not devote a lot of time or money to students participating in these activities, research has revealed an increase in students’ interpersonal skills, academic achievement, and interactions with others when students participate in extracurricular activities (Ewing, Bruce, & Ricketts, 2009; Morris, 2016; Retallick & Pate, 2009; Rubin, Bommer, & Baldwin, 2002).

More than three-fourths of students in U.S. schools participate in some form of extracurricular activity, according to Gibbs, Erickson, Dufur, and Miles (2015). In a study conducted by Gibbs et al., of the students that participated in extracurricular activities, 49% participated in sports, 30% participated in some sort of performance activity, 27% participated in academic activities, and 16% participated in school leadership activities. Students that participate
in extracurricular activities have been found to exhibit more self-confidence, are committed to school values, have higher standardized test scores, and have better cognitive skills (Denault & Guay, 2017; Gibbs et al., 2015). This is true regardless of the type of extracurricular activity the student is involved in such as sports, clubs, or the arts. Interestingly, there was not a relationship between types of extracurricular involvement and student achievement, with the exception being academic clubs. Students that participated in academic clubs have higher enrollment in a 4-year college. Berthelon, Bettinger, Kruger, and Montecinos-Pearce (2019) suggested that colleges should examine peer composition when determining how extracurricular activities are linked to college enrollment and student academic achievement.

Lake (2015) conducted a study on students who participated in extracurricular activities, and suggested that nearly 31% of students had a grade point average of 3.0 or higher, while students that did not participate in extracurricular activities had only 11% higher than a 3.0 grade point average. Lake also reported that 50% of students that participated in extracurricular activities had no unexcused absences, compared to only 36% of students that did not participate in extracurricular activities.

A study conducted by Gardner, Roth, and Brooks-Gunn (2008) determined that the more intensive student participation was in a particular extracurricular activity, the greater the educational success for the student up to two years after participation. In fact, positive associations in students participating in extracurricular activities were noted at eight years after participation in high school, as well as an increase in employability (Pinto, & Ramalheira, 2017). These findings suggest that the longer students participate in extracurricular activities, the better their educational and social success may be.
As noted previously, the effects of student participation in extracurricular activities may affect students even after their time in college. According to Martin (2009), college students that participated in extracurricular activities had a 20% increase in high-grade professions after college, such as executives, doctors, and lawyers. This may be due to greater achievement in college and a higher GPA for some students that participated in extracurricular activities during college.

Astin (1999) noted differences in students that participated in academic programs, athletic programs, and leadership programs. Astin found that those students who were part of an honors program gained self-esteem and were more likely to stay enrolled in college. Korah, Slate, Moore, and Lunenburg (2019) noted that honors programs enhance faculty-student relationships and students have a greater engagement in the institution. Astin (1999) said, “Students who are deeply involved academically are less likely than average students to show an increase in liberalism, hedonism, artistic interest, and religious apostasy or decreases in business interests” (p. 525). Students that are involved in academic extracurricular activities exhibit a strong relationship with satisfaction with college life, with the exception of relationships with other students.

Several studies have been conducted at the middle and high school levels on the effects of extracurricular activities and student achievement. Im, Hughes, Cao, and Kwok (2016) examined the effects of participating in extracurricular activities during middle school on academic achievement in ninth grade. The data were collected during seventh and eighth grade for 483 students with 33% Euro-American, 25% African American, and 39% Latino ethnicities. The data showed a wide range of participants, including 55% male and 45% female. The activities that students participated in included sports, performance arts, academic clubs, and
other activities such as student council. The researchers concluded that there was no significant
difference among student achievement for gender, as well as ethnicity. This also was true in a
study conducted by Meier, Hartman, and Larson (2018), which concluded the gender gap in
extracurricular activities is closing, with males and females participating at a near equal rate.

Students that have special learning disabilities also participate in extracurricular
activities. According to Dymond, Rooney-Kron, Burke, and Agran (2020), secondary-age
students with disabilities participate in extracurricular activities at a much lower rate than
students that do not have disabilities, as there may be some barriers that exist for those students
with disabilities that prevent them from participating. These barriers may include student
characteristics such as cognitive, communicative, social, or behavioral; inadequate options and
support of students; and lack of parent or teacher support (Aran, Achola, Nixon, Wojcik, Cain,
Thoma, Austin, & Tamura, 2017). Special education teachers and parents of students in special
education believe there is a benefit for these students to participate in extracurricular activities,
despite the lack of help for students.

The Individuals with Disabilities Education Act (IDEA, 2004) and Section 504 of the
Rehabilitation Act (1973) both state that students with disabilities should have equal opportunity
in school, which includes both inside and outside the classroom (e.g., participation in
extracurricular activities). The extracurricular activities that students with disabilities participate
in must include students without disabilities. Regardless of these pieces of legislation, there
continues to be a low number of students with disabilities participating in extracurricular
activities (Dymond, 2020).

Palmer, Elliot, and Cheatham (2017) conducted a study that examined students with
disabilities and extracurricular activities, and determined that student involvement in
extracurricular activities increased school involvement, student self-esteem, academic achievement, and adolescent development for students with disabilities and without disabilities. Their findings revealed a statistically significant association between postsecondary degree completion for students with disabilities that participated in extracurricular activities during high school. This link between degree completion and participation in extracurricular activity was found to be true regardless of the type of extracurricular activity. These research findings may help schools to understand the need for extracurricular activities for all students, regardless of age or disability. Since participation in such activities during middle and high school affects learning outcomes in post-secondary schools, secondary schools need to encourage participation in extracurricular activities to better promote learning for the present and future.

Even though a majority of the effects of extracurricular activities have been found to be positive, there have been some negative impacts on students that participate in extracurricular activities, such as heavy drinking. Martinez, Johnson, and Jones (2015) noted that students that participate in activities such as sororities and fraternities in institutions of higher learning have a higher chance of drinking heavily, and students that participate in religious activities have a lower chance. Both student heavy drinking and Cannabis use, have a negative effect on academic achievement in higher education, in addition to lower attendance in classes in higher education (Paramo, Cadaveira, Tinajero, & Rodriguez, 2020).

Another study conducted by Matjasko, Holland, Holt, Espelage, and Koenig (2019) indicated that there is a negative relationship between extracurricular participation intensity and behavior problems in secondary education. This suggests that the more hours a secondary student puts forth in extracurricular activities, the greater the chance that they would exhibit behavioral problems. Another negative impact of extracurricular activities was researched by Yu, Glanzer,
Sriram, Johnson, and Moore (2017). These researchers determined that students that participate in extracurricular activities are more likely to cheat in higher education classes than their peers who do not participate in extracurricular activities. With these mixed results regarding the effects of extracurricular activities on academic achievement, the need for further research on this topic is warranted.

**Types of Extracurricular Activities**

In higher education there are five different types of extracurricular activities in which students may participate, including pro-social activities, team sports, performing arts, school-involvement activities, and academic clubs (Eccles, 2003). These extracurricular activities may be led by the institution or by the community. Gardner, Roth, and Brooks-Gunn (2008) conducted a study to examine the educational outcomes in students that participated in school or community-led extracurricular activities. The researchers concluded that there was no significant difference in educational outcomes in students that participated in school-led or community-led extracurricular activities.

When it comes to students participating in extracurricular activities such as sororities or fraternities and intercollegiate sports, some research suggests a lower overall GPA (Baker, 2008); however, other research suggests these activities provide students with an increase in career-related skills such as public speaking and leadership, which would indicate a positive impact on students (Kim & Bastedo, 2017).

**Sports Participation and Student Achievement**

For students to have healthy minds and bodies, they have to have some form of physical activity. Schools have implemented physical education in the curriculum and added sports as an extracurricular activity in order to have more well-rounded students (Bradley & Conway, 2016).
This physical activity may occur during school hours, but most physical activity that takes place at the high school and college level is conducted during sporting events as a type of extracurricular activity. There recently have been questions as to the effectiveness of sports at middle and high schools, with some schools cutting funding or even canceling seasons of sports (Yeung, 2013). For schools to demonstrate that sports need to be funded, there needs to be a reason why students should participate in them, such as increased academic achievement.

Burns, Brusseau, Pfledderer, and Fu (2020) sought to determine if there was a relationship between sports activity, lifestyle behaviors, and dietary behaviors and academic achievement in high school students. The researchers wanted to determine if there were multiple factors or one factor that contributed to student achievement. The researchers concluded that students that participated in sports exhibited greater academic achievement (as measured by the number of As and Bs in course work) than students that did not participate. Similar findings were also noted in a study conducted by Vucic and Bilic-Kirin (2020) in which students involved in sports exhibited higher academic achievement, in addition to health benefits. Burns et al. (2020) found that students that participated in three or more sports exhibited higher academic achievement than those that only participated in one sport. The findings also determined that students that exhibited higher academic achievement slept at least eight hours, ate breakfast, and had a regular consumption of vegetables. These findings suggest a connection between student participation in sports and an increase in academic achievement at the high school level.

In college students, Sahin, Cekin, and Yazicilar Ozcelik (2018) examined predictors of academic achievement in physical education and sports undergraduate students from their first year of undergraduate studies. Students responded to a questionnaire that examined their sociodemographic, attitudes towards teachers from high school, core self-evaluations, and goals
for the future. The students also submitted their grade point average for their first year of undergraduate studies. Through correlation analysis, it was determined that for students involved in sports, their GPA was associated with gender, high school GPA, core self-evaluations, and mastery-approach goal achievement. The findings suggested that for schools to support students in sports they should try and identify students that struggled in high school at the beginning of the year and offer support to help them be successful in the future. Similar findings were noted in a study conducted by Munoz-Bullon, et al., (2017) in which students that participated in varsity sports had higher academic gains than those that did not participate in sports at the university level.

The research has shown there is a difference in academic achievement in students that participate in individualized sports and students that participate in team sports. Bradley, Keane, and Crawford (2013) conducted a study that examined the effect of sports on educational achievement in Ireland. The researchers looked at four different groups of students: rugby, rowing, soccer, and no sports. Data were collected in the form of secondary school final grades as well as the type of sport in which the student participated. The results indicated a clear increase in final grades for students that had participated in sports during secondary school, with a dramatic increase in final grades for those students who had participated in the only individual sport, rowing. Similar findings were noted by Ishihara, Nakajima, Yamatsu, Sagawa, and Morita (2020), in which students that had individual sports participation exhibited higher academic success than their counterparts. These findings indicate a need for more research to determine if individualized sports play a role in increasing student achievement, or if participation in sports alone may increase academic achievement.
Overall, student participation in sporting activities has been shown to increase student achievement, which has been documented at both the secondary and higher education levels. As a result, schools and higher learning institutions need to help keep these programs funded and there also needs to be a variety of sporting activities offered since some findings suggest there is a difference in academic achievement between individualized sporting participants and team sporting participants.

**The Performing Arts and Student Achievement**

Another type of extracurricular activity includes the performing arts, which could be anything from choir to band or even drama and art clubs. In a demographic profile conducted by Elpus and Abril (2011), it was noted that most students that participate in high school music ensemble come from higher socioeconomic backgrounds, are native English speakers, and are in the highest standardized test score quartiles with GPAs ranging from 3.01 to 4.0. This was also true for a study conducted by Holochwost, et al. (2017), in which music students had higher standardized test scores and had better grades in English and math. Music students are not a representative subset of the U.S. high school population.

Kinney (2008) conducted a study using data from before and during student enrollment in band and choir programs for middle school. The study examined student achievement test scores to determine if there was a difference in students that participated in band, choir, or neither. The before enrollment in school music participation test scores were taken from fourth-grade-students, and during enrollment was taken from sixth- and eighth-grade students. Socioeconomic status and home environment data were also collected. It was noted that the students with higher socioeconomic status scored higher on all tests in the fourth, sixth, and eighth grades. Overall, sixth-grade band students scored significantly higher on achievement tests than choir students.
and nonparticipants, and eighth-grade band students scored significantly higher than nonparticipants. Guhn, Emerson, and Gouzouasis (2020) noted that both music and choir led to higher academic gains, with activities such as band having an even higher student achievement. They suggested that since there was a higher achievement in band students, there may be some way that band attracts higher achieving students than choir, but more research is needed.

The quality of the music program also affects the academic achievement of students in those programs (Guhn, Emerson, & Gouzouasis, 2020). The researchers found that students that participated in low-quality programs had lower standardized test scores than those that participated in formal music education. Olson (2008) conducted a study in which English and math score data were collected from U.S. students in elementary and middle school students involved in music programs. The researcher examined how the scores differed in relation to the quality of the music program. Olson noted, “Many of the organizational skills and learning strategies present in high-quality music programs can aid students in the acquisition of knowledge in other subjects” (p. 23). Olson concluded that deficient instrumental instruction was better than deficient choral instruction; however, deficient choral instruction exhibited nearly the same standardized test scores as no music instruction at all.

Not all research studies have noted that participating in performing arts increases student achievement. For example, Foster and Marcus Jenkins (2017) conducted a study to examine the association between participating in music and the performing arts and childhood cognitive and developmental outcomes. They found no casual associations between participation in music or the performing arts and increased cognitive outcomes for students. Foster and Marcus Jenkins (2017) suggested there might be other factors such as socioeconomic status and other family factors that play a bigger role than student participation in music and the performing arts. More
research is needed to determine the impact of extracurricular activities such as the performing arts on the academic achievement of students in higher education.

**Special Resources**

Students that participate in extracurricular activities may have more special resources available to them to help with their academic achievement than their peers that do not participate. Research suggests that extracurricular activity participation exhibits an increase in positive peer association (Gibbs et al., 2015). This suggests that students may encourage each other in class participation and good study habits with peers that participate in the same extracurricular activities.

According to Ahmad and Rahman (2019), students that participate in college sports have a social network that helps to emphasize the importance of academics. Ahmad and Rahman noted, “Participation in sports may also provide students with unique development opportunities that positively impact the student’s self-concept which may lead to higher academic expectations and therefore better academic outcomes for student-athletes” (p. 1). Astin (1999) noted that students that participate in honors programs and academic programs may have a better relationship with faculty members of higher education institutions. Having frequent interaction with faculty members may lead to an increase in student satisfaction, which in turn may lead to an increase in attendance and student achievement (Morris, 2016). Accessing these special resources may help higher education institutions to increase student academic achievement in both groups (i.e., students that participate in extracurricular activities and students that do not participate in extracurricular activities).
Funding and Enrollment in Community Colleges

Higher education institutions across the U.S. are having to figure out how to fund their institutions. Several community colleges in the U.S. are now being funded through a performance-based funding system (Kelchen, 2019). There are concerns that this will discourage community colleges from enrolling students that may have a low likelihood of success. To prevent this from happening, several states have designated funds for community colleges for students that are low-income, an underrepresented minority, and adult learners. Since some community colleges receive funding through student performance, many are seeking ways to increase student achievement in the classroom. There is also a need to increase enrollment numbers in order to increase the amount of tuition the community college receives. Public community colleges also receive funding through budgets set by their state legislature (Davidson, Ashby-King, & Sciulli, 2020).

Another way in which community colleges are now receiving funding is through crowdsourcing (Gearhart, Smith, & Miller, 2019). Unlike four-year colleges, community colleges do not typically receive a large part of their funding from alumni donations. This is due in part to the fact that the student body of community colleges is as a whole older than the population of a four-year college. Community colleges also have more part-time students than four-year institutions, which decreases the social experience in college that sometimes increases funding in the future.

Gearhart, Smith, and Miller (2019) discussed how in the past 20 years, higher education has been working with businesses and industry support of both academic and occupational programs. On average, the typical associate’s degree earns less than a bachelor’s degree over a person’s lifetime. Most students go on to a four-year institution after they complete their
associate's degree, which may change allegiance to funding in the future of the student population. All of these factors are reasons why Gearhart, Smith, and Miller argued that community college funding programs are at a disadvantage in the philanthropic community.

Increasing student enrollment is another way schools can increase funding. Extracurricular activities that have students that are high achieving have a link to college enrollment (Gibbs, et al., 2015). These are activities such as honors programs and academic clubs. Students that participate in these types of activities are more than likely going to stay in college for longer periods than their peers that do not participate in any extracurricular activities. For students, peers that are similar to themselves involved in their preferred extracurricular activity can increase the likelihood that they would enroll in that specific college (Gardner, Roth, & Brooks-Gunn, 2008). Students that are involved in a particular sport in high school would more than likely enroll in a college that offered that sport. Research conducted by Morris (2016) has identified that students who participate in extracurricular activities show an increase in college class attendance, in addition to an increase in academic achievement. This suggests a need for more research to help colleges increase attendance with increased participation in extracurricular activities. This may provide the college with more financial gains if there is an increase in student enrollment.

Class Attendance and Student Achievement

Student attendance in secondary schools has been linked to student academic achievement. In a study conducted by Maxwell (2016), the school-level student attendance rate was measured in conjunction with the building condition and social climate of the school. The researchers looked at how these variables affect standardized math and English test scores. The researchers concluded that student achievement is linked to building conditions and mediated by
the social climate and student attendance. This was also true for a study conducted by Lavy and Nixon (2017) in which the researchers concluded that well-maintained educational facilities lead to an increase in student achievement. This suggests there is a link between student academic achievement and student attendance in high school.

When students miss 10% or more of a school year, they are considered to be chronically absent. Gottfried (2015) conducted a study to examine the effect of chronic absenteeism on elementary school students’ math and reading testing outcomes. The researcher looked at an urban school district where rates of chronic absenteeism are higher than the national average. The researcher concluded that those students that were chronically absent suffered academically in both reading and math standardized test scores. Surprisingly, the study suggested that students that were classmates with students that were chronically absent may also have had some reduced outcomes. Smerillo, Reynolds, Temple, and Ou (2018) found that chronic absenteeism reduced the likelihood of a student graduating high school in four years. Not only does being absent affect a student’s academic achievement, but it may also affect other students’ academic achievement.

Research has shown that participation in extracurricular activities affects student attendance. In a study conducted by Lake (2015) it was reported that 50% of students that participated in extracurricular activities in high school had no unexcused absence, while only 36% of students that did not participate in extracurricular activities had no unexcused absences. In fact, in a study conducted by The National Association for Music Education, in high schools that have music programs, there is a 93.3% attendance rate, while in schools without music programs there is an 84.9% daily attendance rate (MENC, & NAMM, 2006). Participating in
extracurricular activities has been correlated with an increase in attendance at the secondary school level.

**Class Attendance in College**

Historically, college students typically exhibit lower class attendance rates than students in elementary and secondary schools (Morris, 2016). A study conducted by Landin and Perez (2015) examined the effect of class attendance on academic achievement in pharmacy students. When examining the attendance rates of students, the researchers found a positive relationship between lecture attendance and academic achievement. The findings showed statistically significant differences in students with high class attendance rates compared to those with low or no class attendance. Al-Shammari (2016) suggested that there needs to be a program implemented to help with student class attendance in higher education. The researcher concluded that increased attendance showed an increase in student achievement. An increase in class attendance was achieved through a change in classroom management style. The conclusions of these studies determined that lecture attendance was associated with increased academic achievement, and colleges should implement programs to help reduce the number of class absences to help increase student academic achievement.

In today’s age, technology has been used to record lecture meetings at institutions of higher learning. Some instructors have a negative view of lecture recordings and their effect on class attendance. Nordmann et al. (2019) conducted a study that examined attendance and recording use at a four-year college. The researchers found that even though teachers were recording lectures and posting them online for use, there was no statistically significant effect on class attendance. There was only an increase in student achievement for first-year students but not for any other year. In another study conducted by Skead, Elphick, McGaughey, Wesson,
Offer, and Montalto (2020), the researchers concluded that recording lecture videos deterred students from attending, but there was no statistically significant improvement in student achievement. Overall findings suggest that there are some benefits to using recording devices, but attending classes has a much more positive effect on student achievement (Nordmann et al., 2019).

Colleges may consider increasing class attendance by starting classes at a later time. Higher rates of attendance and higher graduation rates have been noted when school start times are after 8:30 a.m. (School Schedules, 2017). When schools started after 8:30 a.m., the average daily attendance rate grew 4% from 90% to 94%. Graduation rates increased from 79% to 88% (School Schedules, 2017). In a study conducted by Wheaton, Chapman, and Croft (2016), the researchers concluded that a delayed school start time resulted in increased student attendance. This may be one small change that community colleges may implement that may affect class attendance, and ultimately positively impact student academic achievement.

Some studies have shown either a negative link or no significant link between class attendance and student achievement in higher education. For example, some students involved in athletics have shown an increase in isolation from their peers who were not involved in athletics, which may lead to a decrease in attendance. Astin (1999) noted that this is probably due to the many hours spent practicing, travel time to athletic events, and even special living arrangements for athletes of specific sports. Student government participation in higher education suggests that those students interact more with their peers, which may lead to higher attendance and possibly higher academic achievement. A study conducted by Mackintosh-Franklin (2018) examined the effects of mandatory attendance in an undergraduate nursing program. The researcher found that students with 100% attendance in addition to classroom engagement were more likely to achieve
a higher grade than their counterparts; however, the overall findings suggested that student achievement is nonlinear and that it may be more related to student motivation than to classroom attendance.

When it comes to why attending classes is important, the literature shows that students and instructors have conflicting points of view. In a study conducted by Rawlani, Lohe, Bhowate, Khubchandani, and Chandak, (2018) students’ perceptions of attendance include they are more likely to attend and believe attendance is important if an in-class quiz or test is announced, if attendance is required, or directly related to their grade, or if the instructor is interesting. Twenty-seven percent of students cited that a reason why attendance was low in the classroom was due to the availability of instructional materials online. Students believed that if their class met in a large classroom, their absence would not be noticed as much as if they were in a smaller space. This shows students do not deem class attendance as a factor that might affect their performance in the class.

Instructors view attendance as important because they are aware of the research showing a correlation between attendance and academic achievement. This is particularly important in courses that teach skills such as in labs or a clinic setting. In the study conducted by Rawlani et al. (2018), 43% of faculty believed that classroom attendance was correlated with academic achievement, while only 20.8% of students believed the same. These findings suggest that student motivation may be the main factor for attendance in the classroom. Furthermore, due to the difference in the perceptions of students and faculty, there needs to be further research that examines how to bridge that perception gap to help students become more successful in the classroom.
Since the majority of the research suggests that class attendance affects student academic achievement, schools should examine how to increase class attendance. There are several instructional practices that may help increase student attendance. In a study conducted by Droessiger and Vdovinskiene (2020), the researchers polled technology students and asked what students thought instructors could do to increase student attendance in classes. The researchers noted that the first behavior that instructors can change to increase student attendance are factors related to didactic teacher competence. This includes strategies such as combining theory with practice, having visually pleasing course material, planning lectures effectively, having active participation during class meetings, and offering motivation through bonus points. The second behavior that instructors can change to increase student attendance are factors related to communicative teacher competence. The survey results revealed that students want teachers to be able to communicate effectively and they want teachers to help organize open discussions during class time. If instructors can include interesting discussions and engage more students, students will be more likely to attend class meetings. The researchers noted that the last behavior that instructors can change to increase student attendance are factors related to the personal competence of instructors. Students want teachers that will accommodate and be in a good mood, or have a good personality. Students also said they wanted teachers that respond to feedback, such as being flexible in classes if the need arises to change pace or topics. Droessiger and Vdovinskiene suggested that if teachers can change any of these factors, then student motivation will increase, which would likely result in increased class attendance.

Student Motivation

For students to be academically successful in college courses, institutions and instructors need to look at what motivates students to attend classes and participate in those classes.
Students understand that going to class is important for a successful outcome; however, Rawlani et al. (2018) noted that when students missed class, getting the notes from another student seemed to be just as useful as the student going to class themselves. In a study conducted by Fjortoft (2005), 200 students were polled as to what motivated them to attend class. Fjortoft found that the main motivators for students to attend class were that class handouts were not inclusive and new information was presented in class. Another motivator for students to attend class was that faculty applied information to solving real problems. Students did not go to class when the class was before or after a test or if there were two or more hour breaks before or after class. Faculty reading their notes instead of engaging students in lectures also led to a decrease in student class attendance. This study demonstrates that with a few changes in scheduling and faculty behavior, institutions can help increase student attendance by appealing to student motivation.

The motivational force behind students is said to be driven by the self-determination theory. Gagne and Deci (2005) described the self-determination theory as having two parts: autonomous motivation, and controlled motivation. Gagne and Deci described autonomy as, “acting with a sense of volition and having the experience of choice” (p. 333). Intrinsic motivation is an example of autonomous motivation. In education, an example of autonomous, or intrinsic motivation would be students partaking in an activity because they find it interesting and fun. On the other hand, controlled motivation is synonymous with extrinsic motivation. An example of controlled, or extrinsic motivation would be using a reward to control and increase a specific student activity. The self-determination theory is based on three psychological needs: autonomy, competence, and relatedness (Sanchez-Olivia, Pulido-Gonzalez, Leo, Gonzalez-Ponce, & Garcia-Calvo, 2017).
Using the self-determination theory in education, many researchers use sports or physical education as a means for trying to understand certain phenomena. Ferriz, Gonzalez-Cutre, Sicilia, and Hagger (2016) examined the relationships between healthy and unhealthy behaviors in physical education through the lens of self-determination theory. The researchers found a link with autonomous motivation explaining the healthy behaviors of physical activity and participation in sports, but did not find a link in motivation in healthy eating and consumption of tobacco, alcohol, and drugs. Another study conducted by Cuevas, Garcia-Lopez, and Serra-Olivares (2016) used the self-determination theory to analyze a sports education model in self-determination and motivation. They discovered that students in the experimental group exhibited a significant increase in intrinsic motivation when compared to the control group. The researchers concluded that a sports education program may help increase intrinsic motivation for students that participate in the program.

In higher education, Jeno, Danielsen, and Raaheim (2018) used a model based on the self-determination theory to predict academic achievement and student dropout rates among biology students. This study’s goals were to investigate a motivational model of higher education students’ dropout rates and academic achievement, and to investigate underlying motivational factors. The instrument used gathered the following data: student perceptions of their need for support, student relatedness at the institution, the importance of students’ intrinsic and extrinsic aspirations, why students participated in a biology learning activity (autonomous and controlled motivation), students’ perceived competence in biology class, students’ dropout intentions, and students’ academic achievement. The researchers concluded that perceived competence and autonomous motivation both significantly predicted student academic achievement. There was no significant association between controlled motivation and academic achievement. These
findings suggest that students’ academic achievement is driven more by intrinsic motivation than extrinsic motivation. The researchers also speculated that autonomous motivation negatively impacted dropout intentions, while controlled motivation positively predicted dropout intentions. This study suggests that higher education institutions could perhaps use autonomous motivation as a way to increase student academic achievement and decrease student dropout intentions. Overall, student motivation can have an effect on student class attendance as well as student achievement.

Science Course Achievement in Community Colleges

Student achievement in science is not often a topic for research at the post-secondary level. There are a wide variety of science courses offered at community colleges for both science majors and non-science majors. Student success in science courses at community colleges has been related to student transfer to four-year institutions (Cohen & Kelly, 2019). Corkin, Horn, and Pattison (2017) noted that students that successfully completed a science lower-level course had a greater chance to complete a degree in either science, technology, engineering, or math. Freshman level biology has some of the highest dropout rates among all departmental courses, as noted by Corkin, Horn, and Pattison (2017). There is a 39% dropout rate for biology for non-majors and a 34% dropout rate for majors. However, implementing some form of an intervention study group for students that were poor performing led to an increase in student achievement.

In a study conducted by Cohen and Kelly (2019), over 60% of students that successfully completed a science course at a community college went on to graduate or transfer to a four-year institution, as compared to 23% who did not take a science course and successfully graduated or transferred to a four-year college. Students that did not take a science course in community college had an average GPA of 1.83 compared to those students that did take a science course at
a community college, who had an average GPA of 2.66 (Cohen & Kelly, 2019). These findings suggest that students who take a science course in community college may exhibit higher academic achievement and may be more likely to go on to a four-year institution.

Abdulghani, Almelhem, Basmaih, Alhumud, Alotaibi, Wali, and Abdulghani (2020) conducted a study that examined the relationship between student achievement in health science college students and self-esteem. The researchers wanted to try and find a way to help increase student achievement in students that were in the health science fields (i.e., medical students, dental students, nursing students, and applied science students). They determined that students in the health sciences exhibited a decrease in self-esteem as they went through their educational journeys. When questioned “On the whole, I am satisfied with myself” 92% of first-year students agreed, 93.6% of second-year students agreed, 87.3% of third-year students agreed, and 89.1% of fourth-year students agreed. In another study conducted by Jirdehi, Asgari, Tabari, and Leyli (2018), the researchers concluded there was a significant relationship between GPA and educational self-esteem for students enrolled in medical school. The findings from these studies suggest that to increase student achievement in science courses in higher education, institutions might want to look at student self-esteem.

There was no significant difference in self-esteem based on the living status of the student. Abdulghani et al. (2020) concluded students that were more physically active had a more positive attitude about themselves than those that were not consistently active. The researchers noted that most students that reported negative self-esteem also suffered from diseases, anxiety, and depression. Ninety-nine percent of students agreed that time management played a role in student achievement in science courses, and 85.6% of students agreed that faculty support was important. Overall, there was a significant positive relationship between
student measured self-esteem and grade point average in science students in higher education. The current study seeks to determine if there is a relationship between student participation in extracurricular activities and class attendance and student achievement. The results may provide a way in which higher education institutions may help increase student achievement in science courses.

**Gap in the Literature**

It is evident that a gap in the literature exists when it comes to the impact of extracurricular activities and attendance on academic achievement in science courses at community colleges. There are no known studies on how extracurricular activities specifically affect student outcomes in science courses in higher education. There are few research studies on community college and student participation in extracurricular activities. Most studies on extracurricular activities are either in elementary or high school settings, or they are based on four-year colleges. There are a wide variety of different factors that two-year community colleges face when compared to high school and four-year universities.

This study is necessary to provide information to community colleges to possibly help with student achievement. With an increase in student achievement, many two-year colleges could increase performance-based funding and increase enrollment, which would increase tuition funding. With limited quantitative studies on this specific topic, this study adds to the existing research that is currently available.

**Summary**

Students are involved in a variety of different activities and to different extents when they are enrolled in higher education. Students will be involved with activities they feel will benefit themselves in a variety of ways; not just in an academic way. Community colleges need to serve
students in a way that helps increase academic achievement, which would help students achieve their academic goals. There is research that suggests that students will participate in the same extracurricular activities as those of their peers. Class attendance also plays a role in student achievement. Institutions need to find ways to increase student motivation, which would increase class attendance and student achievement. Higher education institutions need to find ways to help with the retention of students and increase enrollment to help with funding. Due to performance-based funding, community colleges should look at how different factors, such as participation in extracurricular activities and class attendance affect student achievement, retention, and graduation rates. One area of study that needs to be researched within community colleges is science. Students exhibit a variety of achievement levels in science courses, and there are fewer interventions in science courses when compared to mathematics and English courses. This study adds to the limited quantitative research that currently exists on the topic of the impact of extracurricular activities and attendance on academic achievement in science courses at a community college.
CHAPTER THREE: METHODS

Overview

This quantitative study has a dual purpose, considering it is a casual-comparative as well as a correlational study. The purpose of the casual-comparative study was to determine if there is a statistically significant difference between the science scores of students that participate in extracurricular activities and students that do not participate in extracurricular activities. The purpose of the correlational study was to determine if there is a statistically significant relationship between class attendance rates and science scores of students that participate in extracurricular activities and students that do not participate in extracurricular activities. This chapter discusses the research design, research questions, hypotheses, participants and setting, instrumentation, procedure, and data analysis of the research study.

Design

The research design for this study was quantitative in nature, using both a casual-comparative study as well as a correlational study. Archival data was obtained from the office of Institutional Research and Effectiveness at the community college of interest. According to Gall, Gall, and Borg (2007), a casual-comparative study is one in which a researcher is seeking to find a cause-and-effect relationship. This is accomplished by forming groups, which are the independent variables, and determining if the different groups affect the dependent variable. This study used a casual-comparative design because there were two or more groups for the independent variable that were categorical, individuals were not randomly assigned to a specific group, and the researcher did not manipulate the variables. Regarding this research, student achievement in science courses at a community college, the continuous dependent variable, was
compared to student involvement in extracurricular activities, the categorical independent variable.

When students first enroll in a community college, they struggle with time management and independent self-discipline life skills. Research suggests that high school students that participate in extracurricular activities exhibit higher academic achievement than their counterparts (Morris, 2016); however, this higher academic achievement does not necessarily transfer over to higher achievement at community college. This study sought to determine the relationship between participation in extracurricular activities, class attendance, and student achievement in science courses at a community college.

In this casual-comparative research study for research questions one and two, the independent variable that cannot be changed was nominal. In research question one, this was involvement in extracurricular activities or no involvement in extracurricular activities. The students involved in extracurricular activities participated in some school-sanctioned activities such as varsity sports, arts, or clubs. Students not involved in extracurricular activities were not involved in the school in any manner other than attending classes. The dependent variable was student achievement in Principles of Biology 1, which was an interval measurement. Student achievement was measured by the percentage grade, which was continuous data, received at the end of the science course. For research question two, the independent variable was the type of extracurricular activity (varsity sports) or no activities. The dependent variable was the same, which was student achievement in science courses.

The casual-comparative research method was most appropriate for research questions one and two because the goal was to examine the relationship among the variables (Gall et al., 2007), involvement in extracurricular activities, and student achievement in science courses, by
comparing students that participate in extracurricular activities to students that do not participate in extracurricular activities and students that participate in varsity sports to students that do not participate in other extracurricular activities. The focus of this study was on archival data where student involvement in extracurricular activities was noted from the office of Instructional Research and Effectiveness from the institution of interest as well as student achievement in science courses. The selected research design allowed the researcher to use statistical data to determine the relationship between participation in extracurricular activities and student achievement in science courses at a community college.

A correlational study was also used in this study to answer research question three. According to Gall et al. (2007), a correlational study is conducted when research seeks to identify relationships between the variables. Correlational studies are conducted when a researcher seeks to find the degree of relationship between the variables being studied. In this correlational study, the researcher sought to find a relationship between the attendance of students that participate in extracurricular activities and students that do not participate in extracurricular activities and their science achievement scores, as measured by the final course percentage grade. In a study conducted by Nordmann, Calder, Bishop, Irwin, and Comber (2019), attendance in college lecture courses had a positive correlation with student achievement in that course. The current study sought to find a relationship between class attendance and student involvement in extracurricular activities and student academic achievement.

The correlational research study was most appropriate for research question three because the researcher sought to search for relationships among the variables, as well as possibly predicting the outcome of future events concerning attendance (Gall et al., 2007). A multiple linear regression was also used to determine the predictive correlation between the participation
in types of extracurricular activities and the predictor variable, class attendance, to determine the linear correlation relationship in student achievement scores in science courses. Class attendance was measured as the number of days of lecture attended. The focus of this study was on archival data where student class attendance and student involvement in extracurricular activities were noted from the office of Instructional Research and Effectiveness of the institution of interest, as well as student achievement in science courses.

**Research Questions**

**RQ1:** Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in extracurricular activities and students that do not participate in extracurricular activities?

**RQ2:** Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in varsity sports and students who do not participate in varsity sports?

**RQ3:** How accurately can Principles of Biology 1 achievement scores of community college students be predicted from a linear combination of attendance in science class and participation in extracurricular activities?

**Hypotheses**

**H\(_0\)1:** There is no significant difference between Principles of Biology 1 achievement scores of community college students who participate in extracurricular activities and students that do not participate in extracurricular activities as measured by final course grades.

**H\(_0\)2:** There is no significant difference between Principles of Biology 1 achievement scores of community college students who participate in varsity sports and students who do not participate in varsity sports as measured by final course grades.
**Ho3:** There will be no significant predictive relationship between Principles of Biology 1 achievement scores of community college students between the criterion variable (final course grades) and the linear combination of predictor variables (attendance in Principles of Biology 1 class and participation in extracurricular activities) as measured by final course grades.

**Participants and Setting**

In the following section, the sample of participants and the setting of the study will be discussed. This section will discuss why this setting is selected as well as the importance and significance of the sample that is being assessed in this research study.

**Demographics of Participants and Setting**

The participants in this study included students attending a community college in Mississippi. The community college of interest is a public community college that has five different campuses across the state. As of 2019, there were 11,839 students enrolled across all five campuses. Full-time student enrollment was 65% and, part-time student enrollment was 35%. In 2019 the minority enrollment was 60%, with 54% being African American with a diversity score of 0.55. Overall, 91% of students were receiving some sort of financial aid. Forty percent of students identified as male and 60% of students identified as female (U.S. News Education, 2018).

At the time of the study, the community college had a total of 511 teachers across all five campuses with a student-teacher ratio of 23:1. This research study was conducted at the main campus, specifically in the Biology Department. This department had nine teachers, all with a master’s degree or higher in biology. Each teacher taught at least four lecture classes and three lab classes for a total of 15 hours, with multiple teachers teaching extra classes.
At the community college of interest, there was a wide variety of extracurricular activities in which students could participate. Men’s varsity sports included baseball, basketball, football, golf, soccer, tennis, and track and field. Women’s varsity sports included basketball, soccer, softball, tennis, and track and field. All these sports are part of the National Junior College Athletic Association and specifically the Mississippi Association of Junior Colleges Conference. Extracurricular activities offered included over 80 student clubs and groups such as band, choir, Baptist Student Union, Robotics Club, and student government.

**Research Question 1**

For the first research question, there were 75 participants that did not participate in extracurricular activities. These students were comprised of 34 females and 41 males. Forty-seven students were African-American, 23 were White, two were Two or More races, two were unknown race, and one was Alaskan Native. Forty-five students were in the age range of 17-21 years and 30 students were in the age range of 22-26 years.

Seventy-five participants participated in extracurricular activities as well. There were 34 females and 41 males. Forty-seven students were African-American, 23 were White, two were Two or More races, two were unknown race, and one was Alaskan Native. Forty-six students were in the age range of 17-21 years and 29 students were in the age range of 22-26 years. Out of the students that participated in extracurricular activities, 34 students did not participate in varsity sports and 41 students did participate in varsity sports.

**Research Question 2**

For the second research question, there were 75 participants that did not participate in varsity sports. These students were comprised of 18 females and 57 males. Fifty-four students
were African-American, 20 were White, and one was unknown race. Thirty-seven students were in the age range of 17-21 years, and 38 students were in the age range of 22-26 years.

Seventy-five participants participated in varsity sports as well. There were 18 females and 57 males. Fifty-four students were African-American, 20 were White, and one was unknown race. Thirty-seven students were in the age range of 17-21 years and 38 students were in the age range of 22-26 years.

**Research Question 3**

For the third research question, which examined the relationship between class attendance, participation in extracurricular activities, and academic achievement, there were 813 participants. Of these, 452 were female and 361 were male. There were 569 African-Americans, 193 White, 25 two or more races, 18 unknown race, six Asian, and two Alaskan Native participants. There were 282 participants in the 17-21 years age range, 373 in the 22-26 years age range, 47 in the 27-30 years age range, 68 in the 31-40 years age range, 26 in the 41-50 years age range, and 17 that were 51 years or over. There were 138 students that participated in extracurricular activities and 675 students that did not participate in extracurricular activities. Of those 138 students that participated in extracurricular activities, 80 participated in varsity sports.

**Sample Procedure**

The researcher used a convenience sample of full-time students that attended the community college and were enrolled in science courses in the biology department. When assuming a medium effect size, the number of participants that were sampled was 150, which exceeds the required minimum. There were 75 participants selected from each group, participation in extracurricular activities, and no participation in extracurricular activities. The Office of Institutional Research and Effectiveness randomly chose students from Principles of
Biology 1 whose names were placed into either participant or not participant, based on student records. According to Gall et al. (2007), there should be at least 100 students sampled (at least 50 from each group) when assuming a medium effect size with a statistical power of 0.7 at the 0.05 alpha level. Students that were not enrolled full time were not included in the sample. For the multiple linear regression, there were 813 students sampled, which exceeded the amount needed. According to Warner (2013), for multiple linear regression the number of samples should be as follows: \( N > 104 + k \), with \( N \) as the sample size and \( k \) the number of predictor variables. For this study \( k = 2 \), extracurricular participation and attendance, so \( N > 104 + 2 \), which would be \( N > 106 \). Therefore, the 813 students were sufficient for multiple linear regression.

After IRB approval was granted, the researcher contacted the Office of Institutional Research and Effectiveness at the community college of interest to gather data. Archival data from the Fall 2019 semester were collected from students enrolled in Principles of Biology I. In the Fall of 2019, there were 730 students enrolled in 80 sections of this course at the main campus.

**Instrumentation**

The instrumentation for this study was archival data obtained from the Office of Institutional Research and Effectiveness at the community college of interest. These data are initially collected to support the college in institutional planning, strategic initiatives, policy planning, and decision-making (Office of Institutional Research and Effectiveness, n.d.). Archival data were used due to the COVID-19 pandemic during the 2020 school year. The community college went to an online platform during Spring 2020, and the last semester where extracurricular activities occurred on a normal basis was Fall 2019. At the time of the study there
continued to be some uncertainty if the Fall 2020 or Spring 2021 semesters would return to a normal setting in a face-to-face platform.

Archival data were gathered from the Spring 2019 and Fall 2019 semesters. Data from both semesters were collected because extracurricular activities vary in their time commitment for each semester. For varsity sports, some sports such as baseball have a spring season, while others, such as football, have a fall season. The data may have been skewed if only one semester had been taken into consideration. This was also true for non-sports extracurricular activities. For example, the band has a busier season in the fall due to time commitments to marching at football games.

The data gathered from the Office of Institutional Research and Effectiveness included demographics, science course taken, student final grade for the course, number of days present, full-time or part-time student, and type of participation in extracurricular activities.

**Procedures**

The researcher applied to Liberty University’s IRB and received IRB Exemption status (Appendix A). The researcher then went through an application process with the Research Review Committee at the community college of interest. The researcher submitted a formal request to the community college that included a formal letter (Appendix B), Chapter One of the dissertation proposal, and the Liberty University IRB approval letter to the Research Review Committee.

The researcher then received approval (Appendix C), and went to the Office of Institutional Research on the main campus of the community college and gathered the archival data (deidentified) for the semesters of Spring 2019 and Fall 2019. All collected data were entered into a Microsoft Excel spreadsheet and the researcher then categorized the data
conducted data analysis. The following categories were developed: gender, status (athlete, other activities, no activities), attendance, and science course grade. Once the data were categorized, they were then imported from Microsoft Excel to SPSS in order to conduct data analysis and clarify the relationships between variables (Creswell, 2009).

**Data Analysis**

Data screening was done for the detection of outliers using visual screening and a box and whisker plot. Statistical analysis for each null hypothesis is described in the following sections. The mean and standard deviation were used to determine if there was a statistically significant relationship between the groups.

**Null Hypothesis 1**

Null hypothesis 1 was addressed using an independent samples $t$ test, which compared the final science course percentage grades of students that participated in extracurricular activities to the science scores of students that did not participate in extracurricular activities. A $t$ test is an appropriate choice for research question one because the researcher attempted to determine if a statistically significant difference existed between the science scores of students that participated in extracurricular activities versus students that did not participate in any activity. A $t$ test is used because there were only two groups for the independent variable, which was categorical, and the dependent variable was measured on a continuous scale (Warner, 2013).

The $t$ test requires that certain assumptions be met. The assumption of Normality was examined using Kolmogorov-Smirnov and histograms, and the assumption of no extreme outliers was examined using boxplots. The equal variance assumption was examined using Levene’s test of equality of error variance. An alpha level of .05 was used, and the effect size was calculated using Cohen’s D (Warner, 2013).
Null Hypothesis 2

Null hypothesis 2 was addressed using an independent samples $t$ test, which compared the science scores of students that participated in varsity sports to the science scores of students that did not participate in varsity sports. A $t$ test was an appropriate choice for research question two because the researcher attempted to determine if a statistically significant difference existed between the science scores of students that participated in varsity sports as an extracurricular activity versus students that did not participate in any activity. A $t$ test was used because there were only two groups for the independent variable, which was categorical, and the dependent variable was measured on a continuous scale (Warner, 2013).

The $t$ test required that certain assumptions were met. The assumption of Normality was examined using Kolmogorov-Smirnov and histograms, and the assumption of no extreme outliers was examined using boxplots. The equal variance assumption was examined using Levene’s test of equality of error variance. An alpha level of .05 was used, and the effect size was calculated using Cohen’s D (Warner, 2013).

Null Hypothesis 3

Null hypothesis three was addressed using a multiple linear regression, which determines if a predictive correlation exists between a criterion variable measured on a continuous scale and a set of predictor variables (Gall et al., 2007). The criterion variable was student science scores; the first predictor variable was attendance, and the second predictor variable was student involvement in extracurricular activities. A correlation coefficient ($r$) and a multiple correlation coefficient ($R$) were produced to analyze. A positive correlation will exist if $r$ is a positive number and a negative correlation will exist if $r$ is a negative number (Warner, 2013). If the correlation coefficient equals zero, then no correlation exists. When it comes to the multiple
correlation coefficient, the larger $R$ is, the better the prediction of the criterion variable (Gall et al., 2007).

Assumptions for a multiple linear regression were also addressed. The assumption of outliers was examined via casewise diagnostics and Cook’s distance values (Warner, 2013). Scatter plots of the studentized residuals (SRE_1) against the (unstandardized) predicted values (PRE_1), and partial regression plots were produced and inspected to assess the assumption of linearity and homoscedasticity.

Another assumption assessed was the assumption of multivariate normal distribution via inspection of the histogram with a superimposed normal curve and a P-P Plot (Warner, 2013). The last assumption for multiple linear regression was the assumption of non-multicollinearity. For this assumption, one looks to see if the two predictor variables are highly correlated. If they are, then they will provide the same information about the criterion variable. For this, a Variance Inflation Factor (VIF) was calculated and measured. As the VIF was not greater than 10, multicollinearity was not present (Warner, 2013).
CHAPTER FOUR: FINDINGS

Overview

The following chapter provides the findings of the research study. The research questions and null hypotheses are stated. Descriptive statistics are also included for each test completed. The results are provided and explained for each of the three null hypotheses. The first two used an independent samples $t$ test and the third was analyzed using a multiple linear regression model.

Research Question(s)

RQ1: Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in extracurricular activities and students that do not participate in extracurricular activities?

RQ2: Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in varsity sports and students who do not participate in varsity sports?

RQ3: How accurately can Principles of Biology 1 achievement scores of community college students be predicted from a linear combination of attendance in science class and participation in extracurricular activities?

Null Hypotheses

$H_0$: There is no significant difference between Principles of Biology 1 achievement scores of community college students who participate in extracurricular activities and students that do not participate in extracurricular activities and measured by final course grades.
**H₀²**: There is no significant difference between Principles of Biology 1 achievement scores of community college students who participate in varsity sports and students who do not participate in varsity sports as measured by final course grades.

**H₀³**: There is no significant predictive relationship between Principles of Biology 1 achievement scores of community college students between the criterion variable (final course grades) and the linear combination of predictor variables (attendance in Principles of Biology 1 class and participation in extracurricular activities) as measured by final course grades.

### Descriptive Statistics

There were three different research questions, and each question had its own data set. This section will break down those three data sets and provide the descriptive statistics for each research question.

#### Research Question 1

Table 1 provides descriptive statistics for Research Question 1. As noted in Table 1, students that participated in extracurricular activities had a mean science score of 77.13 with a standard deviation of 10.34. Students that did not participate in extracurricular activities had a mean science score of 79.21 with a standard deviation of 9.83. The science scores ranged from 50.9 to 96.3.

#### Table 1

*Descriptive Statistics for RQ 1*

<table>
<thead>
<tr>
<th></th>
<th>Participated (n= 75)</th>
<th>Did not Participate (n= 75)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
<td><strong>77.13</strong></td>
<td><strong>79.21</strong></td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td><strong>10.34</strong></td>
<td><strong>9.83</strong></td>
</tr>
</tbody>
</table>

Science Score
Research Question 2

Table 2 provides descriptive statistics for Research Question 2. As noted in Table 2, students that participated in varsity sports had a mean science score of 77.24 with a standard deviation of 10.83. Students that did not participate in varsity sports had a mean science score of 78.07 with a standard deviation of 12.12. The science scores ranged from 48.9 to 97.3.

Table 2
Descriptive Statistics for RQ2

<table>
<thead>
<tr>
<th></th>
<th>Participated (n= 75)</th>
<th>Did not Participate (n= 75)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>77.24</td>
<td>78.07</td>
</tr>
<tr>
<td>SD</td>
<td>10.83</td>
<td>12.12</td>
</tr>
</tbody>
</table>

Research Question 3

Table 3 provides descriptive statistics for Research Question 3. This table provides the descriptive statistics for the independent variables (predictor), attendance, and dependent variables (criterion), science scores. Table 3 indicates that the overall mean of science scores was 78.72 with a standard deviation of 12.23. The mean for attendance (days present) was 31.60 with a standard deviation of 0.86. The science scores ranged from 40.2 to 99.2. The number of students that participated in extracurricular activities was 138, which made up 17% of the participants. The number of students that did not participate in extracurricular activities was 675, which made up 83% of the participants.
Table 3

*Descriptive Statistics for RQ3*

Participant Variables (N=813)

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Score [Total] [Dependent/Criterion Variable]</td>
<td>78.72</td>
<td>12.23</td>
</tr>
</tbody>
</table>

Independent/ Predictor Variables

| Attendance (days present) | 31.60 | .86 |

<table>
<thead>
<tr>
<th>Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation (1= yes)</td>
<td>138</td>
</tr>
<tr>
<td>Participation (0=no)</td>
<td>675</td>
</tr>
</tbody>
</table>

Table 4 is a correlation matrix demonstrating the association among the variables in the analysis, demonstrating several significant pairwise associations among variables. This was conducted using Pearson’s correlation. This shows that for science scores and attendance $r = .118$ and for science scores and participation $r = -.053$. Correlation was only significant with attendance and science scores.

Table 4

*Correlation Matrix*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-.</td>
<td>-.</td>
</tr>
<tr>
<td>2</td>
<td>.118**</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>-.053</td>
<td>-.044</td>
</tr>
</tbody>
</table>

Note. *$p > .05$. 1 = science scores, 2 = attendance, 3 = participation
Results

Null Hypothesis 1

An independent samples \( t \) test was conducted to test null hypothesis one. The science scores of students who participated in extracurricular activities were compared to the science scores of students who did not participate in extracurricular activities. An independent samples \( t \) test is the most appropriate analysis procedure, as it is used when a researcher wants to compare the mean scores of two different groups (Warner, 2013).

Data Screening

Data screening was conducted before assumption testing. All data were examined to eliminate individuals that had withdrawn from the course. Each group (participants and non-participants) had identical individuals. This means that if five individuals were African-American males aged 22 that participated in extracurricular activities, five individuals were African-American males aged 22 that did not participate in extracurricular activities. This provided very similar data based on age, gender, and ethnicity.

Assumption Testing

Before conducting the independent samples \( t \) test, assumption testing was conducted. First, boxplots were generated to examine the assumption of no extreme outliers. Inspection of the boxplots indicated that there were no extreme outliers; however, there were two outliers (case 4 and 79; see Figure 1). Upon further examination, it was determined that the outliers were neither the result of a data entry error nor a measurement error. These two cases were genuinely unusual data points; therefore, the analysis was run with and without the cases. The results remained the same in terms of statistical significance (\( p = .187 \)); therefore, the two cases were retained for the analysis.
For an independent samples $t$ test, the dependent variables should also be approximately normally distributed for each group of the independent variable (e.g., participate in extracurricular activities vs. did not participate in extracurricular activities); this is the assumption of normality. This assumption was assessed by creating histograms and by conducting normality tests, the Kolmogorov-Smirnov. Results demonstrated that normality can be assumed for the students who participated in extracurricular activities (see Table 5 and Figures 2 and 3).
Table 5

*Kolmogorov-Smirnov for Null Hypothesis 1*

<table>
<thead>
<tr>
<th>Extra Curriculum Participant</th>
<th>Kolmogorov-Smirnov Statistic</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verified No</td>
<td>.129</td>
<td>75</td>
<td>.003</td>
</tr>
<tr>
<td>Grade Yes</td>
<td>.083</td>
<td>75</td>
<td>.200*</td>
</tr>
</tbody>
</table>

Note. *p >.05

Figure 2

*Histogram of Students that Did Not Participate in Extracurricular Activities*
The \( p \)-value for the test was above a .05, and the distribution of science scores for this group as demonstrated by the histogram follows a bell-shaped curve. However, normality cannot be assumed for the students who did not participate in extracurricular activities (see Table 5 and Figures 2 and 3). The inspection of the histogram demonstrates that the distribution of science scores is slightly positively skewed. As the independent samples \( t \) test is fairly robust to deviations from normality, the decision was made to continue with the independent samples \( t \) test. Warner (2013) noted that if the sample sizes are equal and sufficiently large, then a minor violation of normality, like the one in this data set, is not likely to be problematic. Non-normality is not likely to affect the Type I error rate, and the independent samples \( t \) test can be considered robust.

Homogeneity of variance is the final assumption of the independent samples \( t \) test that was examined. This assumption assumes that the population distributions have the same
variances. The assumption of homogeneity of variances was tested using Levene’s Test and found suitable, $F(148) = .001, p = .971$.

**Independent t-test Results**

The results of the independent samples $t$ test demonstrated students who do and do not participate in extracurricular activities do not significantly differ statistically in their science scores. Although students who did not participate in extracurricular activities had slightly higher mean science scores (see Table 1). The results of the independent samples $t$ test demonstrated that the two groups of students did not significantly differ in their average science scores, $t(148) = -1.262, p = .209$, Cohen's $d = 0.20$. The effect size is small based on Cohen’s $d$. The alpha level was reported as $\alpha=0.5$. Thus, one would fail to reject the null hypothesis because the two groups of students (those that participated in extracurricular activities, and those that did not participate in extracurricular activities) did not have a significantly different average science score.

**Null Hypothesis 2**

An independent samples $t$ test was conducted to test null hypothesis two. The science scores of students who participated in varsity sports were compared to the science scores of students who did not participate in varsity sports. An independent samples $t$ test is the most appropriate analysis procedure, as it is used when a researcher wants to compare the mean scores of two different groups (Warner, 2013).

**Data Screening**

Data screening was conducted before assumption testing. All data were examined to eliminate individuals that had withdrawn from the course. Each group (participants and non-participants) had identical individuals. This means that if five individuals were African-American males aged 22 that participated in varsity sports, five individuals were African-
American males aged 22 that did not participate in varsity sports. This provided very similar data based on age, gender, and ethnicity.

**Assumption Testing**

Before conducting the independent samples $t$ test, assumption testing was conducted. First, boxplots were generated to examine the assumption of no extreme outliers. Inspection of the boxplots indicated that there were no extreme outliers; however, there were seven outliers across the two groups (cases 1, 19, 20, 21, 76, 94, 95; see Figure 4). Upon further examination, it was determined that the outliers were neither the result of a data entry error nor a measurement error. These seven cases were genuinely unusual data points; therefore, the analysis was run with and without the cases. The results remained the same in terms of statistical significance ($p=.418$); therefore, the seven cases were retained for the analysis.

**Figure 4**

*Box Plot for Null Hypothesis 2*

For an independent samples $t$ test, the dependent variables should also be approximately normally distributed for each group of the independent variable (e.g., participate in varsity sports
vs. did not participate in varsity sports); this is the assumption of normality. This assumption was assessed by creating histograms and by conducting normality tests, the Kolmogorov-Smirnov. Results demonstrated that normality cannot be assumed for either group (see Table 6 and Figures 5 and 6).

**Table 6**

*Kolmogorov-Smirnov for Null Hypothesis 2*

<table>
<thead>
<tr>
<th>Varsity Sports</th>
<th>Kolmogorov-Smirnov Statistic</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verified</td>
<td>No</td>
<td>.142</td>
<td>75</td>
</tr>
<tr>
<td>Grade</td>
<td>Yes</td>
<td>.138</td>
<td>75</td>
</tr>
</tbody>
</table>

**Figure 5**

*Histogram for Did Not Participate in Varsity Sports*
The *p*-values for the tests were below a .05. Inspection of the histograms demonstrates that the distribution of science scores is positively skewed for both groups. As the independent-samples *t* test is fairly robust to deviations from normality, the decision was made to continue with the independent samples *t* test. Warner (2013) noted that if the sample sizes are equal and sufficiently large with similar skew, then a violation of normality is not likely to be problematic. Non-normality is not likely to affect the Type I error rate, and the independent-samples *t* test can be considered robust.

Homogeneity of variance is the final assumption of the independent samples *t* test that was examined. This assumption assumes that the population distributions have the same variances. The assumption of homogeneity of variances was tested using Levene’s Test and found suitable, *F* (148) = .904, *p* = .343.
Independent t-test Results

The results of the independent samples $t$ test demonstrated students who do and do not participate in varsity sports do not significantly differ statistically in their science scores. Although students who did not participate in varsity sports had slightly higher mean science scores (see Table 2), the results of the independent samples $t$ test demonstrated that the two groups of students did not significantly differ in their average science scores, $t (148) = -.441, p = .660,$ Cohen's $d = 0.07.$ The effect size is very small based on Cohen’s $d.$ The alpha level was reported as $\alpha=0.50.$ Thus, one would fail to reject the null hypothesis because the two groups of students (those that participated in varsity sports, and those that did not participate in varsity sports) did not have a significantly different average science score.

Null Hypothesis 3

A multiple linear regression was used for null hypothesis three, which determines a predictive correlation between a criterion variable measured on a continuous scale and a set of predictor variables (Gall et al., 2007). The criterion variable was student science scores and the first predictor variable was attendance and the second predictor variable was student involvement in extracurricular activities.

Data Screening

Before assumption testing, data screening was performed. For this test, the data were screened to eliminate individuals that had withdrawn from the course.

Assumption Testing

Prior to conducting the multiple linear regression, assumption testing was conducted. The first assumption test was the independence of observations using the Durbin-Watson statistic.
This value was .061, which indicates there was probably independence of errors. There was independence of residuals based on the design of the study.

Next was the test for linearity using the scatterplot of the studentized residuals (SRE_1) against the (unstandardized) predicted values (PRE_1) and partial regression plots. This scatterplot demonstrated no violation of the assumption of linearity and may be found in Appendix D. Since the data were nominal, the regression plots form horizontal bands or clusters, forming a relationship that can be considered linear. The data do not demonstrate a curve, so the assumption of linearity is met.

Inspection of the scatterplot of the studentized residuals (SRE_1) against the (unstandardized) predicted values (PRE_1) were also analyzed for the assumption of homoscedasticity. This shows that the variables are spread equally over the predicted values of the criterion variable. The cigar shape demonstrates no gross violations of the assumption of homoscedasticity (see Figure 7).

**Figure 7**

*Assumption of Homoscedasticity*
The assumption of multicollinearity was analyzed, as multicollinearity occurs when two or more predictor variables are highly correlated. Multicollinearity was not violated, as tolerance values are greater than 0.1 (the lowest is 0.998) and VIF values are greater than 10 (highest is 1.002).

While examination of casewise diagnostics indicated extreme outliers (cases 1, 2, 3, 4, 5), an evaluation of Cook’s distance, another analysis to identify extreme outliers, indicated that no case had a value that exceeded 1 (Cook, & Weisberg, 1982). The regression analysis conducted with the outliers retained and removed showed similar results; therefore, the outliers were retained, as they represented real students and no entry errors.

Finally, the assumption of normality was examined to see if the residuals were normally distributed. A P-P Plot and histogram (see Figure 8) demonstrated that while the data were slightly positively skewed, there were no gross violations of the assumption of normality (see Appendix D). The P-P Plot has points aligned close enough along the diagonal line, which indicates the residuals are normally distributed. As assumptions for the multiple linear regression were not grossly violated, the multiple linear regression was used to examine the data to answer the research question and test the corresponding null hypothesis.
Multiple Linear Regression Analysis

The multiple linear regression was used to determine if a statistically significant relationship can be predicted; in this case, science scores (see Table 7). The results of the linear regression demonstrated that the model containing attendance (days attended) and participation in extracurricular activities (yes= 1, no = 0) did significantly predict the participants’ science scores, $R^2 = .016$ (adjusted $R^2 = .014$), $F(2,810) = 6.720$, $p = .001$. To avoid an inflated likelihood of error due to multiple comparisons, an adjusted $p$-value to test for significance was used and calculated using Bonferroni's method (.05/2= .025). There was thus evidence to reject the null hypothesis. Based on the effect size (adjusted $R^2 = .014$), the model explains 1.4 % ($0.014 \times 100$) of the variability of the criterion/dependent variable, science scores.
One variable made an individual significant contribution, attendance (see Table 7). The sign, positive or negative, indicates the direction of the association between the IV/predictor variable and the criterion/ DV. The Beta value was positive for the attendance; therefore, as the number of days students attended class increased, so did their science scores. The Beta value was negative for participation in extracurricular activities; therefore, those who participated in extracurricular activities were more likely than those who did not participate to have lower science scores. However, since $p>.05$, it is not statistically significant.
Table 7

Contributions of Independent Variables (N= 812)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SE B</th>
<th>B</th>
<th>t</th>
<th>p</th>
<th>Zero-Order r</th>
<th>Partial r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance (# Days Present)</td>
<td>1.646</td>
<td>.494</td>
<td>.116</td>
<td>3.330</td>
<td>.001*</td>
<td>.118</td>
<td>.116</td>
</tr>
<tr>
<td>Participation in extracurricular (Yes = 1)</td>
<td>-1.573</td>
<td>1.136</td>
<td>-.048</td>
<td>-1.384</td>
<td>.167</td>
<td>-.053</td>
<td>-.049</td>
</tr>
</tbody>
</table>

*Note. *p < .05
CHAPTER FIVE: CONCLUSIONS

Overview

Chapter Five will discuss the findings of this causal-comparative and correlational study. Each research question will be broken down and the results will be discussed as it relates to the current literature. The implications of this study will be examined as well as the limitations of the study. The conclusion of this chapter will discuss the recommendations for further research.

Discussion

The purpose of this quantitative causal-comparative and correlational study was to explore the effects of extracurricular activities and class attendance on science achievement scores in a population of community college students. This study examined the science scores of students in Principles of Biology 1 with the goal of finding statistically significant differences among extracurricular participants as well as varsity sport participants. This study also attempted to predict science scores using attendance and participation status of students. This section will break down the findings based on the research questions and discuss the results as they relate to the literature on this topic.

Research Question 1

RQ1: Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in extracurricular activities and students that do not participate in extracurricular activities?

The results of an independent samples t test indicated that there was no statistically significant difference in science scores of students that participated in extracurricular activities and those that did not participate in extracurricular activities. However, even though the means
were not statistically significant, the mean score of those that did not participate was slightly higher (79.21) than those that did participate in extracurricular activities (77.13).

Some research has shown that there is an increase in students’ interpersonal skills, academic achievement, and interactions with others with students that participate in extracurricular activities (Morris, 2016; Palmer et al., 2017; Retallick & Pate, 2009). There are also research studies that suggest there is no relationship between participation in extracurricular activities and student achievement as measured by GPA (Denault & Guay, 2017; Gibbs et al., 2015). This study found there is no statistically significant effect of participation in extracurricular activities on student achievement as measured by science scores. There are several reasons why these findings did not align with some of the findings in the literature.

First, most of the literature on student achievement and participation in extracurricular activities was completed at the middle and high school levels (Im, et al., 2016). The current study was conducted at a community college; therefore, different results are to be expected. In addition, most of the studies on this topic measured student academic achievement by GPA. The current study used student science scores in Principles of Biology 1. This could also lead to a difference in outcomes as it relates to the effects of participation in extracurricular activities.

The findings of the current study agree with some studies, which found no significant relationship between participation in extracurricular activities and student achievement (Denault & Guay, 2017; Gibbs et al., 2015). Foster and Marcus Jenkins (2017) also concluded that participating in music had no significant effect on student academic achievement. The current study included students that participated in music, art, dance, and sport extracurricular activities. The results of the independent samples t test for the current study found no significant difference in science scores of students that participated in extracurricular activities and students that did
not participate in extracurricular activities. No significant difference was found; therefore, the results of research question one indicate no significant relationship was found between the participants and non-participants.

Some studies measured more than just academic achievement (Kim & Bastedo, 2017; Matjasko, et al., 2019; Palmer, et al., 2017). There could have been an increase in achievement in another area for the students in the current study; however, this study only targeted students’ science achievement scores. More studies need to be conducted to examine the overall effect of participation in extracurricular activities other than student academic achievement alone.

**Research Question 2**

**RQ2:** Is there a difference between Principles of Biology 1 achievement scores of community college students who participate in varsity sports and students who do not participate in varsity sports?

The results of an independent samples $t$ test indicated there was no statistically significant difference in science scores of students that participated in varsity sports and those that did not participate in varsity sports. However, even though the means were not statistically significant, the mean score of those that did not participate was slightly higher (78.07) than those that did participate in varsity sports (77.24).

Some researchers concluded that students that participate in sports have higher academic achievement than students that do not participate in sports (Burns, et al., 2020; Vucic & Bilic-Kirin, 2020); however, these studies were conducted at the high school level. The current study was conducted at a community college, which could account for a difference in the findings. Another reason why this study reported different results could be the instrument used. Most of
these studies used GPA as a measure of student achievement, while the current study used science course grade. This could also have led to a difference in findings.

In one study conducted by Sahin, et al. (2018), it was reported that gender and high school GPA could more accurately predict student achievement at the community college level than participation in varsity sports. The researcher of the current study did not have access to student records from high school. If those had been accessible, it would have been interesting to see if there was a correlation between high school participation and higher education participation in varsity sports.

**Research Question 3**

**RQ3:** How accurately can Principles of Biology 1 achievement scores of community college students be predicted from a linear combination of attendance in science class and participation in extracurricular activities?

The results of a multiple linear regression indicated that attendance can significantly predict the science scores of students. The Beta value was positive for attendance (1.646); therefore, as the number of days students attended class increased, so did their science scores. The participation in extracurricular activities could not significantly predict the science scores of students. The Beta value was negative for participation in extracurricular activities (-1.573); therefore, those who participated in extracurricular activities were more likely than those who did not participate to have lower science scores. However, since $p>.05$, it is not statistically significant.

Most of the literature agrees that student attendance has been linked to higher student achievement across all levels of education (Maxwell, 2016; Lavy & Nixon, 2017; Gottfried, 2015; Landin & Perez, 2015). With an increase in attendance comes an increase in overall
student achievement. The current study also found that same result. Students that attended more lecture classes had overall higher science scores than those that attended fewer lecture classes. Research has shown that there is typically lower student attendance in college than in high school (Landin & Perez, 2015). The current study adds to the literature in suggesting that class attendance is an important part of student achievement in higher education.

This study provides a specific sample population of students that participated in extracurricular activities that was not found in the literature at the time of this writing. Research question 3 looked at the subset population of extracurricular activity participants and sought to predict the Principles of Biology 1 score. This study determined that the status of extracurricular activity cannot accurately predict the science scores of students.

Mackintosh-Franklin (2018) suggested that having mandatory attendance helps the overall rate of attendance in college programs. The community college where this study was conducted does have an attendance policy. There were three groups of students that emerged when it came to attendance rates: students that had perfect attendance, students with one or two missed classes, and students who had more than four missed classes, which was the limit for that course. Because the institution had an attendance policy, a vast majority of students fit into one of the first two groups, with just a handful of students that had four or more absences. This might explain why there were high attendance, which led to a statistically significant finding on the relationship between attendance and student science scores.

**Overall Findings**

The findings from all three research questions had one thing in common; students that participated in some form of extracurricular activity had a lower science course score. The results from research question 1, which examined participation vs. non-participation, showed that
students that participated in extracurricular activities had a science course average that was 2.08 points lower than students that did not participate in extracurricular activities. The findings from research question 2, which examined participation in varsity sports vs. non-participation, revealed that students that participated in varsity sports had a science course average that was 0.83 points lower than students that did not participate in varsity sports. Research question 3 examined the effect of participation and attendance on science scores, and the results suggested that students that participated in extracurricular activities were more likely than those who did not participate to have lower science course scores.

Student achievement in science courses at institutes of higher learning is not a topic that is well researched. Research shows that freshman level biology (such as Principles of Biology 1) has some of the highest dropout rates, which could be caused by poor student achievement (Corkin, et al., 2017). In another study conducted by Abdulghani et al. (2020), 99% of students agreed that time management plays a role in student achievement in science courses. This could also cause a decrease in student achievement, as students that participate in extracurricular activities have more time commitments with the college than students that do not participate in extracurricular activities.

It is possible that some students respond to extrinsic motivation such as quizzes, class discussions, laboratory exercises, etc., or intrinsic motivation according to the self-determination theory (Sanchez-Olivia et al., 2017). According to Rawlani et al. (2018), students reported that their main motivators for coming to class included handouts that were not inclusive, new information presented, and real world problem solving. It is interesting to note that Cuevas et al. (2016) determined that students who participated in sports had higher intrinsic motivation than those that did not.
Implications

This study adds to the existing body of knowledge in several different ways. First, there is very little literature on the effects of extracurricular activities at institutions of higher education. Most of the research conducted regarding student participation in extracurricular activities was conducted at the primary or secondary levels. This study helps to make the case that there might be a small negative relationship or no relationship at all between participating in extracurricular activities and student achievement, or that more research needs to be conducted at community colleges. It is suggested that schools need to help students that participate in extracurricular activities. These students have a greater time commitment to school functions in addition to their classes, so skills might need to be taught to students that are struggling in their coursework.

Another way that this study adds to the literature is the fact that science course grades were used to measure student achievement instead of GPA. Most of the current literature uses GPA as a way to measure student success. The downside to this measure of student success is that it is categorical data and not continuous. For example, an individual that earned an “A” in the course would have a GPA of 4.0, a “B” would have a 3.0, a “C” would have a 2.0, a “D” would have a 1.0, and an “F” would receive a 0. This study used continuous data to measure student success in the form of the final course grade.

In addition, this study examined the effect that attendance has on student science course grades. No current literature was available at the time of this writing that predicted a science course grade based on the attendance of the student. The findings of the current study aligned with the literature, suggesting that attendance does have a positive effect on student science course grades. This suggests that schools of higher learning need to implement programs to help
students have high rates of attendance in class. This would encourage students to have higher academic achievement.

Since there was a statistically significant impact on student science scores when it came to attendance, this study suggests that institutions need to implement policies or programs to help increase student attendance. This may include faculty development to help instructors conduct class in a way that increases student attendance and participation. According to Droessigner and Vdovinskiene (2020), if teachers can increase student engagement, have a good mood with an approachable personality, and provide competent feedback to students, then class attendance will increase. It is important for institutions of higher learning to help faculty gain these skills in order to increase attendance and therefore increase student achievement.

**Limitations**

There were a few limitations in this study. First of all, there were several different teachers that taught Principles of Biology 1. With different teachers comes different teaching methods, and that might have had an effect on student achievement in those classes. The teachers that taught different sections of the course did have a similar grading policy; however, the delivery method was different, as well as the assignments and test questions themselves. This may have led to a difference in student course grades.

Another limitation to the validity of this study was the grade change that occurred between the Spring and Fall semesters. During the Spring of 2019, summative assessments (such as formal tests) accounted for 60% of the overall grade, and formative assessments (e.g., homework) accounted for 40% of the overall grade. That grading policy changed in the Fall of 2019, with summative assessments (such as formal tests) counting for 70% of the overall grade, and formative assessments (e.g., homework) counting for 30% of the overall grade. With tests
counting more towards the grade, this could have an impact on science course grades. More research and data analysis would need to be conducted to determine if the change in assignment weights had a significant impact on student course grades.

Having to use archived data instead of current data was also a limitation to the study. Being able to use different time points in the semester may have provided more insight as to how students were performing and what differences existed between students that participated in extracurricular activities and those that did not participate. Due to COVID-19, current data were not available because community college of interest had to pivot to online learning in the Spring of 2020 due to the rise in numbers of COVID-19. From that point (and currently – Fall 2021), the college is still using a blended method of instruction with online learning and face-to-face learning occurring in the same course. With these changes, the last “normal” semester was Fall 2019, which is when the data were collected. These limitations may have slightly affected the outcome of the science course grades.

There were also limitations related to the design of the study. This study had two different designs, causal-comparative and correlational. One limitation is that causal-comparative seeks to find causes of the dependent variable and cannot find actual relationships. Causal-comparative is not a randomized controlled trial. The researcher was not blinded, having no control over individuals in the study, so conclusions based on the results are limited. There could have been other factors that caused the differences in data between the two groups in the research questions (Gall et al., 2007).

The lack of control of the variables, (i.e., participation in extracurricular activities), was another limitation of the causal-comparative research design. The researcher did not control which students participated in the extracurricular activity and which did not participate. The type
of extracurricular activities was also not controlled by the researcher. By using causal-comparative research design, the researcher gathered archived data from students that chose their own extracurricular activities.

The predictive correlational research design also has limitations. Predictive correlational studies cannot provide reasons for why relationships exist, such as cause and effect; they can only conclude if there is a relationship among the variables. As with causal-comparative, predictive correlational research design can also be affected by another variable that was not being examined in the research study. This variable could be the cause for differences or relationships among the variables. Lastly, correlational studies do not determine which predictor variable has the greatest effect on the criterion variable, but only if there is a relationship among them (Gall et al., 2007).

**Recommendations for Future Research**

The results of this study indicate that there is a need for future research on this topic. One recommendation would be to analyze English and mathematics class grades to see if there is a difference between students who participate in extracurricular activities and those that do not participate. It would be interesting to see if the same conclusion could be drawn with data from each of these classes.

Another area of future research could be the effect of COVID-19 on student achievement. Since the data were collected before COVID-19 caused a learning environment change, it would be interesting to see if the same results occurred after COVID-19. Since COVID-19 caused a stoppage of some extracurricular activities, future research might be needed to see if this caused an effect on the academic achievement of students that participated or did not participate in extracurricular activities.
In future research studies, it might be beneficial to have several different data points throughout the semester. With different activities taking place during different times in the semester (e.g., football season, rush, final exams), one could look to see if timing caused a change in student achievement. This could help institutions be more cognizant of extracurricular activities for students while major testing is occurring in classes, such as midterms and finals. Overall, any future research studying the impact of extracurricular activities and attendance on student achievement in science courses at a community college would be a welcome addition to the present literature.

Future research could include analysis of intrinsic and extrinsic factors of student motivation as they relate to class attendance and class participation. Gathering qualitative data might help gain insight as to what factors of student motivation have an effect on class attendance and to what degree they have an effect on attendance and student achievement.
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APPENDIX A: IRB Approval Letter

June 11, 2021

Amanda Marbury
D Matson

Re: IRB Exemption - IRB-FY20-21-850 The Impact of Extracurricular Activities and Attendance on Student Achievement at a Mississippi Community College

Dear Amanda Marbury, D Matson:

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46.101(b):

Category 4. Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:
   (i) The identifiable private information or identifiable biospecimens are publicly available;
   (ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;
   (iii) The research involves only information collection and analysis involving the Investigator’s use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of “health care operations” or “research” as those terms are defined at 45 CFR 164.501 or for “public health activities and purposes” as described under 45 CFR 164.512(b); or
   (iv) The research is conducted by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities, if the research generates identifiable private information that is or will be maintained on information technology that is subject to and in compliance with section 208(b) of the E-Government Act of 2002, 44 U.S.C. 3501 note, if all of the identifiable private information collected, used, or generated as part of the activity will be maintained in systems of records subject to the Privacy Act of 1974, 5 U.S.C. 552a, and, if applicable, the information used in the research was collected subject to the Paperwork Reduction Act of 1986, 44 U.S.C. 3501 et seq.

Your stamped consent form(s) and final versions of your study documents can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. Your stamped consent form(s) should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document(s) should be made available without alteration.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at [redacted]

Sincerely,

[Redacted]

Administrative Chair of Institutional Research

Research Ethics Office
APPENDIX B: Formal Request Letter

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The title of my research project is The Impact of Extracurricular Activities and Attendance on Student Achievement at a Mississippi Community College and the purpose of my research is to explore the effects of extracurricular activities and class attendance on science achievement scores in a population of community college students.

I am writing to request your permission to access and utilize archived student grades and records of classes/activities participated in from 2019.

The data will be used to determine if participating in extracurricular activities affects student achievement in Principles of Biology I. It will also seek to predict, based on participation and class attendance, student achievement in Principles of Biology I.

Thank you for considering my request. If you choose to grant permission, respond by email to [email protected]. A permission letter document is attached for your convenience.

Sincerely,

Amanda Marbury
APPENDIX C: Approval Letter

Ms. Amanda Marbury
Primary Researcher,

RE: THE IMPACT OF EXTRACURRICULAR ACTIVITIES AND ATTENDANCE ON STUDENT ACHIEVEMENT AT A MISSISSIPPI COMMUNITY COLLEGE

Principal Investigator(s): Amanda Marbury
IORG Number: IORG0011046

Dear Ms. Marbury:

The Human Subjects Committee of the Institutional Review Board (IRB) has reviewed your protocol and approved it as exempt in accordance with 45 CFR 46.101b.2.

Your Protocol Extended Approval Code is HR2021-05-205-3
Type of Review: Expedited.

This permit will expire on May 21, 2022. Thereafter, continued approval is contingent upon the annual submission of a renewal form to this office.

The IRB acknowledges your timely completion of the application packet

If you have any questions, please contact the IRB Office or

Sincerely:

[Redacted]

Human Subjects Committee
APPENDIX D: Statistical Plots and Graphs

![Studentized Residual vs. Unstandardized Predicted Value Plot]

Partial Regression Plot
Dependent Variable: Verified Grade

![Verified Grade vs. Days Present Plot]