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Lecture Versus Collaborative Learning Methods in Community College Classrooms

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This is to certify that the doctoral study by

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Walden University
2020

Abstract

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by

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MS, Delta State University, 1992

BS, Mississippi Valley State University, 1985

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Educational scholars have recommended using collaborative learning in higher education classrooms to improve the learning outcomes of community college students. The problem is that many community college instructors continue to use traditional lecture methods, which might be due to instructors not being convinced of the merits of collaborative learning. The purpose of this quasi-experimental, causal-comparative, repeated measures, research study was to examine the difference between pre- and posttest change scores on the Personal Community Health assessment of students who were taught with the collaborative method and students who were taught with the lecture method. The theoretical foundation for this study was Knowles' adult learning theory. Data from 150 students were gathered after the students had completed sections of a Personal and Community Health course. While the initial design proposed the use of *t* test, a Mann-Whitney U test was conducted instead because the data did not meet the *t* test assumptions. The findings revealed that on average the change scores did not significantly differ between the two instructional methods. While the findings of this study seem to contradict the more generally accepted opinion about collaborative learning, they also seem to suggest that context matters, which is a conclusion supported by some researchers. The findings suggest that to truly make a difference, it is not enough to mandate the use of collaborative learning without further guidance on how to tailor it to the context and needs of the students. With proper tailoring and guidance collaborative learning has the potential to enhance student learning. Once implemented, a follow up study should be conducted to reassess the outcomes.

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Dedication

This study is dedicated to my family who have supported me on this lifelong journey to accomplish a doctorate degree in education. I would like to acknowledge my husband, who motivated me to follow my long-term goals. I am forever grateful for your support during my emergent times on this journey.

This study is also dedicated to my amazing daughter, Brittny; niece, Taranika and her husband, Christopher Moorer; and their children for pushing me when I wanted to stop. My two brothers, Louis Vaughn, Jr. and Gerald Vaughn, and my sister, Wandra Wade, for those late-night motivational talks that helped me to stay on the path. I thank you for supporting me, motivating me, and encouraging me to stay on the task. I would also like to dedicate this accomplishment to my parents, Callie and the late Louis Vaughn, Sr., who have always supported my decisions. I would have not been able to accomplish this endeavor without your prayers and words of encouragement. Finally, this research study is dedicated to the instructors at Walden University who strive to make their instruction both meaningful and inspiring.

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Chapter 1: Introduction to the Study

Introduction

Educational scholars have recommended collaborative learning in higher education classrooms (Barnes & Piland, 2013; Burns, Pierson, & Reddy, 2014; Liu, Tao, Chen, Chen, & Liu, 2013; Opdecam, Everaert, van Keer, & Buysschaert, 2014). Research findings have shown that the collaborative learning method is preferred by some students (LoPresto & Slater, 2016; Opdecam et al., 2014), is more effective than lecturing (Burns et al., 2014), and has been linked to higher student satisfaction (Mohammadjani & Tonkaboni, 2015). Studies conducted in community colleges have shown that collaborative learning can reduce turnover rates (Laux, Luse, & Mennecke, 2016) and is associated with increased achievement among diverse student populations (Barhoum & Wood, 2016). However, according to the institutional review board of a community college in Mississippi, instructors in various departments at the college rely on lecture methods of teaching, . In an internal survey conducted by the Office of Educational Effectiveness at the community college in Mississippi, a majority (i.e., 84.5%) of the 110 instructors responded that they preferred to use the lecture method.

The mission of the Mississippi community college under study is to prepare students to become lifelong learners and productive citizens of a global society. The college provides academic services to more than 2,400 traditional students and adult learners and offers a variety of athletic, vocational, technical, and academic programs.

Many of the instructors at the community college might be unfamiliar with effective, contemporary teaching methods since they continue to use what could

potentially be less effective teaching methods. This current study was important because the findings may provide the evidence needed to change instructors' minds on how to teach their adult learners.

The remainder of Chapter 1 includes discussions of the background, the problem statement, purpose of the study, research questions and hypotheses, the theoretical framework, and nature of the study. In this chapter, I also provide definitions, assumptions, scope and delimitations, limitations, significance sections, and finally, a summary.

Background

When compared to other methods of teaching, lecture-based teaching is the widest-used method in the university setting (Matiru, Gasser, & Schlette, 1993). Historically, researchers traced the concept and the application of lecturing in the university setting as far back as the 5th century BC (Matiru et al., 1993). Over the years, lecture-based teaching has consisted of largely one-way communication from the instructors to the students, which for some students can limit deeper learning (Matiru et al., 1993). Matiru et al. (1993) also noted that lecturing is less effective for teaching basic skills and higher cognitive thinking skills. Lecturing has been shown to be an effective method to pass on knowledge, and researchers have found that lecturing is excellent for facilitating learning when the message is well structured, interesting, and meaningful for any age of student (Matiru et al., 1993).

In the past 30 years, the age of students matriculating at the community college level has increased steadily (American Association of Community Colleges, 2016). Of

this population, 15% is older than the age of 40, and the average age is 28 years old, well above the average age of students at 4-year colleges (American Association of Community Colleges, 2016). Without a college education, adults are limited by their job-related and social skills as well as their ability to adapt to changes that occur daily in U.S. society (Barnes & Piland, 2013).

Researchers have viewed adult education as a process in which learners become aware of meaningful experiences (Knowles, Holton, & Swanson, 2005). Knowles et al. (2005) theorized that adult learners learned more effectively in a group-centered instructional setting than in a traditional, lecture-based instructional setting, which opens the conversation to the collaborative learning teaching method. The collaborative learning teaching method was a practice of ancient civilizations, like Greece and China, where students collaborated with or learned from a guru (Bright Hub Education, [BHE] 2010). The students made learning a part of their lives, and they lived to learn (BHE, 2010). Life and learning were equal and remained equal for the duration of the learner's life with the learner taking every opportunity to learn collaboratively (BHE, 2010). Collaborative learning practices continued throughout the years, and prophets and seers taught students as the students followed their examples and experiences in small groups (BHE, 2010). Collaborative learning teaching method made is possible for people like Confucius, Buddha, Jesus, and Muhammad to teach others through personal experiences rather than from scriptures (BHE, 2010).

Collaborative learning was revised in the 20th century when researchers found that students learn faster and hold knowledge longer when they collaborate or partner

with the instructors (BHE, 2010). Moreover, adult learning may be best enhanced when the instructor requires the active involvement and participation of students in response to challenging course assignments (Knowles et al., 2005). Students' classroom learning experiences may have a positive influence on a diverse array of outcomes, including academic and cognitive development, clarity of educational goals, interpersonal skills, and openness and tolerance toward diversity (Opdecam et al., 2014; Wolfe, 2012).

Researchers and the institutional review board at the Mississippi community college have noted a gap in comparative assessments between the two methods in academic literature (Schwartzstein & Roberts, 2017); however, there have been assessments of the value of collaborative learning (Béres, Magyar, & Turcsányi-Szabó, 2012; Liu et al., 2013; Mohammadjani & Tonkaboni, 2015; Opdecam et al., 2014; Wolfe, 2016). Sajid et al. (2016) compared collaborative learning to traditional lecturing in a college of medicine and found that students reported preferences for collaborative learning styles. Conversely, Retnowati, Ayres, and Sweller (2016) performed an examination of collaborative learning versus lecturing in mathematics classes and found that mathematics students preferred lectures styles. Overall, there is a lack of literature comparing collaborative learning and traditional lecture style models. Previous assessments have also failed to focus on community college-level comparisons, which leaves a viable gap in the understanding of the effectiveness of collaborative learning versus traditional lecture pedagogical techniques (Schwartzstein & Roberts, 2017).

Problem Statement

The collaborative learning method has been recommended by numerous educational scholars as the preferred method for increasing academic performance of community college students (Béres et al., 2012). The problem investigated in this study was that many community college instructors continue to use traditional lecture methods, which might be due to their distrust of the merits of the collaborative method of learning. In the current empirical research, investigators have indicated that collaborative learning is an effective teaching method and is suitable for adaptation in higher education (Béres et al., 2012; Liu et al., 2013; Mohammadjani & Tonkaboni, 2015; Opdecam et al., 2014; Wolfe, 2012). For example, collaborative learning in higher education classrooms has been shown to improve test scores (Béres et al., 2012). Opdecam et al. (2014) indicated that students prefer collaborative learning to lecture-based teaching, and researchers have linked collaborative learning to increased levels of student satisfaction (Mohammadjani & Tonkaboni, 2015). However, instructors at the community college in Mississippi under study overwhelmingly (i.e., almost 85%) rely on lecture-based teaching.

Purpose Statement

The purpose of this quasi-experimental, causal-comparative, repeated measures research study was to examine the difference between pre- and posttest change scores on the Personal Community Health (PCH) assessment of students who were taught with the collaborative method and students who were taught with the lecture method. The independent variable was the two teaching methods: lecture-based learning and collaborative learning. The dependent variable was the change score between the pre- and

posttest on the PCH. The archival data were retrieved for 150 students enrolled in the PCH course. The study was confined to the student's scores on one pretest and one posttest. The results of this study provide additional data with which to assist community college faculty when selecting appropriate teaching methods to improve students' academic performance.

Research Question and Hypotheses

The following research question and hypotheses guided this study:

RQ: What is the difference in PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period?

> H_0: There is no statistically significant difference in the PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period.
>
> H_a: There is a statistically significant difference in the PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period.

Theoretical Framework

The theoretical foundation for this study was Knowles's (1968) adult learning theory, which is also known as andragogy. Knowles developed the adult learning theory as an approach to better understanding the internal processes of adult learning, which was

based on a set of principles that included internal motivation and self-direction, life experience and knowledge, goal oriented, relevant oriented, practical, and respected (Knowles et al., 2005). During that time, researchers like gerontologists, developmental psychologists, and anthropologists, developed a body of knowledge regarding adult learning that metamorphosed into the adult learning theory (Knowles et al., 2005).The adult learning theory holds that adults (i.e., individuals over 25 years of age) learn differently than children (i.e., those under 18 years old) and young adults (i.e., individuals aged 18–25 years old) due in part to adult learners often having rich experiential backgrounds and being more likely than children and young adults to be self-directed in their learning (Knowles et al., 2005).

Knowles et al. (2005) defined pedagogy (i.e., the teaching of children) as teaching in which students passively receive information from an instructor who dispenses the knowledge because children need more guidance and supervision due to limited life experiences (Bleich, 2018). Conversely, andragogy refers to teaching that is largely active and self-directed but may proceed at different rates according to the individual (Knowles et al., 2005) because adults learn best in an autonomous environment (Bleich, 2018). Adult learners often demonstrate maturity and relate their experiences to learning, while instructors can encourage and nurture adult learners through more dialogic and collaborative learning experiences (Knowles et al., 2005). Adult learners can assign meaning to what they learn because of their experiential backgrounds and their reluctance to be passive receptacles for knowledge delivered by their instructors (Knowles et al., 2005).

Because adults learn best in an autonomous environment and from many ways, the application of the adult learning theory when incorporating teaching methods into the college setting is beneficial and appropriate for the adult learners who need a variety of methods and approaches to engage them (Bleich, 2018). The adult learning theory was an appropriate theoretical framework for the study at the community college level because significantly more nontraditional adult students attended community colleges than traditional 4-year colleges, and the use of the adult learning theory is a proven way of reaching their minds to create better learning (see Bleich, 2018; Knowles et al., 2011). Nationally, 15% of the student population at the community college level was older than the age of 40 years old, and the average age of community college students (i.e., 28 years old) was well above the average age of students at 4-year colleges (American Association of Community Colleges, 2016). In addition, according to adult learning theory, adult learners tend to be actively engaged in learning through collaborative learning and other hands-on approaches because of the experience and self-directed abilities they bring with them to college classrooms (Knowles et al., 2005).

Nature of the Study

Using a quantitative quasi-experimental, causal-comparative, repeated measures research study design, I analyzed archival data collected from the Institutional Research Department of a Mississippi community college. The design allowed me to investigate the cause and effect relationships between the variables, meaning that I could associate a change in the dependent variable (i.e., effect) based on the independent variable (i.e., causal; see Maheshwari, 2018). Using archival data, I examined whether a difference

existed between PCH test scores for two groups of students taught using two different teaching methods, based on ideas from Schweizer, Braun, and Millstone (2017). The quasi-experimental, causal-comparative, repeated measures design was appropriate for this study because the random sampling component is missing, which did not allow me to perform a true experiment as noted by Schweizer et al. Nevertheless, the design allowed for a nonprobability convenience sample rather than a random sample because I used archival PCH scores provided by the college research team. The students were enrolled in the PCH course with instructors teaching via the lecture or collaborative learning. The study cohort consisted of 150 students distributed across six sections with 75 students in three sections being taught using the lecture teaching method and 75 students in three sections being taught using the collaborative learning over a 9-week period.

The quantitative quasi-experimental, causal-comparative, repeated measures research study design also allowed for a pretest-posttest design in which I measured the dependent variable once at the beginning of the PCH course and once at the ending of the course, based on recommendations by Price, Jhangiani, and Chiang (2013). PCH instructors administered a pre- and posttest to all students. The test, PCH Pre- and Posttest, was developed by the textbook publisher, McGraw Hill, and was obtained from the textbook ancillary materials disc. The test is aligned with the textbook for PCH and measured students' knowledge through PCH test scores (i.e., the dependent variable) before and after exposure to the curriculum of a 9-week course of study. The instructors administered the pretest during the first week of class to determine the students' prior knowledge to the PCH course. The posttest addressed objectives taught during the first 4

weeks of class. Both the pre- and posttest queried the same content (i.e., the tests consisted of the same questions).

The quantitative research method allows researchers to test a hypothesis after collecting and analyzing data, unlike the qualitative research method that is used by researchers to explore ideas and experiences in depth (Streefkerk, 2020). I conducted an independent sample *t* test on the resulting data to test whether a difference existed regarding the change scores of students based on the method of instruction. According to Statistics Solutions (2012), a paired sample *t* test is used to determine if the mean scores differ between students' pre- and posttests. Prior to analysis, I assessed the parametric assumptions of normality and homogeneity of variance.

Definitions of Terms

I used the following operational terms and phrases throughout the study:

Andragogy: The theory of how adults learn differently than children or young adults because adult learners relate learning to personal experience and are more likely to be self-directed in their learning (Knowles et al., 2005). For the purposes of this study, andragogy was used interchangeably with adult learning.

Collaborative learning: Students working together or collaborating to accomplish classroom tasks or goals; collaborative learning is more student centered than traditional instructor-based lecture styles of teaching (Powell, 2011).

Lecture-based teaching method: A direct form of instruction that involves manipulation, design, and delivery of course content by the instructor so that students can reach curriculum-defined outcomes (Powell, 2011). During a lecture presentation, the

instructor may use audiovisuals, such as overhead transparencies, slides, or visual aids, to support the presentation; however, content delivery and learning remain instructor based (Powell, 2011).

Assumptions

Leedy and Ormrod (2005) defined research assumptions as self-evident truths within a study. In this study, I assumed that the instructors actually used the teaching method that they indicated they were using (either lecture based or collaborative learning) and that they wanted their students to succeed academically. Another assumption was that all instructors met their classes during the entire semester and time allowed for the classes. A third assumption was that the 9 weeks allocated for this class was enough time for students to grasp the health information to prepare for the PCH test. Finally, I assumed that the students enrolled in the PCH course included in this study received the same amount of instructional time in each section. The assumptions in this study were important because they allowed me to examine how I thought and inferred things as the researcher. Assuming certain things about the instructors, data, and the students showed my unexamined belief; however, once the data had been analyzed, I was able to assess if my assumptions lacked critical thinking or if the assumptions were logical and necessary in the context of the study.

Scope and Delimitations

According to Creswell (2014), the scope is the element of the study that explains the explored area of research and the specific parameters researchers use to conduct studies. I conducted this quantitative, quasi-experimental, causal-comparative, repeated

measures research study using test data from 150 students who had been enrolled in the PCH course at a community college in Mississippi. The scope delimitations of a study are limitations of the research design imposed deliberately by the researcher to describe the boundaries of a study (Creswell, 2014). This study only included student data from a local community college in Mississippi. The data came from students who had been enrolled in a PCH course. The archival data included information about how the initial study was limited to full-time instructors who taught in the Health, Physical Education, and Recreation department on the campus.

This study only included data that were collected during the fall semester of the school year. The study data were confined to one pretest and one posttest. I made no attempt to distribute students equally by gender in the study. Moreover, the sample for this study was limited and did not represent the total community college population at the participating community college. Consequently, the findings of the study might not be generalizable to other areas or populations involved at the community college level because there are unknown or unmeasured factors that have not been considered to determine the usefulness of the study findings.

Limitations

Limitations are those aspects of a study outside the researcher's control that may influence the credibility of the study results (Creswell, 2014). One limitation of using archival data is that the researcher does not typically have control over how the data were originally collected (Creswell, 2014). In this study, I was not involved in the assignment

of instructors into classrooms or involved in the administration of instructional techniques. I only obtained the students' data after their completion of the course.

Another limitation of the study was that if students who took the same course, even from different instructors, studied together, then cross-contamination could have occurred. To address this limitation, I used the understanding that students learn best through collaboration with others, believed that instructors did not limit study groups, and believed that instructors encouraged students to study as much as possible. In addition, I had to interpret the results from the study with caution because of the potential influence of confounding variables I did not account for. Such confounding variables that could have influenced variability in change scores included differences in student engagement, instructor personalities, and sociodemographic factors associated with student backgrounds.

Significance of the Study

The findings from this study could have implications for instructors and administrators at other community colleges seeking methods to improve the academic success of students. Collegiate instructors could use the findings of the study to select an effective method of instruction to better engage students in the educational process, which could increase students' overall grade-point averages (GPAs). According to Moody (2019), having a college GPA of 2.0 and up, on a 4.0 scale, allows students to graduate in a timely manner, which saves money for all involved. When students' GPAs drop to less than 2.0, they may lose their eligibility for federal financial aid, and because some students cannot afford school without federal assistance, they would become

disqualified from the university; would not meet the requirements for scholarships and grants; and would risk expulsion from the school if their GPA continues to fall below 1.5 (Moody, 2019).

The results from this study could inform educators and policy makers about the use of collaborative learning and lecture instruction in the classroom. These methods could be used to address the specific needs of the changing student body of nontraditional students attending community colleges in the 21st century. After graduation, adult learners enter a workforce that requires skills and abilities in synthesizing, comprehending, and collaborating with others at a high level (Wolfe, 2012). Adult learners must learn how to comprehend and work with others within contexts of evolving technologies and social, economic, and global conditions (Wolfe, 2012).

Wolfe (2012) suggested that the academic success of students was reliant on teachers using best practices for instruction. The results of this quasi-experimental, cross-sectional study indicated significant differences in test surveys between students being taught in lecture-based and collaborative learning classrooms, which could lead to positive social change. The results can be used to inform instructors regarding best practices with which to make evidence-based curricular decisions. Since adult learners tend to be more self-directed than children and young adults, the data obtained from this study could be beneficial to administrators, policy makers, and educators and used to identify different instructional teaching methods that are more effective for adult learners, resulting in increased potential for their academic success.

Summary

I designed this study to examine archival data collected from the community college instructors from the Health, Physical Education, and Institutional Research Department to examine whether a difference existed between the learning occurring in classrooms taught using lecture versus collaborative learning methods at a local community college in Mississippi. This quasi-experimental, cross-sectional design allowed for examination of the difference between students' change scores on the PCH assessment. The findings of the study contribute to positive social change by providing information regarding which method of teaching leads to better test scores. The following chapter contains a review of the research literature on the topic and the theoretical foundation of the study.

Chapter 2: Literature Review

Researchers have focused on the varying strategies used by faculty to promote learning and engagement for instruction in undergraduate settings, while university leaders have prioritized graduate and retention of students (Alzahrani, 2018; Hong & Yu, 2017; Magana, Vieira, & Boutin, 2018; Meyer & Hunt, 2017; Opdecam & Evearerts, 2019). Researchers have previously examined the lecture-based type of instruction and also explored collaborative learning and hybrid learning models for college students (Alzahrani, 2018; Hong & Yu, 2017; Magana, Vieira, & Boutin, 2018; Meyer & Hunt, 2017; Opdecam & Evearerts, 2019; Sciullo, 2017). However, little research has been conducted on differences in learning outcomes of the lecture based and collaborative learning approaches (Barhoum & Wood, 2016; Loes, Culver, & Trolian, 2018; Martinez, 2018; Mohammadjani & Tonkaboni, 2015; Rima, Rodriguez, & DePaola, 2019; Singer-Freeman, Bastone, & Skrivanek, 2016; Unal & Cakir, 2017). The problem investigated in this study was that many community college instructors continue to use traditional lecture methods, which might be due to their distrust of the merits of the collaborative method of learning. The purpose of this quasi-experimental, causal-comparative, repeated measures research study was to examine the difference in change scores between a pre- and posttest of the PCH assessment of students who were taught with the collaborative method and students who were taught with the lecture method.

This chapter begins with an overview of the search strategy used for the literature review followed by a description of the theoretical framework of Knowles's (1980, 1984b) theory of andragogy and Galbraith's (2004) theory of factors influencing adult

learners. Finally, I provide a synthesis of the extant research on collaborative learning and lecture-based instruction, including the advantages and disadvantages of both types of learning, to provide a context for this study.

Literature Search Strategy

I accessed the literature reviewed through Walden University's Online Library and online databases and search engines, including ERIC, EBSCO, ProQuest, Taylor & Francis online, SAGE, Google, and Google Scholar as well as relevant Internet sites. I found additional materials by searching and exploring references in relevant articles. The search terms used to locate literature related to the topic were *adult learning styles, adult learning theory, collaborative learning, community college teaching, lectures, nontraditional students, teaching styles,* and *teaching adults*. The literature review included over 50 scholarly journal articles that offered an overview of published literature on collaborative instruction, lecture-based instruction, and other methods used for student instruction. A majority of these studies were conducted at the college level. The goal was to find materials about the concept of collaborative learning and lecture teaching methods as well as adult learning. The first stage of the research was to collect journals, articles, and books in which the lecture-based instructional type used predominantly at community colleges produced different outcomes for students than the instructional approach of collaborative learning using pre- and posttests was studied.

This chapter is divided into four sections. In the first section, I examine the theoretical framework for the study and provide a detailed explanation of the term *adult learner*. The theoretical framework provided a lens through which the problem, purpose,

research question, literature, and findings can be viewed. The second section contains background and data that support the investigation related to the research question and hypotheses of the study, provide a definition of collaborative learning strategies (CLSs), and are related to the implementation of CLSs. The third section contains a review of studies on the implementation of lecture teaching methods. In the final section, I present a summary of the review of the literature.

Theoretical Framework

Since 1980, leaders of colleges and universities have identified a change in enrollment with more adult learners attending college. Older students, defined as adult learners, began enrolling on the collegiate level in record numbers (U.S. Department of Education, National Center for Education Statistics, 2007). Adult learners represent an emerging student population in the United States (Uyder, 2010). In response to this phenomenon, the U.S. Department of Education's National Center for Education Statistics (2011) asserted college and university instructors must be trained to use a variety of teaching methods, enabling them to identify methods to enhance satisfaction and academic performance among adult learners. According to the U. S. Department of Education's National Center for Education Statistics (2014), the number of adult learners for both the traditional and nontraditional learner is on the rise. By 2024, the number of traditional and nontraditional enrolled students is expected to have grown by almost 9 million from 2003 at degree-granting institutions (National Center for Education Statistics, 2014). The adult learning theory may be used as a guide to anchor instructional

approaches used at the university level; therefore, it is important to understand how adult learning is theorized to transpire.

Adult learning theorists claim that the learning process is different for adults than it is for children. The theoretical framework of this study is based on the work of Lindeman (Nixon-Ponder, 1995) and Knowles et al. (2011), which is anchored in the adult learning theory. Lindeman and Knowles posited principles specific to adult learning. In this section, I describe the principles underlying Lindeman and Knowles' theories and then specify the connection of these theories to this study.

Adult learning theory authors have provided key learning frameworks for the adult learning experience that presented a manner through which to view the literature and phenomenon of focus in this study. Lindeman, a German philosopher, coined the term andragogy in the early 1900s while writing with Anderson and proffered that learning for adults was grounded in constructive social action (Nixon-Ponder, 1995). The term, andragogy was coined and defined as "the true method of adult learning" (as cited in Brookfield, 1987, p. 127). Believing learning is a cooperative journey between the adult learner and the teacher, Lindeman (1926) espoused that adult learning was nonauthoritarian in nature with the main purpose being "to discover meaning of experience" (p. 11). Lindeman contended there were four principles of adult education:

1. Education is a life-long process. Regarding adult education solely as a means for preparing learners for unknown future events is to short-change them intellectually.

2. Adult education is non-vocational. Adult education more accurately defined begins where vocational education leaves off.
3. Adult education should emphasize situations not subjects. Adult education begins when adults feel themselves needing to adjust to new situations.
4. Adult education should place primary emphasis on the learner's experiences. Experience is the adult learner's living textbook. (pp. 5-7)

Using these four principles, Lindeman's methods of instruction focus on the use of discussion and small group work to support the development and use of the adult learner's analytical skills. With the theoretical framework that adult learning is based on experiences, Lindeman emphasized structuring learning so that group work supports adults to understand social issues and serves to provide adults with the knowledge and skills needed to take social action and maintain a democratic society (Nixon-Ponder, 1995). Lindeman denounced the use of textbooks and advocated for multicultural learning experiences developed through discussion groups, contending that the method or experience created by the instructor for the adult learner is more important than the content. Adult learning theory continued to be a focus of theorists in the mid-1900s.

Knowles professed that adult education should be focused on helping adults to learn versus educating adults about specific content (Smith, 2002). The adult learning framework, andragogy, focuses on informal learning, self-concept, self-direction, and groupwork (Smith, 2002). Knowles emphasized self-directed learning, perhaps because of an association with a prodigee of Carl Rogers named Arthur Shedlin, who facilitated a seminar in which Knowles (1989) noted, "It was exhilarating. I began to sense what it

means to get ‘turned on’ to learning. I began to think about what it means to be a facilitator of learning rather than a teacher” (p. 14). Knowles went on to describe self-directed learning as a process “in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes” (p. 18).

The rationale for self-directed learning is three-fold. First, Knowles espoused that self-direction is proactive and opposed to a reactive learning process (Smith, 2002). Knowles noted that if an adult learner delves into the learning process intentionally, the result is that the learning is more intentional and active, creating internal motivation on the part of the adult learner resulting in better retention and application of the learning (Smith, 2002). Secondly, self-direction in learning is a natural psychological process and relates to a person’s maturation as individuals take more responsibility for themselves as they grow older (Smith, 2002). Thirdly, self-direction places the onus on the adult learner and supports self-initiative in the learning process, thereby avoiding failure, frustration, and anxiety in the learning process for not only the adult learner but also for the instructor (Smith, 2002).

Knowles (1984a) extended on adult learning theory in the 1980s by proposing there are basic assumptions grounding adult learning and additional principles of andragogy. Knowles tendered that there are five assumptions or characteristics about adult learners that are different than child learners:

1. Self-concept: Learning evolves in the self-directed adult rather than the adult with the dependent personality as the person matures.
2. Adult learner experience: Learning accumulates, and the adult becomes more of a resource as a person matures.
3. Readiness to learn: Learning becomes more developmental and task-focused on social roles as a person matures.
4. Orientation to learning: The learning perspective changes to immediate application and from subject centered to problem centered as a person matures.
5. Motivation to learn: Learning shifts to being internally driven and developed as a person matures. (Nixon-Ponder, 1995, p. 2)

Knowles (1984a, 1984b) applied the five characteristics of adult learners to the learning process and contended that the four principles of adult learning be used to guide adult-centered classrooms in university and training contexts. These andragogy principles are:

1. Adults need to be involved in the planning and evaluation of their instruction.
2. Experience (including mistakes) provides the basis for the learning activities.
3. Adults are most interested in learning subjects that have immediate relevance and impact to their job or personal life.
4. Adult learning is problem centered rather than content oriented. (Kearsley, 2010)

Knowles (1984a, 1984b) upheld Lindeman's principles of learning and deepened adult learning theory constructs. Specifically, Lindeman and Knowles both proffered that learning should be task focused, consider a variety of backgrounds and learning styles, and should allow learners to develop personal insights. Knowles contributed that the rationale for specific content during instruction should be provided, the experience learners come with to the learning environment should be considered when planning instruction, and that guidance should be provided when learners make mistakes. Based on andragogy theory, the Greek word for "man-leading" rather than pedagogy, meaning "child-leading," instructors should scaffold and instruct differently for adult learners (Mohring, 1990, p. 93). Knowles distinguished the learning of adults from the teaching of children as distinctly different concepts and processes (Nixon-Ponder, 1995; Smith, 2002).

Adult learners come to school with a different set of expectations and experiences than younger students, and adaptive instruction is necessary to match the challenges that adult learners face (Knowles et al., 2011). In the 1960s, Knowles et al. (2011) developed the previously described set of principles for how adults learned through an internal process. During that time, gerontologists, developmental psychologists, and anthropologists developed a body of knowledge about adult learning that became a theory regarding adult learning.

Knowles et al. (2011) suggested that pedagogy (mostly related to teaching children) differed from andragogy (related to adult learning). Essentially, Knowles et al. defined *pedagogy* as teaching in which the learner was dependent on the teacher.

Andragogy is teaching that is largely self-directed, with different learners processing information at different rates. Adult learners need to be respected for their maturity and experience, and the teacher should encourage and nurture adult learners (Knowles et al., 2011). Knowles et al. contended that the role of the educator in instructing and teaching adult learners was not that of a lecturer but should involve facilitating students and acting as a helper, guide, academic coach, encourager, or consultant prepared to guide adult learners in accomplishing their educational goals. Knowles articulated in an interview that self-directed learning requires expert facilitation and that the instructor must have specific competencies (Hatcher, 1997). Hatcher noted that in the self-directed learning model, the instructor allows for time to learn, allows for mistakes, provides learners with feedback, considers learners' styles and abilities, and is able to give up control of the learning environment. Self-directed learning in collaborative groups may fail if the culture of this learning model is not understood by the implementors, and it may result in some facilitators feeling inadequate due to loss of autonomy (Hatcher, 1997).

Researchers findings have supported the assumptions of adult learning theories. Galbraith (2004) posited that the lives of adult learners are complicated; they must divide their attention among family, work, financial issues, and college. These factors affect life balance, and academic work can be difficult for nontraditional students. Karantzas et al. (2013) noted that adult learners need both problem-solving abilities and the ability to analyze data critically and studied how a tutorial program could be used to develop these skills in adults more fully. This program was used for 273 college juniors. The program was successful because latent growth curve modeling demonstrated that students self-

reported being more skilled in problem-solving and critical analysis during the program (Karantzas et al., 2013). Learning for adults is critical at the university level as adults are preparing for their careers or retraining for new careers in the university setting. This study was focused on the use of lecture-based instructional type teaching used predominantly at a community college, and whether different outcomes resulted using collaborative based learning for students using pre- and posttests. These theorists provided a focus on the assumptions for adult learning and characteristics of the adult learning that are essential for successful learning. As this study focused on teaching approaches, lecture-based, or collaborative based at the college level, these theorists' contentions also afforded a close alignment to the hypotheses and research questions being investigated.

The adult learning theorists, Lindeman and Knowles, stressed the importance of experience-based learning methods in which the instructor uses discussion, and considers learners' experiences, preferences and diverse backgrounds as instruction is planned. Discussion is used as a bridge to create collaborative learning experiences for adult learners (Akers & Flann, 2016; Buchs, Gilles, Antoinietti, & Butera, 2016). Expert facilitation involves understanding adult learning needs to interact with others to dialogue about the new knowledge, thereby supporting retention, understanding and application of the new learning (Akers & Flann, 2016). Adult learning at the college level was the phenomenon studied, and therefore the adult learning theories provided a clear lens to focus the study. In the following section, a synthesis of the research is provided which supports the need for the present study.

Literature Review

The purpose of this quasi-experimental, causal-comparative, repeated measures research study was to examine the difference in change scores between a pre- and posttest of the PCH assessment of students who were taught with the collaborative method and students who were taught with the lecture method. As such, this literature review is organized toward presenting current literature and illustrating the gap within the literature. The first section provides a definition of collaborative learning and collaborative learning methods, and a description of collaborative learning studies and researchers' findings.

Collaborative Learning Methods

This section provides an overview of collaborative learning methods reviewed within contemporary academic literature. According to Nokes-Malach, Zepeda, Richey, and Gadgil (2019), collaborative learning strategy (CLS) is a style of learning in which students work together to achieve shared goals or create a meaningful project. The researchers also stated that CLS provides the driving force for social constructivism where students take ownership of their learning process. Nokes-Malach et al. also stated that collaborative learning has evolved since its early conceptualization centuries ago and is still evolving. In collaborative learning, the instructor encourages an educational approach that involves students working together using problem-solving skills with different ideas to create a complete task. Instructors have a vital role in collaborative learning. The interactive nature of collaborative learning provides opportunities not only for student-to-student and teacher-to-student learning, but also for instructors to learn

from students (Chen, 2018). Hennessy and Evans (2006) cited the importance of educational institutions using CLS to improve adult student performance in collaborative situations. Support, dedication, and collaboration are essential to improving instructional practice (McCall, Padron, & Andrews, 2018), and collaborative learning is one method where educators can embrace different teaching styles to help students learn (Hawk & Shah, 2007). According to Wlodkowski (2008), "theories of collaborative learning focus on how individuals' function in a group" (p. 140). The combination of working in a group or with a partner energizes the students and strengthens engagement for students in the learning activity.

Collaborative learning is a teaching approach that assists adult learners by not only helping them comprehend material and acquire information, but by also helping them become involved in person-to-person interactive processes in which the students develop self-confidence and self-directed learning skills, as a result of being a member of a collaborative learning group (Hwang, Sung, Hung, Huang, 2013; La Hanisi, Risdiany, & Sulisworo, 2018; van Leeuwen & Janssen, 2019; Yong-Ming, 2015). Collaborative technologies have precise significance in education, because they can be used to help students develop interpersonal and intrapersonal abilities needed for working in groups and with one another which are required in the real world (Lim, Foo, Loh, & Deng, 2018; Sheffield, 2016; Yong-Ming, 2015). Collaborative technologies refer to information and communication technologies that enable individuals to work together on mutual task while group learning originates from constructivist theory, which believes that learning should be progressed through the conversations and communication between people

(Yong-Ming, 2015); that is to say, education should not be simply communicated from instructor to students, but rather the students should actively create the information through teamwork (Yong-Ming, 2015). Learning styles should be observed as they influence the adult learning needs, engagement and use of learning technologies (Hwang et al., 2013; Sheffield, 2016). Accordingly, collaborative technologies provide students with a context in which they can discuss, argue, and negotiate their ideas, so as to collaboratively construct their own knowledge. Collaborative learning involves students working together on assignments or activities to master learning outcomes. CLS often involves active student learning, instructor guidance, and feedback provided by instructors in student work groups, which all serve to enhance student learning (van Leeuwen & Janssen, 2019). Instructors using collaborative learning must find the right balance between guiding students through learning and letting students take charge of their own learning (van Leeuwen & Janssen, 2019). CLS mirror the skills required in the real-world work environment. Students work on understanding and are simultaneously working on collaboration skills, which have been found to be central to successful performance on the job (Lim et al., 2018; MacLaren, et al., 2017). For example, the process of active listening, in addition to active involvement, is important in collaborative learning and effectively involves every member of the group (Iqbal, Velan, O'Sullivan, & Balasooriya, 2016). Instructors' roles differ in collaborative learning approaches.

When using CLS, instructors should share their own learning experiences and provide guidance and feedback to students to establish not just their roles as instructors but also to establish the instructor's social presence within the collaborative classroom,

which is especially important for adult learners (Pierson, 2017). In collaborative learning, instructors' roles may shift from expert instructor to learning coach, as they move to the sidelines and guide student learning (Ammenwerth, Hackl, Felderer, & Hörbst, 2017). In contrast, the lecture teaching method applied in higher education does not always meet the new and emerging goals of students, including adult learners. In the lecture method the instructor is focused on helping the learner master knowledge and skills, whereas CLS focus on mastery of material and using a social skill, such as working with others, concurrently (Ammenwerth et al., 2017). There are advantages of using CLS.

Benefits of Collaborative Learning

There are several benefits to using collaborative learning with adult learners (Pierson, 2017). Collaborative learning methods can provide an opportunity for the learners to improve their competence to assess problems analytically and apply learned concepts to new situations (Selva, John, Christhu, & Rajeev, 2017). Collaborative learning can also be used to achieve enhanced teaching outcomes because of its peer-reviewed and monitored nature (De Hei, Strijbos, Sjoer, & Admiraal, 2015). One example of CLS is the use of games. Innovative forms of collaborative learning, such as the use of games, allowed students to have fun while learning (Emblen-Perry, 2018). When learners have fun in a meaningful manner while learning new material, engagement and motivation are strengthened, which in turn improves learning outcomes (Emblen-Perry, 2018). Game-based learning can produce enhanced teaching outcomes even in adult learners as students have been shown to be more engaged reflective of lessons (Emblen-Perry, 2018). Interestingly, Koç (2018) noted that English language

instructors in Turkey preferred using collaborative learning with younger students than older ones. The findings in this study were that the instructors also reportedly disliked collaborative learning, mostly because it was difficult for them to implement. Collaborative learning requires preplanning and structure by the instructor to be successful. Most students, regardless of level, preferred collaborative learning. Koç noted that teacher training on collaborative learning must be prioritized to implement it properly. CLS have been shown to support adult learning experiences. Action learning has been shown to be an effective CLS. Another approach considered to be a CLS approach is cooperative learning.

One of the many learning models that has been studied and developed by experts is the model of cooperative learning. Cooperative learning is considered a collaborative learning approach as participants are working together to master the material or complete a project (Schilstra, Takacs, Abcouwer, 2019; Sugiharto, 2015). It is incumbent on the instructor to select, structure and implement the appropriate learning model to strengthen learners' motivation and to create an atmosphere conducive learning to achieve the learning outcomes. The implementation of cooperative learning model will usually facilitate students' development their social skills such as interpersonal relationship skills to achieve and master the concepts and materials designed by the teacher (Asino & Pulay, 2019; Emerson, English, & McGoldrick, 2015). Cooperative learning environment prepares students to master valuable social skills they will use during their lives. Learning styles of the students are important and unique characteristic to consider. Educator's knowledge concerning students learning styles helps them to create suitable and

multisensory learning environment, which serves the best possible learning climate for learners. Optimal learning results will be obtained if the variety of students such as habits, interests, and learning styles being accommodated by educators through the proper choice of learning models and teaching materials with regard to the learning styles of learners. The quality process of learning could be improved through bolstering educators' understanding of the characteristics of adult learners including their learning styles (Asino & Pulay, 2019). Educators should consider the information about learners in selecting methods, teaching techniques, and appropriate teaching materials. Conditions of learning like typical of students and the characteristics of course, strategy, effectiveness, efficiency and attractiveness of learning have been the influential factors on learning outcome.

The literature related to CLS is inconclusive in respect to whether the use of CLS strengthens adult students' understanding of the curriculum taught. There is no uniform method of implementing CLS in college classrooms or in adult learning contexts (Jakobsen & Daniel, 2019). There are recommended guidelines for facilitating adult learning (Lindeman, 1926, Knowles, 2011, Nixon-Ponder, 1995, Smith, 2002, …). Consequently, it is difficult to compare the implementation of CLS across all multiple studies and draw conclusions about the efficacy of CLS. One component that enhances the problem of making comparison in the study findings is that the manner in which CLS is applied is not always defined distinctly (Haidet et al., 2012; Liu & Beaujean, 2017). Some researchers have compared CLS to traditional lecture, active lectures, and other fully active teaching approaches (Holmes, 2016; Travis, Hudson, Henricks-Lepp, Street,

& Weidenbenner, 2016). Researchers have indicated that the term, ‘lecture’, could vary and include demonstrations, videos and other activities that are incorporated into the lecture, thus making the lecture a combination of instructional approaches rather than exclusively lecture (Travis et al., 2016). Findings indicated that CLS is more effective than other methods of instruction, however other researchers have found that CLS is at least as effective as other instructional approaches (Liu & Beaujean, 2017). Even reviews and a meta-analysis of the CLS literature included these comparative evaluations (Fatmi, Hartling, Hillier, Cambell, & Oswald, 2013; Sisk, 2011) and explored possible moderators such as outcome measures (e.g., standardized exams, course grades), education level of the course (e.g., undergraduate, graduate), and subject matter (Liu & Beaujean, 2017). These reviews and meta-analysis concluded that CLS is at least as effective as other instructional approaches. Most researchers agree that college adult learners need different instructional approaches other than the “sage-on-the stage” approach and have indicated that adult learners coming from diverse backgrounds with nontraditional experiences need to have their experiences validated and instructors should take time to get to know their adult students as well as employ strategies that demonstrate an understanding that adult students can learn from one another (McCall et al., 2018).

Researchers examined the learning outcomes for students when using an interactive discussion approach and a team-based learning approach. In a quasi-experimental study of college psychology students, two groups composed of 33 students each were instructed using different instructional approaches, interactive learning (IL) and team-based learning (TBL) for one semester (Jakobsen & Daniel, 2019). A pretest

was used to assess prior knowledge of course content and there were no significant differences. Independent samples *t* tests were used to compare cumulative GPA and the analyses showed that students in both groups were similar in terms of their overall academic performance (Jakobsen & Daniel, 2019). The IL group received a copy of the lecture notes in advance of class and listened to lectures using PowerPoint. The IL group also engaged in extending the material presented through discussions with students and instructor, the use of think-pair-share. Students in the TBL group received a reading handout related to the material to be learned one week before each class. Students in the TBL group were assigned teams. TBL students were provided a "muddiest points" lecture at the beginning of each class following the receipt of TBL group scores and submission of clarifying points to the instructor for the previous class. Group responses on the quiz could be appealed for using evidence from course materials (p. 286). Team quizzes and two exams were used to assess performance. The TBL group participated in the team quiz, whereas the IL group received individual quizzes and exams. The TBL group also completed a quantitative and qualitative formative team evaluation during the 6th week of class (Jakobsen & Daniel, 2019). Jakobsen and Daniel (2019) reported the following findings:

> Using a univariate ANOVA with class (IL, TBL) and GPA demonstrated no significant difference between groups. There were class GPA findings resulting from independent t test which reflected that higher GPA students in the TBL group earned significantly more points than the higher GPA students in the IL class (M = 582, SD = 23), $t(36) = 2.05$, $p = .048$, $d = 0.66$. The findings of further

> indicated that lower GPA students in the IL class (M = 539, SD = 37) earned significantly more points than lower GPA students in the TBL class (M =501, SD =21), $t(18) = 2.73$, $p = .014$, $d = 1.22$. (p. 287).

Overall there were significant differences for higher GPA students and lower GPA students in the two groups (Jakobsen & Daniel, 2019). Higher GPA students earned significantly more points in the TBL group compared to those in the IL group. Lower GPA students earned significantly more points in the IL group compared to the TBL group. It appears that lower GPA students may benefit from post lecture assessment. Jakobsen and Daniel (2019) concluded that lower GPA students may also benefit from lecture that allows the adult learner to construct knowledge with the afforded by the direct instruction used in IL. These findings support that TBL is at least as effective as IL. Interactive components, such as in-class discussion, think-pair-share, and small group interactions may be responsible for the efficacy of the learning (Akers & Flann, 2016; Jakobsen & Daniel, 2019). As Jensen, Kummer, and Godoy (2015) found in their study involving the flipped classroom with integrated active learning components compared to a traditional (nonflipped) classroom with active learning strategies, interactive learning components, when used with either instructional approach were the mediating factor in learning. It is important to have a toolbox of many strategies to facilitate learning for adults, which include TBL and interactive strategies to engage the learner. The instructor is responsible for tailoring the instructional approach to the learners in the classroom, their experiences, learning styles, and their prior learning or knowledge (Jakobsen, 2018).

Researchers have explored the use of CLS with nursing students at the community college level. It is important for nurses to have skills that envelope the "mind, body and spirit" (Blesch, 2015, p. 63). Simulation has been explored as an innovative teaching strategy to allow students to process new material they are applying with patients, such as spiritually caring for their patient and being able to respond to the patient with appropriate caring verbal responses (Blesch, 2015). In a quasi-experimental study using a repeated measure with analysis of variance design, 26 nursing students participated in a study in which the teaching approaches of lecture and simulation were paired with modeling key behaviors to build caring behaviors centered around spirituality were used for students pursuing associate nursing degrees at the community college level (Connors et al., 2017). Several different teaching approaches were used to develop the understanding of the material and demonstration of the behaviors nursing students should use with patients to spiritually care for the patients when conducting an assessment. The teaching strategies included the classroom lecture, assessment with a patient requiring students to apply the skills introduced in the lecture, pre-simulation exercise, simulation with interruption for teaching, and reintroduction of the simulation. The simulation exercises were a form of small group learning in which the students could debrief with each other about the strategies to use in the simulation experience (Connors et al., 2017) The Competence and Confidence Tool, a Likert scale measure, which has an internal reliability of .91 was adapted and used to measure the participants' perceived confidence and competence in delivering spiritual care to the patients. The sample size, although small, was sufficient as the as the participants were assessed on three instances using the

same instrument following the exposure of one of the three teaching approaches. Participants self-evaluated on the constructs of competence and confidence following each teaching approach. The participants reported the most significant changes in competence and confidence levels following the simulation with debriefing, a form of CLS. Participants recommended one additional simulation and debriefing session to further strengthen the use of spiritual comfort and care with patients. There are many CLS methods that can be used with adult learners.

Open dialogue and the sharing of personal experiences is a simple classroom strategy that easily allows adult learners to learn from each other (Santos, 2018). Another CLS for adult learners is action learning. Middlehurst, Cross, and Jeannin (2018) described an action learning as a meeting involving real-world problems that students encountered outside of the classroom or the group. In action learning, students deconstructed and discussed the problem, with the other members actively listening and collaboratively guiding their fellow students. A major principle in action learning is that the other members of the group do not explicitly provide answers or solutions to the problem. Instead, they probe and ask questions to allow the student who presented with the problem to gain insights and arrive at the solution themselves, eventually leading to the student applying what they learned in the real-world situation (Middlehurst et al., 2018). This strategy also supports the development of inquiry strategies which serves to develop higher level thinking skills (Middlehurst et al., 2018; Santos, 2018). Such strategies may be suitable for adult learners who may already be practicing or who may already have some experience within their field of study because this strategy helps the

learners make internal connections to the problem and their own experiences.

Collaborative Learning Challenges

Students can become frustrated with CLS approaches if the methods are not structured appropriately. Even though many instructors still rely on lectures in the classroom, many online instructors rely on group work. However, online students have expressed frustration about these collaborative activities. Capdeferro and Romero (2012) studied the negative emotion of frustration when university students from Spain were engaged in collaborative learning online to pinpoint the main cause of the frustration. The researchers found that the most common cause of frustration was that collaboration did not occur in the same way it would in the classroom and was asymmetric instead. The students reported difficulties in sharing goals, organizing groups, and lack of balance in contributions by other students. They also had trouble communicating and did not like getting the same grades as other group members. Capdeferro and Romero stressed the importance of gaining knowledge about the sources of frustration so that online instructors could improve the quality and design of group involvement. Additionally, in Molinillo, Aguilar-Illescas, Anaya-Sánchez, and Vallespín-Arán's (2018) study of a social web-based collaborative learning environment, the online setup was purported to bring more conflict between students. The role of the teacher in an online environment is crucial to keep students in harmony and promote active collaborative learning without conflict (Molinillo et al., 2018). Technology tools have been used to promote small group

discussions in online learning environments.

One factor to consider in online collaborative learning could be whether interactions were synchronous or asynchronous. Vuopala, Hyvönen, and Järvelä (2015) studied online programs of three different universities in Europe. They found that synchronous and asynchronous interactions produced different types of collaborative outcomes. The synchronous interactions, which involve chat applications, allowed students to have reciprocal discussions where ideas are exchanged and immediately responded to. This led to more answers and comments being produced in such an environment, although there were also more informal discussions. Alternatively, the asynchronous programs involved more formal planning and organization (Vuopala et al., 2015). Synchronous learning was also found to increase perceptions of belongingness and positively affected students more than asynchronous learning, thereby engendering more positive collaborations (Peterson, Beymer, & Putnam, 2018). A drawback of synchronous learning is that students found themselves lacking time to absorb and properly reflect on lessons (Kutnick & Joyner, 2019; Vuopala et al., 2015). Kutnick and Joyner (2019) addressed these disadvantages by proposing semi-synchronous learning, which allowed the flexibility of asynchronous learning and the reciprocal exchanges in chats of synchronous learning.

The role of the instructor is prominent in effective implementation of collaborative learning to promote accountability and learning for all students. Some researchers have argued that, while collaborative learning has its benefits, it may overshadow the value of individual learning. Particularly, free riders or students who do

not contribute to the shared group goal, are problematic in collaborative learning (McCall et al., 2018; Yadin & Or-Bach, 2019). Collaborative learning was purported to promote only partial learning where students do not follow the whole process of learning and are not responsible for the outcomes as it did not fully reflect their thinking (Yadin & Or-Bach, 2019). Consequently, it is important for the instructor to structure collaborative learning so that all learners are responsible for comprehending the learning objectives.

Instructors must know the experiences and learning styles of their students and plan accordingly. In a developmental math class in an urban Midwestern community college, Cafarella (2014) interviewed 20 developmental math instructors on their best practices including acceleration, collaborative learning, organizing as an art, many low stake tests, and manipulatives. Cafarella found that although collaborative learning could help students, the instructors themselves had to gauge class composition, along with their familiarity and comfort with the technique. Some researchers have examined the differences between collaborative versus individual endeavors for college level students.

Chace (2014) in a 3-year-period at Salve Regina University studied students' research projects and assessments on environmental impact. Chace conducted both qualitative and quantitative measurements on the projects presented orally and in writing. The end goal of the collaborative project was to mitigate the library's carbon footprint by addressing the issues and making recommendations. Those who worked collaboratively received higher grades not only on their projects but also on tests. Their grades were higher overall than those who worked individually. Chace argued that collaborative learning was validated by the findings, especially in scientific gateway courses for

students in science, technology, engineering, and math majors. The instructor's knowledge of students and how to structure a facilitated learning environment is critical to the students' willingness to collaborate and to the development of their knowledge of the course content and constructs that the instructor is seeking to mediate.

Lam (2014) found collaborative activities to be helpful not only for the students but also for the teacher regarding individualized conversations with students, as well as informal observations. Lam acknowledged that "collaborative learning could promote the development of learning skills, formative assessment opportunities, and growth of mathematical understanding" (p. 34). Still, Lam (2014) had challenges. Compared to high school, students in college often needed prompting to collaborate, and the teacher needed to consider the cultural and age diversity in the classroom. To counter this challenge, Lam argued that students needed to get instructional guidance on how to contribute well, talk to their peers, and develop mathematical ideas. Lam suggested that instructors needed to remain clear about expectations in collaborative learning.

Collaborative learning could also involve professional institutions for more practical learning. MacLaren et al. (2017) purported that the use of intra-disciplinary groups in collaborative learning allowed students to get more practical experiences reflecting real-world settings. Allowing students to work with other students in related fields on common project practices their collaborative skills, knowledge application, and a sense of their professional roles within a wider team (MacLaren et al., 2017). Long and Carlo (2013) integrated student groups to design a decentralization of a manufacturing firm that made fuel cells. The researchers found that students had positive feedback for

this integrated project. The researchers suggested several strategies to implement such multi-institutional group projects collaboratively.

Researchers have conducted comparison studies in which CLS implementation was compared a lecture style approach including minimal interactions with other students. LoPresto and Slater (2016) examined collaborative learning compared to self-guided learning that was based upon lectures and assignments. The researchers examined 264 students using pre- and posttests to assess how collaborative learning improved examinations tests. LoPresto and Slater targeted the assessment towards teaching astronomy at community colleges. The researchers also applied a Likert-style attitude survey to assess students' preferences for each modality after the end of each class. LoPresto and Slater reported that pre- and posttests improved from 42% to 49% in traditional lectures. However, with collaborative learning, pre- and posttests improved from 42% to 72%. Lastly, surveys noted that students felt that collaborative learning assisted in their learning processes. LoPresto and Slater's research is a notable example of the effect of collaborative learning versus traditional learning. Additionally, the researcher's examination remains one of the few identified examples of comparative assessments at the community college level.

To summarize, the researchers throughout this section indicated the importance of collaborative learning as a pedagogical technique to improve the efficacy of student academic outcomes. According to Lim et al. (2018), the more college students are active in collaborative learning settings using learning strategies such as group presentations, peer teaching, project-based learning, and group discussions, they are more likely to

develop expertise that will help them succeed in and out of college settings, especially in the millennial generation wherein students are less tolerant of traditional teaching methods. However, despite the variety of assessments considering collaborative learning as a pedagogical technique and examining the usefulness of this model in the classroom, there is room for more empirical considerations of how collaborative learning compared to traditional lecture models. As such, the following section introduces the topic of the lecture as a model.

Lecture Method of Teaching

It is important to understand the lecture method of teaching and the efficacy of this approach in college instruction. This section is designed to establish the current understanding the history of the lecture method, modifications to the lecture method, a of the comparison of lecture methods, to collaborative learning, and to assess how this study fills the gap in contemporary academic literature. Future sections will compare lecture methods with collaborative learning to assess the gap in academic literature. The lecture method has been used in education throughout history, since Aristotle's *Rhetoric* (Sciullo, 2017). The lecture method has evolved over the years. Modifications of the lecture method have been employed in college instruction and have been found to be beneficial for student learning.

Traditionally, most college instruction has been delivered through lectures in which the instructor generally stands in front of the classroom and delivers information to the student body (Morrison, 2014). Such a teacher-centric setup is commonly cited in the literature as "the sage on the stage" (Kramer, 2017, p. 246). Older definitions of lecture

notably omit the audience of such lectures, focusing on the speaker instead (Sciullo, 2017). Newer perspectives defined lecture as a "form of direct instruction that can be defined as the design and manipulation of experiences by the instructors to enable students to achieve desired curricular outcomes – the delivery of a lecture" (Powell, 2011, p. 200). Although the newer definition already addressed the audience, the students, the method of lecturing appears to remain a teacher-centered method (Kramer, 2017). Some researchers have noted the benefits of lecture methods for college students.

The lecture method has been a topic in the literature for the past few years as its value in education began to be challenged in light of more innovative interactive methods (French & Kennedy, 2016). Generally, researchers have purported that the lecture method is obsolete in the 21st century (De Los Santos, Kupczynski, & Bain, 2016; French & Kennedy, 2016; Kohli, Sukumar, Zhen, Yew, & Gomez, 2019). De Los Santos et al. (2016) noted that the lecture method might be deficient in catching students' interests, exclusive to traditional learners, and lacking in student engagement and support. While lectures may indeed be more passive than innovative collaborative learning, the lecture approach presented more active engagement than student reading (Magana, Vieira, & Boutin, 2018). As such, undergraduate and graduate engineering students preferred the lecture approach to more passive learning activities (Magana et al., 2018). Some researchers proffered that lecture style instructional approach does not allow for individualization of students' learning styles.

The recognition that students have different learning styles and rates renders the lecture method inappropriate for meeting all students' diverse learning needs (Kohli et

al., 2019). There were, however, certain benefits associated only with lecture methods such as the enhancement of notetaking and listening skills (French & Kennedy, 2016; Meyer & Hunt, 2017). Meyer and Hunt (2017) purported that the fault in lecture methods may lie in the implementation rather than the method itself. The problem, as cited by Meyer and Hunt, may lie in the negative stigma already established in the literature surrounding lecture methods. Lecturers, especially in large classes, have reported that it is difficult to engage with most students, leading the students to feel less responsible for learning (Hong & Yu, 2017). The findings reported by Hong and Yu were that the lack of student engagement was related to students not being required to think critically in such lecture-centered settings (Hong & Yu, 2017). Additionally, students experiencing passive lecture methods often reported the lectures as uninteresting, which consequently affected their motivation to learn (Alzahrani, 2018). Therefore, passive lecture methods have been associated with low learner engagement and motivation to learn. Students must be exposed to more complex, hands-on experiences. These strategies when embedded in lecture approaches require sustained involvement and collaboration. Unfortunately, instead of engaging students using specific strategies to gain the attention and involvement of the learning, some instructors continue to use the lecture style approach referred to as the so-called sage on the stage, sometimes resulting in the lecture being ineffective and causing students to lose interest instead (Kramer, 2017). The level of activity, however, may exist in a continuum rather than a binary conceptualization.

Researchers have sought to compare the effects of lecture style instruction to the collaborative learning style in college settings. The first example is provided by

Retnowati, Ayres, and Sweller (2017) who examined the effectiveness of lecture-style versus collaborative learning in mathematics lectures at the collegiate level. The researchers noted that within the field of mathematics, assessments of traditional mathematics teaching and collaborative learning had yet to be conducted. As such, the researchers examined a sample of 182 students in traditional lecture-style mathematics classes and 122 students in collaborative learning style mathematics courses (Retnowati et al., 2017). The researchers measured effectiveness based upon the ability to complete increasingly complex mathematic problems. ANOVA statistical analysis was used to assess the effectiveness of the two groups. The researchers found that statistical evidence did not indicate that collaborative learning was more effective than lecture styles. Retnowati et al. argued that this may be due to the tendency for some students to feel intermediated or timid towards working on mathematical questions surrounded by others. The researchers argued that their findings indicated the need for further researchers to assess if collaborative learning is effective for some classes, versus others, such as mathematics (Retnowati et al., 2017). Mathematics anxiety indeed existed in students who may encounter stress and perceive mathematics to be a form of punishment (Olanrewaju, 2019). As such, even though collaborative learning positively influenced mathematics achievement, mathematics anxiety negatively influenced mathematics achievement as well (Olanrewaju, 2019). Researchers have examined the use of collaborative learning compared to lecture style in other content specializations for college students.

Conversely, Sajid et al. (2016) examined collaborative learning, compared to traditional lecturing, and found positive results. The researchers assessed collaborative learning versus traditional lecture style in a sample of 127 students. Data were obtained from student feedback at the end of the semester. Students in the sample were enrolled within the College of Medicine and were involved in classes on pathophysiology. The researchers reported that 22% of students felt that lectures should be lecture style. Conversely, 73.1% reported that they preferred the collaborative learning approach. However, 20% also felt that they could maintain mastery of the learning materials with lectures being recorded and placed online. Overall, Sajid et al. reported that it appeared that collaborative learning was considered more effective and useful for students within their sample. The researchers argued for more studies to assess the comparisons between teaching methods. Possible reasons for these findings different from Retnowati et al. (2017) are that Sajid's assessment was conducted on a non-mathematics class; however, further research is needed to assess for differences in the lecture approach versus collaborative learning.

Similarly, within the medical field, Schwartzstein and Roberts (2017) noted that there is an increasing trend within medical schools to end lecture-based styles in college. The researchers noted that more medical schools were reporting using methods of collaborative learning, in-class activities, and problem-based learning than lecturing styles. Schwartzstein and Roberts did not perform a comparative assessment but noted that the trend appeared to indicate that collaborative learning techniques were more effective, or at least more preferred by students and professors. Schwartzstein and

Roberts argued that future research should examine differences between such methods, further indicating the need for this study to fill the gap noted by the author. Ataei, Hamedani, and Zameni, (2020) likewise noted that the literature on medical education favored collaborative group learning rather than traditional lecture methods. Collaborative learning was related to a higher level of learning, more student interest and satisfaction, and higher levels of encouragement for class participation. Furthermore, traditional lecture-based practices were purported to be time-consuming and not cost-effective (Ataei et al., 2020).

In the related field of veterinary medicine, students from Universidad Andrés Bello in Chile preferred collaborative learning to lecture-based learning as well focusing on specific reasons students preferred CLS (Diamond, Vasquez, Borroni, & Paredes, 2019). These veterinary students shared how collaborative learning allowed for increased feedback from their peers, reinforcement of concepts otherwise forgotten in lecture classes, and building of skills necessary for long-term practice. In this study, most of the resistance from collaborative learning stemmed from conflict with team members. Otherwise, students were generally satisfied with the opportunity to collaborate with their peers (Diamond et al., 2019). Collaboration skills are applied in CLS approaches.

Collaboration is required skill for most careers and is essential for the social aspects of scientific investigation leading researchers to study collaboration in lecture and collaborative groups in a university setting. Specifically, researchers sought to increase collaboration in Biology Science lab classrooms using cooperative learning modules to consider the effect of structured interdependency on engagement and achievement during

learning as was the focus of early studies involving cooperative learning (Blesch, 2015; Buchs et al., 2010; Jensen et al., 2002; Johnson & Johnson, 1999). Interdependency was the factor examined in this study as a key element in cooperative learning (Blesch, 2015). Ten classrooms of students totaling 251 students were instructed using a collaborative group approach with interdependency features similar to the Jigsaw method of instruction used in Cooperative Learning for a 9-weeks (see Slavin, 1980). Ten classrooms of students totaling 232 students were instructed using the lecture method for the same period using the same curriculum content. The findings suggested that there were no significant differences in achievement performance for the students participating in cooperative learning compared to those receiving common lecture practice instruction (Blesch, 2015). However, substantial changes were observed in whole-class collaborative engagement and individual-level engagement for undergraduate students participating in the intervention group. The implication is that interdependency can be used to increase peer cooperation (Blesch, 2015; Slavin, 1980). Perception of benefit, reciprocity, and friendship are predictors of engagement and interdependency. Thus, the students' perception of cost relative to investment of may be a consideration for instructors in designing effective teaching approaches for undergraduate Science students (Blesch, 2015). It is important that undergraduate students experience authentic collaborative environments in which they internalize the social aspects of the scientific process. Instructors must intentionally structure learning processes to provide opportunities to collaborate and to rely on one another thus serving to provide other skills needed for the

real-world careers (Blesch, 2015). Researchers noted that the use of multiple data collection tools yielded more valid data than if a single measure had been used.

Several data collection tools were used to determine the effect of the intervention and the researchers did not rely only on student self-reports. Individual observations, class observations, and self- reports were implemented over multiple measures and triangulated (Blesch, 2015). The researchers proffered that using several data collection tools afforded them to discern the findings of instructional approach of collaborative grouping and interdependence. Hence, future work should include multiple sources of data to triangulate and determine the findings. Pandero et al. (2016) noted that students could potentially self-report the over presence of certain abilities or experiences and confirmed the importance of other data sources for validation of findings.

Some researchers have proposed that collaborative learning methods and lecture methods may be used together. Marei, Donkers, Al-Eraky, and Van Merrienboer (2019) investigated the use of virtual patients or simulations in a dental school during the academic years of 2015 and 2016. In addition to the traditional lecture methods, students were tasked to work on the virtual patient in either a collaborative and deductive manner, an independent and deductive manner, and an independent and inductive manner. The results showed that the collaborative group appeared to have better knowledge acquisition, retention, and transfer than the other two groups. Marei et al. purported that collaborative learning methods after lectures represented the most efficient instructional method out of the three methods.

Researchers have studied a blended approach using both lecture and collaborative learning strategies. In the field of business education, Ordu and Abdulkarim (2018) proposed that lecture method need not explicitly compete with collaborative learning, as the two methods could be combined to provide opportunities for gaining knowledge and applying them to real life. A total of 272 students from the Federal College of Education (Tech.) Omoku during the academic years of 2013 to 2014 were investigated. These students were split evenly into two groups with one group undergoing collaborative learning and the other group undergoing an action learning approach in addition to the lecture method. The researchers found that both approaches similarly improved marketing skills. Notably, they also found that the action learning group showed more significant improvement in financial management skills. Ordu and Abdulkarim purported that the interaction of the smaller action learning group with the bigger class group and other small groups allowed them to see more diverse perspectives, leading to more learning. The researchers concluded from this study that collaborative learning and action learning, which both involved student engagement and interaction, blended well with lecture methods, and could thus be used in combination to provide more learning opportunities for students (Ordu & Abdulkarim, 2018).

The field of engineering has also been the focus of previous research on collaborative learning, as it involves technicalities that are often taught in a lecture-based setup. Nerona (2017), for instance, investigated 287 engineering students at Saint Louis University in the Philippines regarding the difference between a collaborative learning environment against the traditional lecture-based setup. The group that underwent

collaborative learning was found to have higher scores in collaborative learning activities, problem-solving activities, feedback, interaction with faculty/peers, problem-solving skills, communication skills, and group skills as compared to their lecture-based counterparts (Nerona, 2017). Kalaian, Kasim, and Nims's (2018) meta-analysis undergraduate engineering and technology classes in the literature supported this finding. They noted that, among the various studies, small-group learning methods, including collaborative learning, had more favorable results than traditional lecture methods (Kalaian et al., 2018). However, larger groups may need different considerations.

Some students in Opdecam and Everaert's (2019) study of undergraduate students in a large class in Europe preferred the lecture-based setting, as it gave the freedom to learn at their own pace. Some students also indicated that they preferred to work alone as compared to working with a group. Opdecam and Everaert then proposed a choice-based learning method where students could choose if they preferred individual lecture-based formats or collaborative learning.

To summarize, despite a few comparative assessments (LoPresto & Slater, 2016; Sajid et al., 2016; Schwartzstein & Roberts, 2017; Retnowati et al., 2017) and multiple ascertains previously covered regarding the benefits of collaborative learning (Béres et al., 2012; Liu et al., 2013; Mohammadjani & Tonkaboni, 2015; Opdecam et al., 2014; Wolfe, 2016) there remains a lack of literature that assesses how collaborative learning is effectual compared to lecture method style of teaching. This is especially true when searching for literature within the past 5 years (e.g., 2015-2019). Problematically, these assessments are limited and are not focused upon how these methods are comparatively

assessed at the community college level. Within reviewing studies, using the aforementioned search strategy, research related to comparing lectures and collaborative learning methods was not evident at the community college level.

Summary

The review of the literature provided an overview of the research related to collaborative learning and lecture teaching. The review of the literature showed how researchers supported one using collaborative learning in the classrooms. Nokes-Malach et al. (2019), stated that CLS is a style of learning in which students work together to achieve shared goals or create a meaningful project. Wang and Chen (2008) stated that previous studies confirmed that matching types of instructional styles of teaching with learner's styles could enhance learners' information and communication technology skills and motivation.

In addition, traditionally, most college instruction has been delivered through lectures in which the instructor generally stands in front of the classroom and delivers information to the student body (Morrison, 2014). Whereas, other researchers concluded that traditional lecture might be failing to produce results because students are not engaging in the lessons. It was reported that lecture work in the classrooms is simply irrelevant and does not promote higher-order thinking skills. Overall, a gap was identified in the review of literature assessing collaborative researchers, compared to, traditional lecture methodologies in community colleges. Additionally, teaching styles need to accommodate the diversity of students in the classroom. Despite the disadvantages of lecture methods, it may not be completely obsolete in the field of education. Gubera and

Aruguete (2013) hypothesized that despite the popularity of collaborative learning in college, it was unclear if it should replace traditional learning entirely. Therefore, the purpose of this quasi-experimental, causal-comparative, repeated measures research study was to examine the difference in change scores between a pre- and posttest of the PCH assessment of students who were taught with the collaborative method and students who were taught with the lecture method. In this chapter, I provided needed information on collaborative learning and lecture teaching, pertinent to the study to support the research. In the following chapter, I provide facts to support the design and methodology.

Chapter 3: Research Method

The purpose of this quasi-experimental, causal-comparative, repeated measures research study was to examine the difference in change scores between a pre- and posttest of the PCH assessment of students who were taught with the collaborative method and students who were taught with the lecture method. This chapter includes a discussion of the processes used to collect, analyze, and interpret the data from the students at the community college in Mississippi who were taught using either a lecture-based teaching method or collaborative learning. In the following sections, I explain the research methodology: the research design and rationale, the methodology, population, sampling and sampling procedures, recruitment, data collection, instrumentation, data analysis method, threats to validity, ethical procedures, and a summary of the methodology.

Research Design and Rationale

Research Design

In this study, I used a quantitative quasi-experimental, causal-comparative, repeated measures research design to examine relationships between numerically measurable constructs, based on recommendations from Howell (2010). The archival data were collected prior to this study in the normal course of educational processes, in which case the students, the participants in this study, were not randomly assigned to groups. A repeated measures design was employed because the participant outcomes are measured at two different occasions: once before and once after the treatment. A causal-comparative design was used because I investigated the causal relationship between the variables. The independent variable in this study was the teaching method. In one group,

students were engaged in collaborative learning, while the other group was exposed to lecture-based teaching methods. The dependent variable was the change in scores on the PCH between a pre- and posttest.

Rationale

The primary reason a quantitative approach was appropriate for this study is because I sought to compare two approaches to learning in which student performance was measured numerically and available as archival data. The alternative, a qualitative approach, which is used to gain an in-depth understanding of a phenomena, could not offer evidence of causality, which was the intended purpose of this study. Additionally, access to potential study participants for data collection was limited. A mixed methods approach was not applicable because of the qualitative data collection limitations; however, the use of archival data reduced the amount of time taken to collect a sizable amount of student data. Because the data were readily available, there were no noticeable resource constraints, which made the quantitative method the most appropriate to answer the research question for this study.

Methodology

Population

The community college selected for this study is 1 of 17 community colleges within the state of Mississippi. The community college provides educational and training services to approximately 2,400 diverse students every year. The enrollment in the PCH course of interest was exactly 150 students for that semester. The racial breakdown for students enrolled at this community college was 93.0 % African American, 0.06% Native

Hawaiian, 5.18% White, 0.29% Hispanic of any race, 0.23% Nonresident Alien, and 0.93% race and ethnicity unknown.

Sampling and Sampling Procedures

To select the data for this study, I used a convenience sampling strategy. Convenience sampling is a nonprobability sampling method that does not allow for random selection of data or participants (Creswell, 2014). I used convenience sampling because the archival data were easy to access and gather from the college. The data came from the 150 undergraduate students enrolled in the PCH course. This group of students comprised high school graduates and returning freshmen, sophomores, and transfers from other collegiate schools who met the enrollment qualifications at the selected college based on admission requirements. All other students (i.e., those not in the PCH course) were excluded from participating in the study. The PCH course was designed to acquaint students with basic concepts and methods related to a wide variety of health-related issues. Instructors in the Health and Physical Education department taught using lectures or collaborative methods.

To analyze the data, I planned to use an independent sample *t* test to compare the two groups, corresponding to the two instruction methods. However, before I could analyze the data, I had to determine how many student PCH test scores I would need from the archival data files. I anticipated discovering a generally accepted medium effect size of $d = .30$, based on recommendations from Cohen (1988). Following the suggestions of Faul, Erdfelder, Buchner, and Lang (2014) and using an alpha level of .05,

a medium effect size of .30, and a power of .8, the G*Power 3.1.7 analysis recommended a minimum sample of 128 participants (i.e., 64 in each group)

Procedures for Recruitment, Participation, and Data Collection

After receiving approval to conduct this from the community college in Mississippi and the Walden Institutional Review Board, I began collecting archival data on students who had been enrolled in the PCH course. The instrument used for the pre- and posttest was the PCH exam, which the PCH textbook publisher designed and supplied to the instructors of the PCH course. Instructors taught 3 of the 6 scheduled sections of the PCH101 course using the lecture instruction method, while the instructors taught the other 3 using collaborative learning. The college administration staff collected the students' archival data and stored the data in the student information system using its normal operating procedures.

In preparation for this study and prior to the semester beginning, the department chair offered me support by asking instructors if they were willing to participate in the study. Instructors who agreed to participate were asked to teach their sections of the PCH course using only one teaching method, either lecture or collaborative learning. The instructor agreed to not alter their instruction method during the study. The instructors using the lecture method planned the presentation using factual information with the aid of audiovisuals, such as overhead transparencies, slides, or visual aids, to support the presentation. The instructors provided students with handouts, which the students could take notes on pertaining to the lecture material. The instructors also observed the students

to determine if they had enough time to process the information and take notes. At the end of each class, the instructor offered a review of the lesson.

The instructors who used a collaborative method gave specific instructions for the work period. The instructors worked with the students using the following activities:

- a think, pair, share group activity during which the instructor composed a question that would require the students to use synthesis, evaluation, or analysis skills to solve the problems as a group activity and
- a catch-up, which involved the students working with partners or small groups to compare their notes and ask each other specific questions about the lesson to ensure comprehension of the lesson.

The instructors using collaborative learning strategies also had students work on case studies. The instructions given to students included a timeframe of the collaborative work period. All students were instructed to share in the discussion of the lesson. The instructors informed students that they must work as a team. Finally, the instructors informed students that the work period was a group performance and not to focus on it being a grade. Instructors using the collaborative method of learning sections used textbooks, Internet resources, projectors, interactive boards, and prearranged groups of 3 to 5 students as methods of instruction. Students were actively engaged in hands-on activities, which the instructors monitored for student participation. The students completed the course with a posttest to measure their learned knowledge. From the results of this posttest, I, as the researcher, and the instructors gained more data about the teaching method and whether it was effective in raising grade scores. The posttest

assessed objectives taught during the first 4 weeks of class with content from the PCH course textbook.

I had to obtain permission to use the archival student data from the college president (see Appendix A). With the archival data, I was able to examine the entire population of students in the course. I called the department chair and explained the purpose of the study and asked for an appointment to speak with them face-to-face. The department chair granted me with an appointment met with me to discuss the research project further. The department chair found my idea for the research interesting and noted that she would support me in this endeavor as well as gave me permission to use the archived PCH test scores and conduct the study (see Appendices E and F). During that same meeting, the department chair showed me the students' PCH test scores and scheduled another appointment so that she could provide me with the raw data scores to conduct the study. I made the follow-up appointment, and the department chair downloaded a Microsoft Excel file with a set of de-identified data from the student information system to an external hard drive that was only used for this study. Each student was assigned a numeric identifier in the data set because in a repeated-measures study, the pre- and posttest score records for each student had to be matched.

Because the PCH course is a core and service health course and most of the students are required to take the course, the administration was able to post information concerning the study for that 9-week section of the course on the student electronic message board. The message explained to the students who would be enrolled in the course for that section that their test scores could be potentially used in a study. All

students were informed about the study and that their test scores could be used for further research, and all the students who enrolled in that section of the PCH course consented to their test scores being used confidentially.

The study data in the form of the students' PCH scores were divided into six individual sections consisting of 150 enrolled students whose instructors taught using either lectures or collaborative learning. Each section closed when a total of 25 students had enrolled in the course. Across the two groups, 50% of the students were taught using the lecture method, and the other 50% of the students were taught using the collaborative method. I did not include the names of any students in the narrative of the study; instead, I assigned each participant a confidential numeric identifier. The subjects for this study came from a variety of demographic backgrounds and academic majors.

Instrumentation and Operationalization of Constructs

The college instructors administered the PCH assessment twice that semester as the pre- and posttests to assess the knowledge of the students enrolled in PCH course knowledge. The adopted textbook for the PCH course was Insel and Roth's (2010) *Connect Core Concepts in Health* published by McGraw Hill. The publisher provides the PCH pre- and posttest as part of the ancillary material for the textbook. Objectives assessed are supported by the Southern Association of Colleges and National Content Standards – Physical Education teaching guidelines and benchmarks. The test, used for the pre- and posttest in this study, consisted of 40 identical questions totaling 100 points. Each correct question received a score of 2.5 points. The benchmarks or standards covered included (a) understanding your health, (b) stress, (c) relationships, and (d)

parenthood. Each test was administered and scored by the instructor. I compared participants' change scores between the traditional lecture and collaborative methods groups. The change scores were calculated by analyzing the difference between the pre- and posttest scores. The change scores were treated as a continuous variable.

Reliability

According to Frankel and Wallen (2009), reliability refers to the consistency of the scores obtained from individuals, regardless if from one administrator of an instrument to another or from one set of items to another. Three kinds of reliability exist: test-retest, alternate (or parallel) form, and internal consistency (Creswell, 2014). Inquiries with McGraw Hill and the school revealed that the reliability of the PCH test had not been established. Nevertheless, the instrument had been used by instructors from the Department of Health, Physical Education, and Recreation for approximately 8 years to assess student learning in PCH101 and its results supply the data needed to study the desired phenomena. Therefore, despite the lack of reliability information and because of the limited scope of this study, the decision was made to use the data as recorded.

Validity

Lodico, Spaulding, and Voegtle (2010) stated that validity was mostly formulated through an in-depth review of the instrument, including an examination of the instrument's items to be certain that these were accurately measuring the content or objectives tested, and by relating scores on the instrument to other measures. The three kinds of validity are construct, criterion, and content.

Construct validity assesses how well a construct measures what it claims to measure (Pedhauzer & Schmelkin, 1991). Criterion validity assesses how well a measure is related to an outcome (Creswell, 2014). Content validity covers how well the test in its entirety covers the entire domain the test is designed to measure (Salkind, 2010).

The instrument selected for this study, developed by a third party, contained a set of multiple-choice questions, each with only one correct answer. While the author of the test did not provide official validity measures for the test, faculty at the study site acknowledged that all three validity criteria can be considered as upheld, assessment which was used in their decision to use the test for the PCH101 course for the past 8 years.

Data Analysis Plan

To answer the research question posed in this study, presented below, there were two possible approaches: (a) study the change in scores between pre- and posttest and (b) use a statistical test designed for repeated measures studies. Studying the change in score is simpler, more intuitive, and easier to interpret. Nevertheless, its usefulness depended on showing that the participants entered the coursework at similar levels. That is, their pretest scores were homogeneous. If that was not the case, then a statistical test specifically designed for repeated measures studies, which can account for the variance introduced by the different initial levels of the participants, such as repeated measure ANOVA, was to be used.

The research question and its associated hypotheses this study was designed to answer were:

RQ: What is the difference in PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period?

H_0: There is no statistically significant difference in the PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period.

H_a: There is a statistically significant difference in the PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period.

To answer the research question, I chose to perform an independent sample *t* test to determine whether the lecture-based teaching method would have an influence on the change in students' scores. An independent sample *t* test is an appropriate statistical analysis when the goal of the researcher is to assess the differences in a continuous interval level dependent variable between nominal groups (Tabachnick & Fidell, 2012). The continuous dependent variable corresponded to students' change scores between pretest and posttest. Before using the *t* test, its assumptions would need to be tested. The assumptions for the *t* test are normally distributed data, homogeneity of variance, and independence of observations. In this study independence of observations was observed because each data point represents data for one participant. Normality was tested using the Shapiro-Wilks test and the homogeneity of variance using the Levene's test. If these tests revealed that the assumptions were not met, an alternative test, the Mann-Whitney U, was to be used. An additional statistical assumption to be met was that the participants

in the two groups should be at similar levels of knowledge when they enter the course, which means their pretest scores needed to be homogeneous. The *t* test was chosen for this analysis, to compare the pretests scores between the two study groups.

Threats to Validity

Threats to Internal Validity

There may be confounding variables that influence the relationship explored between the variables of interest (Howell, 2010). These variables include but are not limited to maturity level of the student, recognition of test question due to the test/retest nature of the instrument, lack of knowledge concerning all instructional activity in the class. The potential influence of these unexamined covariates was recognized in the interpretation of findings in Chapter 4.

Threats to External Validity

Threats to external validity corresponded to sections of the study that created bias in connection with the specific steps taken to collect data and interpret of measured findings. Caution was applied when interpreting the findings, and I did not assume that the statistical results could automatically be linked to the greater population of interest.

Ethical Procedures

As in any body of research, ethical concerns are paramount when planning, conducting and evaluating research (Cozby, 2004). I complied with the Walden University ethical guidelines and strove to prevent any foreseeable risk or harm to participants. Prior to launching the study, I obtained approval of the research from the Walden Institutional Review Board (Approval Number 06-27-17-0118836), and written

permission from the college president (see Appendix A) and the department chair (see Appendixes E and F) in Mississippi. I received deidentified data from the department chair. Each participant was assigned a confidential numerical identifier, and no personal characteristics were recorded.

I securely stored the data on an external hard-drive. The conventional safeguard method for data storage was within a locked file in my residence. I will securely hold all data for a period of 5 years after the research is completed, and then destroy all corresponding files.

Summary

This chapter included information that explained and justified the use of the selected research methodology and design used for this quantitative quasi-experimental, causal-comparative, repeated measures research study. Traditionally the lecture-based teaching method was used in all classrooms, schools, and colleges. Yet, researchers have found that student-centered collaborative learning methods brought better results (Burns et al., 2014; Liu et al., 2013; Opdecam et al., 2014). To examine this relationship and to answer the research question the quantitative method was the ideal choice for this study. This chapter included detailed information about the population of interest and the sampling, recruitment, participation, and data collection procedures. Moreover, the chapter included information about the test instrument, its reliability and validity, and ethical procedures. The next chapter will include the reported results of the study.

Chapter 4: Results

The purpose of this quasi-experimental, causal-comparative, repeated measures research study was to examine the difference in change scores between a pre- and posttest of the PCH assessment of students who were taught with the collaborative method and students who were taught with the lecture method. In line with this purpose, I collected data to address the following research question: What is the difference in PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period? Statistical analysis procedures were employed to accept or reject the null hypothesis that there was no statistically significant difference in the PCH change scores between students being taught by the lecture-based teaching method and those being taught by the collaborative learning method over a 9-week period. This chapter contains information about how the data were collected, the results of the analyzed student data, and a summary of the findings.

Data Collection

I conducted this study using archival data collected by the instructors at the Health, Physical Education, and Recreation Department of a community college in Mississippi during normal educational processes. The sample for the study included test score data from 150 male and female students of different ages, races, and ethnic backgrounds enrolled in six sections of the PCH101 course. Prior to the study, the chair of the Health, Physical Education, and Recreation department discussed the instructional background setup that the instructors had to use in the classrooms. Based on the

instructions from the Health, Physical Education, and Recreation department chair, three instructors taught the course using the traditional lecture method, while the other three instructors taught the course using collaborative learning strategies.

The data were collected using an instrument with 40 multiple choice questions covering topics from the course textbook. The instructors conducted a pretest prior to covering the information provided in the textbook, and a posttest during Week 9 after all the textbook topics were taught in class. All students were given 2 days of preparation before the six instructors administered the posttest.

Results

Prior to conducting the inferential analysis for hypothesis testing, I carried out preliminary analysis procedures in the form of descriptive statistics analysis based on the recommendations of Mertens, Pugliese, and Recker (2017). Tests were also performed to determine whether the data set met the assumptions required for inferential testing. Descriptive statistics, in the form of measures of central tendency, were also calculated using the data set. Descriptive statistics are typically used to describe the data and to examine the variables of interest, potentially before conducting inferential statistics (Creswell, 2014; Mertens et al., 2017). Moreover, descriptive statistics provide summaries of the data and are used to answer descriptive research questions (Creswell, 2014). In the case of this study, I did not have any descriptive research questions; therefore, the descriptive statistics were used as a supplement to understand the inferential results.

All students in the classes completed both the pre- and posttest. The 150 students were evenly split between lecture-based and collaborative-based teaching methods. However, only 149 scores were included in the inferential analysis because one pretest response for a subject in the collaborative learning group was not inserted properly so that participant was dropped from the study to maintain the integrity of the data set.

Table 1 presents the descriptive statistics for the pre- and posttest scores as well as the change between the two scores.

Table 1

Descriptive Statistics for Pre- and Posttest Scores and Change Scores

	Lecture-based classrooms			Collaborative learning classrooms		
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*
Pretest scores	73.64	8.12	75	75.81	7.68	74
Posttest scores	76.59	7.41	75	79.45	6.02	74
Change scores	2.95	5.51	75	3.64	5.87	74

The score means presented in Table 1 suggest that there was an increase in the overall posttest scores and that score gains were different between the two groups defined by the teaching methods. Nevertheless, further analysis was needed to determine if the difference was significant.

To determine if there were significant differences in average score gains between the groups defined by the two teaching methods, I used an independent sample *t* test based on recommendations from Tabachnick and Fidell (2012). If the pretest scores of the two groups were homogeneous and if the *t* test assumptions were verified, the continuous dependent variable would have corresponded to students' change scores between the pre- and posttest. The dependent variable was categorical, with two levels

defined by the two teaching methods. I preformed the first analysis to determine if the pretest scores of the two groups were homogeneous. I intended to use an independent sample *t* test if the assumptions were met; otherwise, a Mann-Whitney U test was to be used.

The data set included 150 pretest scores across the two groups defined by the teaching methods. Each student was taught using only one teaching method, which confirms the assumption of independence of observations. The descriptive statistics of the pretest scores are presented in Table 2.

Table 2

Descriptive Statistics of Pretest Scores

Group	*n*	*M*	*SD*	*Mdn*	*Skewness*	*Kurtosis*	*SE*
Group 1 (= 1)	75	73.64	8.12	73	-0.19	-0.64	0.94
Group 2 (= 2)	75	75.87	7.64	78	-0.65	-0.05	0.88

The remaining two assumptions of the *t* test were the homogeneity of variance across the two groups and normally distributed data for each group. I used Levene's test to determine homogeneity (see Table 3) and Shapiro-Wilks to test normality (see Table 4).

Table 3

Results of the Levene's Test for Pretest Scores

	df	*F* value	Pr(>F)
Group 1	148	0.54	0.465

Because the computed $p = 0.465 > 0.05$, I failed to reject the null hypothesis and the homogeneity of variance assumption was confirmed.

Table 4

Results of the Shapiro-Wilks Test of Normality for Pretest Scores

Group	*W* Statistic	*p*	Decision
Group 1 (= 1)	0.97	0.046	$p < 0.05$ = > reject null hypothesis
Group 2 (= 2)	0.93	0.0007	$p < 0.05$ = > reject null hypothesis

The results of the Shapiro-Wilks test show that both groups present significant departures from normality, and therefore, a nonparametric test, the Mann-Whitney U, was used. The results of the Mann-Whitney U test are presented in Table 5.

Table 5

Results of the Mann-Whitney U Test for the Pretest Scores

	PreScore
Mann- Whitney U	2304.000
Wilcoxon W	5154.000
Z	-1.932
Asymp. Sig. (2-tailed)	0.053

Because the computed $p = 0.053 > 0.05$, I failed to reject the null hypothesis. Therefore, no statistically significant difference was found between the two study groups on their pretest scores. Consequently, the scores gain/loss could be safely used to analyze the effects of the two teaching methods on student performance.

The next step in the analysis was to determine if the *t* test to compare score changes was appropriate to be used for the analysis by testing its underlying assumptions. The assumptions for the *t* test are normally distributed data, homogeneity of variance, and independence of observations. In this study, independence of observations was verified because each data point represents data for only one participant. I tested normality using the Shapiro-Wilks test and the homogeneity of variance using Levene's test. If these tests

revealed that the assumptions were not met, an alternative test, the Mann-Whitney U, was to be used. Levene's test showed that homogeneity of variance was verified as well.

Table 6

Results of the Levene's Test for Pretest Scores

	df	*F* value	Pr(>F)
Group 1	148	0.54	0.465

To verify the assumptions of normality, I conducted a Shapiro-Wilk test to determine whether change scores could have been produced by a normal distribution, based on recommendations from Razali and Wah (2011). The result of the Shapiro-Wilk test was significant, $W = 0.93$, $p < .001$, indicating that change scores were unlikely to have been produced by a normal distribution, and hence, normality could not be assumed.

Table 7

Results of Assumption Testing - Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Change Score	1	.136	75	.001	.952	75	.007
	2	.192	74	.000	.841	74	.000

[a]Lilliefors Significance Correction

Because of the failure to meet the assumption of normality, I moved to conduct a nonparametric test, the Mann-Whitney U test. The Mann-Whitney U test was used to compare the means of the two groups within the sample to determine whether the two-sample means were equal or not, based on the recommendations of Lai and Hong (2015). The findings of the Mann-Whitney U test, summarized in Table 8, indicate that there is no statistically significant difference between the two groups. Based on these results, I

failed to reject the null hypothesis because there was no statistically significant difference in the average changes score between lecture-based and collaborative learning methods.

Table 8

Mann-Whitney U Test for the Difference in Change Scores

	ChangeScore
Mann-Whitney U	2709.500
Wilcoxon W	5559.500
Z	-.252
Asymp. Sig. (2-tailed)	.801

a. Grouping Variable: Group

Summary

The results indicated that students' test score data showed an increase with both the collaborative-based teaching method garnering an average change score of $M = 3.64$ and the lecture-based teaching method garnering an average change score of $M = 2.92$. Moreover, both teaching methods displayed an increase in mean scores between the pre- and posttest. However, the results from the Mann-Whitney U test suggest that there were no statistically significant differences between the two study groups on their test scores.

In the final chapter of this study, I present a discussion of these results in relation to the existing literature. Additionally, the conclusions, implications of the findings, and my recommendations are included.

Chapter 5: Discussion, Conclusions, and Recommendations

Overview

The purpose of this quasi-experimental, causal-comparative, repeated measures research study was to examine the difference in change scores between pre- and posttests of the PCH assessment of students who were taught with the collaborative method and students who were taught with the lecture method. Traditionally, the lecture-based teaching method has been used in all classrooms, schools, and colleges; yet, researchers have found that student-centered, collaborative learning methods brought better results (Burns et al., 2014; Liu et al., 2013; Opdecam et al., 2014) and many students prefer this interactive approach (LoPresto & Slater, 2016; Mohammadjani & Tonkaboni, 2015; Sajid et al., 2016). However, assessments of collaborative learning versus lecture-based teaching models are lacking in academic literature (LoPresto & Slater, 2016; Sajid et al., 2016). Nevertheless, the use of a quantitative, quasi-experimental, causal-comparative, repeated measures design allowed me to answer the research question through finding a cause and effect relationship between the variables. Additionally, the design allowed me to attempt to associate a change in the dependent variable (i.e., effect) when I could not manipulate the independent variable (i.e., causal), which was based on ideas from Maheshwari (2018).

I conducted this study using archival student change scores to explore whether the lecture-based instructional method produced different outcomes for students compared to the collaborative learning method. The results of the data analysis showed that while the change scores from pre- to posttest exhibited an increase for both the lecture-based and

collaborative learning classrooms, the difference in the change scores of the two groups was not statistically significant. Based on this outcome, the null hypothesis that there was no statistically significant difference in the average changes score between lecture-based and collaborative learning methods could not be rejected.

Interpretation of Findings

The results of this research study were not consistent with that of other research on collaborative learning versus lecture-based teaching strategies. Both instructional strategies resulted in a moderate increase in student achievement as indicated by the change scores. However, unlike in previous studies (i.e., Burns et al., 2014; Liu et al., 2013; LoPresto & Slater, 2016; Opdecam et al., 2014), collaborative learning was not found to be a statistically more effective teaching method than the traditional, lecture-based method. These findings align with Sajid et al. (2016) who noted that collaborative learning is not effective for all students or for all academic subjects. Conceivably, this is one possible interpretation that mirrors the findings of this study.

Some observations I made concerning the data were the descriptive statistics for the two groups showed very little change in the score and the average change in score was no more than 4 points. One possible explanation is the topic covered by the instructors, specifically personal health and family relationships, may already be a familiar topic for the students and would account for the fact that even on the pretest, students from both the lecture-based and collaborative learning group already scored higher than 70%. It is possible that the students already had enough preexisting knowledge on the subjects covered and that different methods of instruction would not

result in much of an improvement or further learning. Therefore, performing this experiment for a topic that is much more complex or is not too familiar for the respondents might yield different results.

Second, by its definition, collaborative learning is a designed, educational approach where groups work together toward a common goal that is meant to help students develop better reasoning, problem-solving skills, and the ability to see the viewpoint of others (Stewart & Gonzales, 2006). The literature also indicated mixed results regarding the efficacy of collaborative learning techniques. For instance, Barnes and Piland (2013) found that collaborative learning yielded positive results for students who were close to finishing a developmental English course, but the same success was not exhibited when collaborative learning was used in the lowest or beginning levels of the same developmental English course. In the same vein, Sajid et al. (2016) reported that collaborative learning was only effective for some students in their assessed sample. However, Slater (2016) found that students preferred collaborative models compared to lectures methods, noting an increase in pre- and posttests scores of collaborative learning student samples when compared to traditional lecture methods. Overall, Barnes and Piland, Slater, and Sajid et al. demonstrated the mixed results concerning collaborative learning versus traditional lectures style models.

The context in which collaborative teaching method was used could also have influenced the results of the study. Previous studies testing the effectiveness of collaborative learning used data based on more alternative forms of assessments, such as portfolios or reflective essays (Bergom, Wright, Brown, & Brooks, 2012; Hennessy &

Evans, 2006). Some previous assessments were used on post- and pretests concerning the increase in course scores (LoPresto & Slater, 2016), while others relied on Likert-based scales (LoPresto & Slater, 2016; Sajid et al., 2016) and questionnaires (Meebonya, Khlaisang, & Natakuatoong, 2017) to assess student perceptions of the efficacy of each pedagogical method. Similarly, other assessments noted increased lecture efficacy by using ANOVA statistical analysis to assess for differences between groups (Retnowati et al., 2016). Other assessments have also been based on the use of interviewing participants to gain their perceptions towards collaborative and lecture-based models (Ünal & Çakir, 2017). In the current study, I assessed the effectiveness of the method using a knowledge-based approach, which may not be the most appropriate assessment of the benefits of collaborative learning.

There might be different reasons or a combination of reasons why the results of this study did not confirm the results of previous studies conducted by researchers like Burns et al. (2014), Liu et al. (2013), Opdecam et al. (20140, and Slater (2016). One possible explanation was that the study was limited to one community college and one subject module within the college. This focus did not offer much variety regarding students attending the course or instructors presenting the course material and might not be representative of the community college student population or its instructor population.

The community college consisted of students from various ethnic groups and a mixture of traditional and nontraditional students. However, it is noteworthy that Callaghan et al. (2018) and Barhoum and Wood (2016) argued that collaborative learning

is one possible model for reaching the needs of ethnically and culturally diverse student groups. The differences between the students of this study, coupled with the lack of a tradition of collaboration between students, could have influenced the degree of their collaboration. In this study, the students were grouped by the lecturer and did not form their own groups, which could influence optimal collaboration as forming a group takes time. There may have not been enough time for both groups to form optimal communication between group members of different abilities, demands on their time, and ethnicities as well as working together on the course material.

Pertaining to the instruction situation, cross-contamination could have occurred. This study involved students taking the same module during the same semester, albeit from different instructors. Other variables that were not accounted for included class size, instructor personality, and students' sociodemographic factors, which could have influenced the results of the study. Meebonya et al. (2017) noted that instructors that used collaborative models should connect the students to the importance and quality of the technique; however, this was a variable that was not assessed in this study and could not be accounted for as a possible variable effecting the pedagogical effectiveness. One other possible reason for the lack of significant differences in the findings was that the instructors using the collaborative learning approach might not be comfortable with or even convinced of the merits of this approach, considering all instructors at the community college used the lecture-based approach.

According to Cafarella (2014), the instructor 's level of comfort with collaborative learning influenced the students' performance. This is similar to the

findings of Callaghan et al. (2018) and Barhoum and Wood (2016) who found that students were more likely to respond to educators who used collaborative learning techniques that were specialized towards their needs, culture, and applicability to real-life scenarios.

Limitations

The limitations of this study include cross-contamination, lecturer knowledge, and confounding variables. Cross-contamination could have occurred because the community college students involved in this study all took the same course at the same time and with no limitations on their interactions. According to Keogh-Brown et al. (2007), to adjust for cross-contamination, researchers should report the level of contamination. However, the college students taking the course at the same time and free to interact with each other limited the degree to which I or the instructors could control students studying together or discussing course materials and notes. The results of the study could have been influenced by cross-contamination and, therefore, may not be a true reflection of the possible influence of collaborative learning. Moreover, because the study used archival data, I did not have any control over the students' interactions.

Another limitation was lecturer knowledge and experience with collaborative learning. To implement the intervention, the department chair informed participating lecturers about the use of the collaborative method as the method of providing instructions during the PCH course. However, many of the lecturers did not have previous experience with the method. The lecturers' knowledge of and familiarity with the collaborative method could have been a limitation in the optimal implementation of

the method. Some of the lecturers participating in this study did not have prior knowledge of the collaborative learning method, which could have influenced their use of the method during the instruction period and study.

Another possible limitation could have been the lecturers' bias toward the collaborative teaching method. According to White (2017), because humans view others and things with unreasonable judgements, it is possible that the college instructors' bias towards a different teaching method could have influenced their implementation of the collaborative method during the study. This limitation could have influenced the reliability of the results.

The final limitation that could have impacted the findings of this study were confounding variables. Confounding variables for this study were variables that conflict with the students' exposure to collaborative learning, based on ideas from Skelly, Dettori, and Brodt (2012). Some of these confounding variables may have included the students' class attendance; differences in instructor personalities; and sociodemographic factors, such as gender, age, education level, and employment status. According to Skelly et al., this limitation is observed when there is a difference in test scores between teaching methods, making it difficult to determine whether students' scores are based on the teaching method.

Implications for Social Change

This study might have implications for social change and could add to the current literature on collaborative learning with nontraditional learners. A valuable contribution of this research, to the community college, was that all the students in the PCH course

achieved better results. Although it is unclear what caused the increased results, the findings indicated students' achievements could increase following more or different effort from the lecturers. The administrators of the community college could use the results of this study to determine how the study influenced the teaching and learning situation. The changes brought about by the study benefitted the students by increasing their test scores in the final assessment and could be implemented throughout the college. Effective teaching should incorporate a variety of instructional methods (Ross-Gordon, 2011) to make the learning process interesting, interactive, and challenging (Terenzini, Cabrera, Colbeck, Parente, & Bjorklund, 2011) for the student to achieve academically and become valued contributors to their chosen profession and society.

A major goal in the higher education setting is the promotion of a higher level of academic achievement. Numerous studies have indicated that the use of collaborative learning in the college setting resulted in an increase in student achievement and satisfaction (Burns et al., 2014; Liu et al., 2013; LoPresto & Slater, 2016; Mohammadjani & Tonkaboni, 2015; Opdecam et al., 2014; Schwartzstein & Roberts, 2017). Students felt that collaborative learning led to the development of social networks that enhanced engagement, comprehension, and retention of subject matter (Barhoum & Wood, 2016; Opdecam et al., 2014).

The findings from this study were not consistent with the literature, as there were no significant posttest differences between the students in the collaborative learning situation, as could be expected based on previous studies. These results provided some insight into instructors using collaborative learning strategies in certain fields of study.

The lack of a significant difference in student achievement for the teaching strategies studied might be due to the types of students in the study and the subject matter being learned and assessed.

The course used in this study covered the basic principles of health. The majority of the information presented involved rote memorization of facts. The material was objective and could be adequately learned using either the collaborative or traditional lecture-based method of teaching. These results indicated that an analysis of the material to be learned should be conducted prior to selection and utilization of a teaching strategy. If the information was of the objective type—either one knew it, or one did not—the teaching strategy used might have little influence on the degree of student academic achievement.

In addition, the composition of the student body within the course could also influence the success of the learning strategy employed. Students with similar backgrounds and levels of preparation might perform similarly when learning materials were based on objective facts. Thus, the complexity of the material to be learned, in combination with the composition of the class, should be considered prior to the selection and use of a teaching method.

Recommendations for Further Study

The limited nature of this study calls for a more varied sample of students, courses, and instructors at the same college or community colleges in the same region. Opdecam et al. (2014) used 291 Economy and Business Administration program students in their quasi-experimental design. Students were exposed to different modules and

lecturers presenting the course when the study was conducted. Burns et al. (2014) included instructors from two states in their study, thus geographically distributed and representing different schools and students. The researchers provided a 6-month training program in collaborative learning before assessing the outcomes of implementing collaborative learning. Such an approach ensured that the instructors were familiar with collaborative learning and could manage the method well in class, as suggested by Cafarella (2014) and Lam (2014).

A similar model that could be effective for a future study was conducted by Slater (2016) who examined the use of collaborative learning versus traditional lecture models. In the authors study, 264 students were examined using pre- and posttests. These tests were statistically analyzed for group differences. Additionally, a Likert-style scale was used to assess student perceptions of each methods and to garner why a student felt that a method worked or did not work for them. This form of mixed-method approach could be an appropriate approach for a future study and provide furthered information to the efficacy and reasoning for efficacy of a pedagogical approach.

I recommend conducting a similar study that includes different community colleges and courses to determine the benefits of collaborative learning versus lecture-style teaching. Although researchers have indicated that collaborative learning yield better results, Gubera and Aruguete (2013) warned that collaborative learning might not always be more beneficial. In the same vein, Sajid et al. (2016) noted that collaborative models are not effective for all student learner needs. Overall, there is a mixed understanding of how, and why, certain pedagogical techniques are more effective for

some students (Sajid et al., 2016). Additionally, previous researchers (LoPresto & Slater, 2016; Opdecam et al. (2014)) indicated that collaborative methods are more effective for specific classes (e.g., astronomy) compared to others (e.g., mathematics).

Therefore, further investigation is needed. In addition, instructors chosen to use the collaborative learning can first attend workshops to prepare them thoroughly for the changed teaching approach (Cafarella, 2014). This process will ensure that the collaborative method is applied and managed well, with clear instructions from the lecturer, during the experiment (Lam, 2014). A qualitative study can be conducted with (a) the students as participants to gather their perceptions and preferences pertaining to the teaching method used and (b) the instructors' lived experiences of using the two teaching approaches. Such a study can provide insights into the students' preferred mode of learning and best corresponding teaching method (Wolfe, 2012), as well as how instructors who have used the lecture-based method have experienced the change to a collaborative method of instruction (Chace, 2014). The lived experiences of the instructors can inform the future training of instructors in using the collaborative method. Further study is also needed to assess the suitability of a CLS for various fields of study (Gubera & Aruguete, 2013; LoPresto & Slater, 2016; Sajid et al., 2016).

Summary

The findings showed that increases in student academic achievement occurred with both collaborative learning and lectured based teaching strategies. The increase observed in the scores from pretest to posttest did not significantly differ between the two teaching strategies. Thus, in this study, the collaborative learning method was not

determined to be superior to the lecture-based method in educating adult community college learners. The findings of this study are not in congruence with the results from previous literature, but the disparity in the results can be attributed to different factors, such as the students' familiarity with the selected topic, the nature of the assessment used to determine the effectiveness of one method compared to another, the limited time provided for the students to form effective groups, cross contamination, and the lecturers' experience with collaborative methods. Likewise, the study was limited by confounding variables such as student attendance and sociodemographic factors that were not considered in this study. Thus, further studies are recommended using varied populations in different geographical locations or using different quantitative research methods. Likewise, qualitative studies can also be conducted to gather more information about the students' and instructors' views on the collaborative learning, which can be used to design more specific quantitative studies to determine the effectiveness of the collaborative method in comparison with traditional, lecture-based methods.

References

Alzahrani, M. A. (2018). The learning experience of international students in Canada: Progressive educational theory and passive learning styles. *English Language Teaching*, *11*(7), 76-85. Retrieved from http://www.ccsenet.org/journal/index.php/elt

American Association of Community Colleges. (2016). *Why choose community college?* Retrieved from http://plus50.aacc.nche.edu/Students/yccc/Pages/default.aspx

Ammenwerth, E., Hackl, W. O., Felderer, M., & Hörbst, A. (2017). Developing and evaluating collaborative online-based instructional designs in health information management. In R. Rohrig et al (Eds.), *German medical data sciences: Visions and bridges* (pp. 8-12). German Association for Medical Informatics, Biometry and Epidemiology (gmds) e. V. and IOS Press. https://doi.org/10.3233/978-1-61499-808-2-8

Asino, T. I., & Pulay, A. (2019). Student perceptions on the role of the classroom environment on computer supported collaborative learning. *TechTrends*, *63*(2), 179-187. Retrieved from https//doi.org/10.1007/s11528-018-0353-y

Ataei, M., Hamedani, S. S., & Zameni, F. (2020). Effective methods in medical education: from giving lectures to simulation. *Journal of Advanced Pharmacy Education & Research*, *10*(S1), 37. Retrieved from www.japer.in

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

https://www.questia.com/library/journal/1G1-478697134/differences-in-active-and-collaborative-learning-by

Barnes, R. A., & Piland, W. E. (2013). Learning communities' impact on student success in developmental English. *Community College Journal of Research & Practice*, *37*(12), 954-965. Retrieved from https://doi.org/10.1080/10668926.2010.491994

Béres, I., Magyar, T., & Turcsányi-Szabó, M. (2012). Towards a personalized, learning style based collaborative blended learning model with individual assessment. *Informatics in Education, 11*(1), 1-28. Retrieved from https://www.mii.lt/informatics_in_education/

Blesch P., (2015). Can spiritual care be taught via simulation? *Journal Christian Nursing*, *32*(4), 232-235. Retrieved from https://doi.org/10.1097/CNJ0000000000000204

Brookfield, S. (1987). Eduard Lindeman. In P. Jarvis (Ed.), *Twentieth century thinkers in adult education* (pp. 119-143). New York, NY: Routledge.

Buchs, C., Gilles, I., Antonietti, J.-P., & Butera, F. (2016). Why students need to be prepared to cooperate: A cooperative nudge in statistics learning at university. *Educational Psychology*, *36*(5), 956-974. Retrieved from https://doi.org/10.1080/01443410.2015.1075963

Burns, M., Pierson, E., & Reddy, S. (2014). Working together: How teachers teach and students learn in collaborative learning environments. *International Journal of Instruction*, *7*(1), 17-32. Retrieved from https://www.e-iji.net/

Cafarella, B. (2014). Exploring best practices in developmental math. *Research & Teaching in Developmental Education*, *30*(2), 35-64.

Callaghan, P., Paraone, R., Murray, M., Tahau, N., Edgarton, S., Bates, E….Hanham, L. (2018). Tuākana/Teina Water Warriors Project: A collaborative learning model integrating mātauranga Māori and science. *New Zealand Journal of Marine and Freshwater Research*, *52*(4), 666-674. Retrieved from https://doi.org/10.1080/00288330.2018.1509880

Capdeferro, N., & Romero, M. (2012). Are online learners frustrated with collaborative learning experiences? *International Review of Research in Open & Distance Learning*, *13*(2), 26-44. Retrieved from http://www.irrodl.org/index.php/irrodl/index

Chace, J. (2014). Collaborative projects increase student learning outcome performance in nonmajors environmental science course. *Journal of College Science Teaching*, *43*(6), 58-63. Retrieved from http://www.nsta.org

Chen, Y. (2018). Perceptions of EFL college students toward collaborative learning. *English Language Teaching*, *11*(2), 1-4. Retrieved from http://www.ccsenet.org/journal/index.php/elt

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). St. Paul, MN: West.

Connors, J., Good, P., & Gollery, T. (2017) Using innovative teaching strategies to improve nursing student competence and confidence in providing spiritual care. *Nurse Educator: Teaching Strategies*, *42*(2), 62-64. Retrieved from https://doi.org/10.1097/NNE.0000000000000301

Cozby, P. C. (2004). *Multiple-choice test on ethical research.* New York, NY: McGraw-

Hill Higher Education.

Creswell, J. W. (2014). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (5th ed.). Upper Saddle River, NJ: Pearson Education.

De Hei, M. S., Strijbos, J. W., Sjoer, E., & Admiraal, W. (2015). Collaborative learning in higher education: Lecturers' practices and beliefs. *Research Papers in Education*, *30*(2), 232-247. Retrieved from https://doi.org/10.1080/02771522.2014.908407

De Los Santos, S. B., Kupczynski, L., & Bain, S. F. (2016). The lecture method is DEAD. *FOCUS on Colleges, Universities & Schools*, *10*(1). Retrieved from http://www.nationalforum.com/Electronic%20Journal%20Volumes/De%20Los%20Santos,%20Stephanie%20Bain%20The%20Lecture%20Method%20Is%20D-E-A-D%20FOCUS%20V10%20N1%202016.pdf

Diamond, K. K., Vasquez, C., Borroni, C., & Paredes, R. (2019). Exploring veterinary medicine students' experiences with team-based learning at the Universidad Andrés Bello. *Journal of Veterinary Medical Education,* Retrieved from https://doi.org/10.3138/jvme.0518-062r

Emblen-Perry, K. (2018). Enhancing student engagement in business sustainability through games. *International Journal of Sustainability in Higher Education, 19*(5), 858–876. Retrieved from https://doi.org/10.1108/ijshe-05-2017-0075

Emerson, T. L., English, L., & McGoldrick, K. (2016). Cooperative learning and personality types. *International Review of Economics Education, 21*, 21-29.

Retrieved from https://doi.org/10.1016/j.iree.2015.12.003

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2014). G*Power Version 3.1.9 [Computer software]. Uiversität Kiel, Germany. Retrieved from http://www.gpower.hhu.de/en/html

Frankel, J. R., & Wallen, N. E. (2009). *How to design and evaluate research in education* (7th ed.). New York, NY: McGraw-Hill.

French, S., & Kennedy, G. (2016). Reassessing the value of university lectures. *Teaching in Higher Education, 22*(6), 639 654. Retrieved from https://doi.org/10.1080/13562517.2016.1273213

Galbraith, M. W. (2004). *Adult learning methods* (3rd ed.). Malabar, FL: Krieger.

George, D., & Mallery, P. (2016). *SPSS for Windows step by step: A simple guide and reference, 11.0 update* (14th ed.). Boston, MA: Allyn & Bacon.

Gubera, C., & Aruguete, M. (2013). A comparison of collaborative and traditional instruction in higher education. *Social Psychology of Education, 16*(4), 651-659. Retrieved from https://doi.org/10.1007/s11218-013-9225-7

Haidet, P., Levine, R. E., Parmelee, D. X., Crow, S., Kennedy, F., Kelly, A.,… Richards, B. F. (2012). Guidelines for reporting team-based learning activities in the medical and health sciences education literature. *Academic Medicine, 87*, 292-299. Retrieved from https://doi.org/10.1097/ACM.0b013e318244759e

Hatcher, T. (1997). Ins and outs of self-directed learning. *Training and Development, 51*(2), 34-39. Retrieved from https://www.researchgate.net/journal/0041-0861_Training_and_development_journal

Hawk, T., & Shah, A. (2007). Using learning style instruments to enhance student learning. *Decision Sciences Journal of Innovative Education, 5*(1), 1-19. Retrieved from https://doi.org/10.1111/j.1540-4609.2007.00125.x

Hennessy, D., & Evans, R. (2006). Small-group learning in the community college classroom. *The Community College Enterprise, 12*(1), 93-109. Retrieved from https://schoolcraft.edu/cce/community-college-enterprise

Holmes, J. D. (2016). Myth: Lecturing is broadly inferior to other teaching methods. In J. D. Holmes (ed.), *Great myths of education and learning* (pp. 25-39.) Malden, MA: John Wiley & Sons.

Hong, S., & Yu, P. (2017). Comparison of the effectiveness of two styles of case-based learning implemented in lectures for developing nursing students' critical thinking ability: A randomized controlled trial. *International Journal of Nursing Studies, 68,* 16–24. Retrieved from https://doi.org/10.1016/j.ijnurstu.2016.12.008

Howell, D. C. (2010). *Fundamental statistics for the behavioral sciences* (7th ed.). Belmont, CA: Brooks/Cole-Thompson Learning.

Huang, Y. (2015). Exploring the factors that affect the intention to use collaborative technologies: The differing perspectives of sequential/global learners. Australasian *Journal of Educational Technology, 31*(3), 278-293. Retrieved from https://doi.org/10.1016/j.compedu.2010.05.023

Hwang, G. J., Sung, H. Y., Hung, C. M., & Huang, I. (2013). A learning style perspective to investigate the necessity of developing adaptive learning systems. *Educational Technology & Society, 16*(2), 188-197. Retrieved from http://www.ifets.info/

Insel, P., & Roth, W. (2010). *Core concepts of health* (12th ed.). New York, NY: McGraw-Hill Humanities/Social Sciences/Languages.

Iqbal, M., Velan, G. M., O'Sullivan, A. J., & Balasooriya, C. (2016). Differential impact of student behaviours on group interaction and collaborative learning: medical students' and tutors' perspectives. *BMC Medical Education, 16*(1). Retrieved from https://doi.org/10.1186/s12909-016-0730-1

Jakobsen, K. V. (2018). Team-based learning: A tool for your pedagogical toolbox. In W. Altman, L. Stein, & J. E. Westfall (Eds.), *Essays from e-xcellence in teaching* (Vol. 17, pp. 1-6). Retrieved from http://teachpsych.org/ebooks/eit2017/index.php

Jakobsen, K. V., & Daniel, D. B. (2019). Evidence-inspired choices for teachers: Team based learning and interactive lecture. *Teaching of Psychology, 46*(4), 284-289. Retrieved from https://doi.org/10.1177/0098628319872411

Jensen, J. L., Kummer, T. A., & Godoy, P. D. D. M. (2015). Improvements from a flipped classroom may simply be the fruits of active learning. *CBE-Life Sciences Education, 14*(1), 1-12. Retrieved from https://doi.org/10.1187/cbe.14-08-0129

Johnson, D. W., & Johnson, R. T. (1999). Making cooperative learning work. *Theory into Practice, 38*(2), 67-73. Retrieved from https://doi.org/10.1080/00405849909543834

Kalaian, S. A., Kasim, R. M., & Nims, J. K. (2018). Effectiveness of small-group learning pedagogies in engineering and technology education: A meta-analysis. *Journal of Technology Education, 29*(2), 20-35. Retrieved from http://scholar.lib.vt.edu/ejournals/JTE

Karantzas, G. C., Avery, M. R., Macfarlane, S., Mussap, A., Tooley, G., Hazelwood, Z., & Fitness, J. (2013). Enhancing critical analysis and problem-solving skills in undergraduate psychology: An evaluation of a collaborative learning and problem-based learning approach. *Australian Journal of Psychology*, *65*(1), 38-45. Retrieved from https://doi.org/10.1111/ajpy.12009

Kearsley, G. (2010). *Andragogy* (in M. Knowles). *The theory into practice database*. Retrieved from http://tip.psychology.org

Keogh-Brown, M. R., Bachmann, M. O., Shepstone, L., Hewitt, C., Howe, A., Ramsay, C. R., . . . Campbell, M. J. (2007). Contamination in trials of educational interventions. *Health Technology Assessment, 11*(43). Retrieved from https://researchonline.lshtm.ac.uk/id/eprint/6318/1/FullReport-hta11430.pdf

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers*. New York, NY: Association Press.

Knowles, M. (1984a). *The adult learner: A neglected species* (3rd ed.). Houston, TX: Gulf Publishing.

Knowles, M. (1984b). *Andragogy in action*. San Francisco, CA: Jossey-Bass.

Knowles, M. S. (1989). *The making of an adult educator*. *An autobiographical journey*. San Francisco, CA: Jossey-Bass.

Knowles, M., Holton, E., III, & Swanson, R. (Eds.). (2011). *The adult learner: The definitive classic in adult education and human resource development* (7th ed.). Oxford, England: Butterworth-Heinemann.

Koç, E. (2018). Exploring collaborative learning with a focus on group activities in EFL

classrooms. *İnönü Üniversitesi Eğitim Fakültesi Dergisi, 19*(3), 582-597. Retrieved from https://doi.org/10.17679/inuefd.385741

Kohli, S., Sukumar, A. K., Zhen, C. T., Yew, A., & Gomez, A. A. (2019). Dental education: Lecture versus flipped and spaced learning. *Dental Research Journal*, *16*(5), 289–297. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6749854/

Kramer, M. W. (2017). Sage on the stage or bore at the board? *Communication Education*, *66*(2), 245–247. Retrieved from https://doi.org/10.1080/03634523.2016.1272129

Kutnick, D. G., & Joyner, D. A. (2019). Synchronous at scale: investigation and implementation of a semi-synchronous online lecture platform. In *Proceedings of the Sixth (2019) ACM Conference on Learning@ Scale* (pp. 1-4). Retrieved from https://doi.org/10.1145/3330430.3333653

La Hanisi, A., Risdiany, R., Dwi Utami, Y., & Sulisworo, D. (2018). The use of WhatsApp in collaborative learning to improve English teaching and learning process. *International Journal of Research*, *7*(1), 29-35. Retrieved from https://doi.org/10.5861/ijrset.2018.3004

Lai, K. W., & Hong, K. S. (2015). Technology use and learning characteristics of students in higher education: Do generational differences exist? *British Journal of Educational Technology*, *46*(4), 725-738. Retrieved from https://bera-journals.onlinelibrary.wiley.com/doi/abs/10.1111/bjet.12161

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science:

A practical primer for t-tests and ANOVAs. *Frontiers in Psychology, 4*, 863. Retrieved from https://doi.org/10.3389/fpsyg.2013.00863

Lam, M. (2014). Collaborative learning - it's more than divide and conquer. *Ontario Mathematics Gazette, 52*(4), 32-34. Retrieved from http://www.oame.on.ca/

Laux, D., Luse, A., & Mennecke, B. E. (2016). Collaboration, connectedness, and community: An examination of the factors influencing student persistence in virtual communities. *Computers in Human Behavior, 57*, 452-464. Retrieved from https://doi.org/10.1016/j.chb.2015.12.046.

Leedy, P. D., & Ormrod, J. E. (2005). *Practical research: Planning and design*. Upper Saddle River, NJ: Merrill Prentice-Hall.

Levene, H. (1960). Contributions to probability and statistics. In I. Olkin, S. G. Ghurye, W. Hoeffeling, W. G. Madow, & H. B. Mann (Eds.), *Essays in honor of Harold Hotelling* (pp. 278-292). Palo Alto, CA: Stanford University Press.

Lim, S. M., Foo, Y. L., Loh, H. T., & Deng, X. (2018). Use of peer teaching to engage millennial students: the case of a hospitality business module at SIT. In *Applied Learning in Higher Education: Perspective, Pedagogy, and Practice*. Santa Rosa, CA: Informing Science Press.

Lindeman, E.C. (1926). *The meaning of adult education*. New York, NY: New Republic.

Liu, S. N. N., & Beaujean, A. A. (2017). The effectiveness of team-based learning on academic outcomes: A meta-analysis. *Scholarship of Teaching and Learning in Psychology, 3,* 1-14. Retrieved from https://doi.org/10.1037/st10000075

Liu, C., Tao, S., Chen, W., Chen, S. Y., & Liu, B. (2013). The effects of a creative

commons approach on collaborative learning. *Behaviour & Information Technology, 32*(1), 37-51. Retrieved from https://doi.org/10.1080/0144929X.2011.572184

Lodico, M. G., Spaulding, D. T., & Voegtle, K. H. (2010). *Methods in educational research: From theory to practice* (Vol. 28). Hoboken:NJ John Wiley & Sons.

Loes, C. N., & Pascarella, E. T. (2017). Collaborative learning and critical thinking: Testing the link. *The Journal of Higher Education, 88*(5), 726-753. Retrieved from https://doi.org/10.1080/00221546.2017.1291257

Loes, C. N., Culver, K. C., & Trolian, T. L. (2018). How collaborative learning enhances students' openness to diversity. *The Journal of Higher Education, 89*(6), 935-960. Retrieved from https://doi.org/10.1080/00221546.2018.1442638

LoPresto, M., & Slater , T. F. (2016). A new comparison of active learning strategies to traditional lectures for teaching college astronomy. *Journal of Astronomy & Earth Sciences Education 3*(1). Retrieved from https://doi.org/10.19030/jaese.v3i1.9685

MacLaren, A. J. W., Wilson, M., Simmonds, R., Hamilton-Pryde, A., McCarthy, J., & Milligan, A. (2017). Educating students for the collaborative workplace: facilitating interdisciplinary learning in construction courses. *International Journal of Construction Education and Research, 13*(3), 180–202. Retrieved from https://doi.org/10.1080/15578771.2016.1267667

Magana, A. J., Vieira, C., & Boutin, M. (2018). Characterizing engineering learners' preferences for active and passive learning methods. *IEEE Transactions on Education, 61*(1), 46–54. Retrieved from https://doi.org/10.1109/te.2017.2740203

Maheshwari, V. K. (2018). *Causal-comparative research*. Retrieved from http://www.vkmaheshwari.com/WP/?p=2491

Marei, H. F., Donkers, J., Al-Eraky, M. M., & Van Merrienboer, J. J. (2019). Collaborative use of virtual patients after a lecture enhances learning with minimal investment of cognitive load. *Medical Teacher*, *41*(3), 332-339. Retrieved from https://doi.org/10.1080/0142159X.2018.1472372

Martinez, J. C. (2018). An Examination of the Generational Differences in Social Capital of Minority Male Community College Students. *ProQuest LLC*. Retrieved from https://eric.ed.gov/?id=ED595662

Matiru, B., Gasser, G., & Schlette, R. (1993). *Teach your best: A handbook for university lecturers*. Retrieved from http://www.nzdl.org/gsdlmod?e=d-00000-00---off-0cdl--00-0----0-10-0---0---0direct-10---4-------0-0l--11-en-50---20-about---00-0-1-00-0--4----0-0-11-10-0utfZz-8-00&cl=CL1.117&d=HASH01bacd4b975a0db4bc878ddf.8.4&gt=1#:~:text=Historically%20the%20lecture%20can%20be,teaching%20method%20in%20higher%20education.

McCall, R. C., Pardon, K., & Andrews, C. (2018). Evidence-based instructional strategies for adult learners: a review of the literature. *Journal of the Louisiana Chapter of the ACRL*, *4*(4), 29-47. Retrieved from https://academicworks.cuny.edu/bx_pubs/43

Meeboonya, S., Khlaisang, J., & Natakuatoong, O. (2017). Development of an instructional design model to enhance public consciousness of undergraduate

students by using service-learning projects with computer-supported collaborative learning. *Scholar: Human Sciences, 9*(1). Retrieved from filhttps://files.eric.ed.gov/fulltext/EJ1108647.pdf

Mertens, W., Pugliese, A., & Recker, J. (2017). *Quantitative data analysis*. *A companion accounting and information systems research.* New York, NY: Springer International Publishing. doi:10.1007/978-3-319-42700-3

Meyer, K. R., & Hunt, S. K. (2017) The lost art of lecturing: Cultivating student listening and notetaking. *Communication Education, 66*(2), 239-241. Retrieved from https://doi.org/10.1080/03634523.2016.1275719

Middlehurst, R., Cross, M., & Jeannin, L. (2018). Job-embedded, collaborative and reflective professional development for university administrators: The action learning pedagogy. *South African Journal of Higher Education, 32*(1), 162-177. Retrieved from https://doi.org/10.20853/32-1-1712

Mohammadjani, F., & Tonkaboni, F. (2015). A comparison between the effect of cooperative learning teaching method and lecture teaching method on students' learning and satisfaction level. *International Education Studies, 8*(9), 107-112. Retrieved from http://www.ccsenet.org/journal/index.php/es

Mohring, P. M. (1990). Andragogy and pedagogy: A comment on their erroneous usage. *Human Resource Development Quarterly, 1*(1), 93-96. Retrieved from https://doi.org/10.1002/hrdq.3920010111

Molinillo, S., Aguilar-Illescas, R., Anaya-Sánchez, R., & Vallespín-Arán, M. (2018). Exploring the impacts of interactions, social presence and emotional

engagement on active collaborative learning in a social web-based environment. *Computers & Education, 123,* 41–52. Retrieved from https://doi.org/10.1016/j.compedu.2018.04.012

Moody, J. (2019). What a good college GPA is and why it matters. Retrieved from https://www.usnews.com/education/best-colleges/articles/2019-01-28/what-a-good-college-gpa-is-and-why-it-matters

Morrison, C. D. (2014). From "sage on the stage" to "guide on the side": A good start. *International Journal for the Scholarship of Teaching and Learning, 8*(1). Retrieved from https://doi.org/10.20429/ijsotl.2014.080104

Nerona, G. G. (2017). Enhancing students' achievement and self-assessed learning outcomes through collaborative learning strategies in various engineering courses. *Global Journal of Engineering Education, 19*(3), 231-236. Retrieved from http://www.wiete.com.au/journals/GJEE/Publish/index.html

Nixon-Ponder, S. (1995). Eduard C. Lindeman. Leaders in the field of adult education. Kent State University, Ohio Literacy Resource Center. Retrieved from https://eric.ed.gov/?id=ED380667

Nokes-Malach, T. J., Zepeda, C. D., Richey, J. E., & Gadgil, S. (2019). Collaborative learning: The benefits and costs. In J. Dunlosky & K. A. Rawson (Eds.), *The Cambridge handbook of cognition and education* (p. 500–527). Cambridge, England/UK: Cambridge University Press.

Olanrewaju, M. K. (2019). Effects of collaborative learning technique and mathematics anxiety on mathematics learning achievement among secondary school students

in Gombe State, Nigeria. *Asian Journal of University Education*, *15*(1), n1. Retrieved from https://education.uitm.edu.my/ajue/

Opdecam, E., Everaert, P., van Keer, H., & Buysschaert, F. (2014). Preferences for team learning and lecture-based learning among first-year undergraduate accounting students. *Research in Higher Education, 55*(4), 400-432. Retrieved from https://doi.org/10.1007/s11162-013-9315-6

Ordu, P., & Abdulkarim, M. (2018). Effect of new entrepreneurial learning approaches in the development of entrepreneurial skills by colleges of education students. *Nigerian Journal of Business Education (NIGJBED), 3*(2), 122-132. Retrieved from http://www.nigjbed.com.ng/index.php/nigjbed/article/view/53

Pandero, E., Brown, G. T., & Strijbos, J. W. (2016). The future of student self-assessment: A review of known unknown and potential directions. *Educational Psychology Review, 28*(4), 803-830. Retrieved from https://doi.org/10.1007/s10648-015-9350-2

Pedhauzer, E. J., & Schmelkin, L. P. (1991). *Measurement, design and analysis: An integrated approach.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Peterson, A. T., Beymer, P. N., & Putnam, R. T. (2018). Synchronous and asynchronous discussions: effects on cooperation, belonging, and affect. *Online Learning*, *22*(4), 7-25. Retrieved from https://olj.onlinelearningconsortium.org/index.php/olj/index

Pierson, D. (2017). Reengineering army education for adult learners. *Journal of Military Learning*, *6*(11). Retrieved from https://www.armyupress.army.mil/Portals/7/journal-of-military-

learning/Archives/Pierson-Reengineering-Army-Education.pdf

Powell, S. (2011). *Introduction to middle school*. Boston, MA: Pearson.

Razali, N. M., & Wah, Y. B. (2011). Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*, *2*(1), 21-33. Retrieved from http://instatmalaysia.com/

Retnowati, E., Ayres, P., & Sweller, J. (2017). Can collaborative learning improve the effectiveness of worked examples in learning mathematics? *Journal of educational psychology*, *109*(5), 666. doi:10.1037/edu0000167.

Rima, B., Rodriguez, C. C., & DePaola, T. (2019). Supplementing the college experience with program-based learning communities. *Community College Journal of Research and Practice*, *43*(12), 840-853. Retrieved from https://doi.org/10.1080/10668926.2018.1542637

Ross-Gordon, J. (2011). Research on adult learners: Supporting the needs of a student population that is no longer nontraditional. *Association of American Colleges and Universities, 13*(1), 26-29. Retrieved from http://www.aacu.org/peerreview/pr-will/prwill_RossGordon.cfm

Sajid, M. R., Laheji, A. F., Abothenain, F., Salam, Y., AlJayar, D., & Obeidat, A. (2016). Can blended learning and the flipped classroom improve student learning and satisfaction in Saudi Arabia? *International journal of medical education*, *7*, 281. Retrieved from https://doi.org/10.5116/ijme.57a7.83d4

Salkind, N. (2010). *Encyclopedia of research design*. Thousand Oaks, CA: Sage Publications.

Santos, K. V. (2018). Five strategies to enhance the transfer of learning from classroom to clinical setting. *Adult Higher Education Alliance*. Retrieved from http://www.ahea.org

Schilstra, T., Takacs, E., & Abcouwer, T. (2019). Cooperative learning in a higher educational setting: Realizing high performing cooperative learning in higher education. Proceedings of the 2019 Association for Information Systems (AIS SIGED) International Conference on Information Systems Education and Research. 7. Retrieved from https://aisel.aisnet.org/siged2019/7

Schwartzstein, R. M., & Roberts, D. H. (2017). Saying goodbye to lectures in medical school—paradigm shift or passing fad? *New England Journal of Medicine*, *377*(7), 605-607. Retrieved from nejm.org

Schweizer, M. L., Braun, B. L., & Milstone, A. M. (2017). *Research methods in healthcare epidemiology and antimicrobial stewardship – quasi-experimental designs*. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5036994/#:~:text=The%20greatest%20advantages%20of%20quasi,RCTs)%20or%20cluster%20randomized%20trials.

Sciullo, N. J. (2017). The lecture's absent audience. *Communication Education, 66*(2), 237-239. Retrieved from https://doi.org/10.1080/03634523.2016.1275722

Selva, M. G., John, B. A., Christhu, R. M. R., & Rajeev, S. (2017). Effectiveness of active learning strategies for engaging learners and improving performance in data structures engineering course. *International Journal of Learning*

Management Systems, 5(2), 61-67. Retrieved from https://doi.org/10.18576/ijlms/050203

Sheffield, A. (2016). Associations between collaborative learning and personality/cognitive style among online community college students. University of North Texas, ProQuest LLC). Retrieved from http://www.proquest.com/en-US/products/dissertations/individuals.shtml

Singer-Freeman, K., Bastone, L., & Skrivanek, J. (2016). Using eportfolios to assess applied and collaborative learning and academic identity in a summer research program for community college students. *International Journal of ePortfolio*, *6*(1), 45-57. Retrieved from http://www.theijep.com

Skelly, A. C., Dettori, J. R., & Brodt, E. D. (2012). Assessing bias: The importance of considering confounding. *Evidence-Based Spine-Case Journal*, *3*(1), 9-12. Retrieved from https://doi.org/10.1055/s-0031-1298595

Slavin, R. E. (1980), Cooperative learning. *Review of Educational Research*, *50*(2), 315-342.

Smith, M. K. (2002). Malcolm Knowles, informal adult education, self-direction and andragogy. *The Encyclopedia of Pedagogy and Informal Education*. Retrieved from http://www.infed.org/thinkers/et-knowl.htm.

Stewart, S., & Gonzales, L. (2006). Instruction in professional issues using a cooperative learning, case study approach. *Communication Disorder Quarterly, 27*, 159-172. Retrieved from https://doi.org/10.1177/15257401060270030401

Streefkerk, R. (2020). Qualitative vs. quantitative research. Scribbr. Retrieved from https://www.scribbr.com/author/raimo/#:~:text=quantitative%20research,12%2C%202019%20by%20Raimo%20Streefkerk.&text=When%20collecting%20and%20analyzing%20data,gaining%20different%20kinds%20of%20knowledge.

Sugiharto. (2015). The effect of cooperative learning model and Kolb learning styles on learning result of the basics of politics. *Journal of Education and Practice*, *6*(21). Retrieved from https://files.eric.ed.gov/fulltext/EJ1079121.pdf

Sullivan, L. M., & d'Agostino, R. B. (1992). Robustness of the t-test applied to data distorted from normality by floor effects. *Journal of Dental Research, 71*(12), 1938-1943. Retrieved from https://doi.org/10.1177/00220345920710121601

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). Boston, MA: Pearson.

Terenzini, P. T., Cabrera, A. F., Colbeck, C. L., Parente, J. M., & Bjorklund, S. A. (2001). Collaborative learning vs. lecture/discussion: Students' reported learning gains. *Journal of Engineering Education*, *90*(1), 123-130. Retrieved from https://doi.org/10.1002/j.2168-9830.2001.tb00579.x

Travis, L. L., Hudson, N. W., Henricks-Lepp, G. M., Street, W. S., & Weidenbenner, J. (2016). Team-based learning improves course outcomes in introductory psychology. *Teaching of Psychology*, *43*, 99-107. Retrieved from https://doi.org/10.1177/0098628316636274

Ünal, E., & Çakir, H. (2017). Students' views about the problem based collaborative learning environment supported by dynamic web technologies. Malaysian Online

Journal of Educational Technology, *5*(2), 1-19. Retrieved from http://www.mojet.net

U.S. Department of Education, National Center for Education Statistics. (2007). *The condition of education 2007* (NCES 2007-064, Indicator 10). Washington, DC: U.S. Government Printing Office.

U.S. Department of Education, National Center for Education Statistics. (2011). *The condition of education 2011.* Washington, DC: Author.

U.S. Department of Education, National Center for Education Statistics. (2014). *Digest of education statistics*, 2014 (NCES 2016-006). Retrieved from https://nces.ed.gov/programs/digest/d14/index.asp

Uyder, D. (2010). Beyond pedagogy: Lesson learned through a teacher prep cohort. *American Association for Adult and Continuing Education- Adult Learning, 21*(3-4), 21-26. Retrieved from https://doi.org/10.1177/104515951002100303

van Leeuwen, A., & Janssen, J. (2019). A systematic review of teacher guidance during collaborative learning in primary and secondary education. *Educational Research Review.* Retrieved from https://doi.org/10.1016/j.edurev.2019.02.001

Vuopala, E., Hyvönen, P., & Järvelä, S. (2015). Interaction forms in successful collaborative learning in virtual learning environments. *Active Learning in Higher Education, 17(1), 25–38.* doi:10.1177/1469787415616730

Wang, L., & Chen, P. (2008). Enhancing ICT skills learning through peer learning: Perspectives of learning style and gender. *International Journal of Education and Information Technologies, 1*(2), 18-23. Retrieved from

https://link.springer.com/journal/10639

White, S. (2017). Are my biases impacting the classroom? Retrieved from https://blog.discoveryeducation.com/blog/2017/09/08/are-my-biases-impacting-the-classroom/

Wlodkowski, R. (2008). *Enhancing adult motivation to learn: A comprehensive guide for teaching all adults* (3rd ed.). San Francisco, CA: Jossey-Bass.

Wolfe, A. (2012). Implementing collaborative learning methods in the political science classroom. *Journal of Political Science Education*, *8*(4), 420-432. Retrieved from https://doi.org/10.1080/15512169.2012.729451

Yadin, A., & Or-Bach, R. (2019). The importance of emphasizing individual learning in the "collaborative learning era". *Journal of Information Systems Education*, *21*(2), 5. Retrieved from https://aisel.aisnet.org/jise/

Yong-Ming, H. (2015). Exploring the factors that affect the intention to use collaborative technologies: The differing perspectives of sequential/global learners. *Australasian Journal of Educational Technology*, *31*(3) 278-292. Retrieved from https://doi.org/10.1016/j.compedu.2010.05.023

Appendix: Letter of Permission from McGraw-Hill Representative Memo

To: Whom It May Concern

From: Sarah Link

Date: 9/07/2016

RE: Granted Permission

As Professor Vaughn's McGraw-Hill rep, she has permission to use the results from the pretest and posttests from her McGraw-Hill materials in her proposal.

Best regards,

Sarah Link

Sarah Link | Inside Learning Technology Representative | Humanities, Social Sciences, Languages

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